QUANTUM

22 April 2024

QUANTUM MAESTRO SECURITY GATEWAY

R80.20SP

Administration Guide

CHECK POINT™

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Important Information

Latest Software

We recommend that you install the most recent software release to stay up-to-date with the latest functional improvements, stability fixes, security enhancements and protection against new and evolving attacks.

Certifications

For third party independent certification of Check Point products, see the Check Point Certifications page.

Check Point R80.20SP Quantum Maestro Performance Tuning Administration Guide

For more about this release, see the R80.20SP home page.

Latest Version of this Document in English

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Feedback

Check Point is engaged in a continuous effort to improve its documentation.
Please help us by sending your comments.

Revision History

Date	Description
22 April 2024	Improved formatting and document layout
27 October 2019	Updated: - *"fw sam_policy" on page 196* - the '`batch`' parameter is not supported (Known Limitation MBS-8143) - *"fwaccel synatk" on page 121* - all commands in this section must run with the '`g_`' prefix Removed: - *'fw sam_policy batch'* - the '`batch`' parameter is not supported (Known Limitation MBS-8143)
03 October 2019	Updated: - Terms - *"Rate Limiting for DoS Mitigation" on page 36* - *"Accelerated SYN Defender" on page 39* - *"Default Configuration of CoreXL" on page 260* - *"fw sam_policy" on page 196* - *"fw sam_policy add" on page 199* - *"fw sam_policy del" on page 212* - *"fw sam_policy get" on page 216* - *"Multi-Queue Special Scenarios and Configurations" on page 349* - *"Multi-Queue Troubleshooting" on page 351* Added: - *"Multi-Queue Special Scenarios and Configurations" on page 349*
28 February 2019	First release of this document

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Glossary

A

Accelerated Path
Packet flow on the Host appliance, when the packet is completely handled by the SecureXL device. It is processed and forwarded to the network.

Affinity
The assignment of a specified CoreXL Firewall instance, VSX Virtual System, interface, user space process, or IRQ to one or more specified CPU cores.

Anti-Bot
Check Point Software Blade on a Security Gateway that blocks botnet behavior and communication to Command and Control (C&C) centers. Acronyms: AB, ABOT.

Anti-Spam
Check Point Software Blade on a Security Gateway that provides comprehensive protection for email inspection. Synonym: Anti-Spam & Email Security. Acronyms: AS, ASPAM.

Anti-Virus
Check Point Software Blade on a Security Gateway that uses real-time virus signatures and anomaly-based protections from ThreatCloud to detect and block malware at the Security Gateway before users are affected. Acronym: AV.

Application Control
Check Point Software Blade on a Security Gateway that allows granular control over specific web-enabled applications by using deep packet inspection. Acronym: APPI.

Audit Log
Log that contains administrator actions on a Management Server (login and logout, creation or modification of an object, installation of a policy, and so on).

B

Breakout Cable
An optical fiber cable that contains several jacketed simplex optical fibers that are packaged together inside an outer jacket. Synonyms: Fanout cable, Fan-Out cable, Splitter cable.

Bridge Mode
Security Gateway or Virtual System that works as a Layer 2 bridge device for easy deployment in an existing topology.

C

Cluster
Two or more Security Gateways that work together in a redundant configuration - High Availability, or Load Sharing.

Cluster Member
Security Gateway that is part of a cluster.

Compliance
Check Point Software Blade on a Management Server to view and apply the Security Best Practices to the managed Security Gateways. This Software Blade includes a library of Check Point-defined Security Best Practices to use as a baseline for good Security Gateway and Policy configuration.

Content Awareness
Check Point Software Blade on a Security Gateway that provides data visibility and enforcement. See sk119715. Acronym: CTNT.

CoreXL
Performance-enhancing technology for Security Gateways on multi-core processing platforms. Multiple Check Point Firewall instances are running in parallel on multiple CPU cores.

CoreXL Dynamic Dispatcher

Improved CoreXL SND feature. Part of CoreXL that distributes packets between CoreXL Firewall instances. Traffic distribution between CoreXL Firewall instances is dynamically based on the utilization of CPU cores, on which the CoreXL Firewall instances are running. The dynamic decision is made for first packets of connections, by assigning each of the CoreXL Firewall instances a rank, and selecting the CoreXL Firewall instance with the lowest rank. The rank for each CoreXL Firewall instance is calculated according to its CPU utilization. The higher the CPU utilization, the higher the CoreXL Firewall instance's rank is, hence this CoreXL Firewall instance is less likely to be selected by the CoreXL SND. See sk105261.

CoreXL Firewall Instance

On a Security Gateway with CoreXL enabled, the Firewall kernel is copied multiple times. Each replicated copy, or firewall instance, runs on one processing CPU core. These firewall instances handle traffic at the same time, and each firewall instance is a complete and independent firewall inspection kernel. Synonym: CoreXL FW Instance.

CoreXL SND

Secure Network Distributer. Part of CoreXL that is responsible for: Processing incoming traffic from the network interfaces; Securely accelerating authorized packets (if SecureXL is enabled); Distributing non-accelerated packets between Firewall kernel instances (SND maintains global dispatching table, which maps connections that were assigned to CoreXL Firewall instances). Traffic distribution between CoreXL Firewall instances is statically based on Source IP addresses, Destination IP addresses, and the IP 'Protocol' type. The CoreXL SND does not really "touch" packets. The decision to stick to a particular FWK daemon is done at the first packet of connection on a very high level, before anything else. Depending on the SecureXL settings, and in most of the cases, the SecureXL can be offloading decryption calculations. However, in some other cases, such as with Route-Based VPN, it is done by FWK daemon.

CPUSE

Check Point Upgrade Service Engine for Gaia Operating System. With CPUSE, you can automatically update Check Point products for the Gaia OS, and the Gaia OS itself. For details, see sk92449.

D

DAC Cable

Direct Attach Copper cable. A form of the high-speed shielded twinax copper cable with pluggable transceivers on both ends. Used to connect to network devices (switches, routers, or servers).

DAIP Gateway

Dynamically Assigned IP (DAIP) Security Gateway is a Security Gateway, on which the IP address of the external interface is assigned dynamically by the ISP.

Data Loss Prevention

Check Point Software Blade on a Security Gateway that detects and prevents the unauthorized transmission of confidential information outside the organization. Acronym: DLP.

Data Type

Classification of data in a Check Point Security Policy for the Content Awareness Software Blade.

Distributed Deployment

Configuration in which the Check Point Security Gateway and the Security Management Server products are installed on different computers.

Downlink Ports

Interfaces on the Quantum Maestro Orchestrator used to connect to Check Point Security Appliances. You use DAC cables, Fiber cables (with transceivers), or Breakout cables to connect between the Downlink ports and Security Appliances. The Check Point Management traffic (policy, logs, synchronization, and so on) co-exists with the data (user) traffic on the Downlink ports. Bandwidth is guaranteed for the Check Point Management traffic (portion of the downlink bandwidth). These ports form the system backplane (management, data plane, synchronization).

Dynamic Object

Special object type, whose IP address is not known in advance. The Security Gateway resolves the IP address of this object in real time.

E

Endpoint Policy Management

Check Point Software Blade on a Management Server to manage an on-premises Harmony Endpoint Security environment.

Expert Mode

The name of the elevated command line shell that gives full system root permissions in the Check Point Gaia operating system.

F

F2F

Denotes non-VPN connections that SecureXL forwarded to firewall. See "Firewall Path".

Firewall Path

Packet flow on the Host Security Appliance, when the SecureXL device is unable to process the packet (see sk32578). The packet is passed to the CoreXL layer and then to one of the CoreXL Firewall instances for full processing. This path also processes all packets when SecureXL is disabled. Synonym: Slow Path.

G

Gaia

Check Point security operating system that combines the strengths of both SecurePlatform and IPSO operating systems.

Gaia Clish

The name of the default command line shell in Check Point Gaia operating system. This is a restricted shell (role-based administration controls the number of commands available in the shell).

Gaia gClish

The name of the global command line shell in Check Point Gaia operating system for Security Appliances connected to Check Point Quantum Maestro Orchestrators. Commands you run in this shell apply to all Security Appliances in the Security Group.

Gaia Portal

Web interface for the Check Point Gaia operating system.

H

Hotfix

Software package installed on top of the current software version to fix a wrong or undesired behavior, and to add a new behavior.

HTTPS Inspection

Feature on a Security Gateway that inspects traffic encrypted by the Secure Sockets Layer (SSL) protocol for malware or suspicious patterns. Synonym: SSL Inspection. Acronyms: HTTPSI, HTTPSi.

HyperSync

Check Point patented technology that makes sure that active connections are only synchronized to backup Security Appliances in the Security Group. HyperSync makes sure each connection flow has a backup within the Security Group.

I

ICA

Internal Certificate Authority. A component on Check Point Management Server that issues certificates for authentication.

Identity Awareness

Check Point Software Blade on a Security Gateway that enforces network access and audits data based on network location, the identity of the user, and the identity of the computer. Acronym: IDA.

Identity Logging

Check Point Software Blade on a Management Server to view Identity Logs from the managed Security Gateways with enabled Identity Awareness Software Blade.

Internal Network

Computers and resources protected by the Firewall and accessed by authenticated users.

IPS

Check Point Software Blade on a Security Gateway that inspects and analyzes packets and data for numerous types of risks (Intrusion Prevention System).

IPsec VPN

Check Point Software Blade on a Security Gateway that provides a Site to Site VPN and Remote Access VPN access.

IRQ Affinity

A state of binding an IRQ to one or more CPU cores.

J

Jumbo Hotfix Accumulator

Collection of hotfixes combined into a single package. Acronyms: JHA, JHF, JHFA.

K

Kerberos

An authentication server for Microsoft Windows Active Directory Federation Services (ADFS).

L

Log Server

Dedicated Check Point server that runs Check Point software to store and process logs.

Logging & Status

Check Point Software Blade on a Management Server to view Security Logs from the managed Security Gateways.

M

Maestro Orchestrator

A scalable Network Security System that connects multiple Check Point Security Appliances into a unified system. Synonyms: Orchestrator, Quantum Maestro Orchestrator, Maestro Hyperscale Orchestrator. Acronym: MHO.

Management Interface

(1) Interface on a Gaia Security Gateway or Cluster member, through which Management Server connects to the Security Gateway or Cluster member. (2) Interface on Gaia computer, through which users connect to Gaia Portal or CLI.

Management Server

Check Point Single-Domain Security Management Server or a Multi-Domain Security Management Server.

Manual NAT Rules

Manual configuration of NAT rules by the administrator of the Check Point Management Server.

Medium Path

Packet flow on the Host Security Appliance, when the packet is handled by the SecureXL device. The CoreXL layer passes the packet to one of the CoreXL Firewall instances to process it. Even when CoreXL is disabled, the SecureXL uses the CoreXL infrastructure to send the packet to the single CoreXL Firewall instance that still functions. When the Medium Path is available, the SecureXL fully accelerates the TCP handshake. Rule Base match is achieved for the first packet through an existing connection acceleration template. The SecureXL also fully accelerates the TCP [SYN-ACK] and TCP [ACK] packets. However, once data starts to flow, to stream it for Content Inspection, an FWK instance now handles the packets. The SecureXL sends all packets that contain data to FWK for data extraction in order to build the data stream. Only the SecureXL handles the TCP [RST], TCP [FIN] and TCP [FIN-ACK] packets, because they do not contain data that needs to be streamed. The Medium Path is available only when CoreXL is enabled. Exceptions are: IPS (some protections); VPN (in some configurations); Application Control; Content Awareness; Anti-Virus; Anti-Bot; HTTPS Inspection; Proxy mode; Mobile Access; VoIP; Web Portals. Synonym: PXL.

Mobile Access

Check Point Software Blade on a Security Gateway that provides a Remote Access VPN access for managed and unmanaged clients. Acronym: MAB.

Multi-Domain Log Server

Dedicated Check Point server that runs Check Point software to store and process logs in a Multi-Domain Security Management environment. The Multi-Domain Log Server consists of Domain Log Servers that store and process logs from Security Gateways that are managed by the corresponding Domain Management Servers. Acronym: MDLS.

Multi-Domain Server

Dedicated Check Point server that runs Check Point software to host virtual Security Management Servers called Domain Management Servers. Synonym: Multi-Domain Security Management Server. Acronym: MDS.

Multi-Queue

An acceleration feature on Security Gateway that configures more than one traffic queue for each network interface. Multi-Queue assigns more than one receive packet queue (RX Queue) and more than one transmit packet queue (TX Queue) to an interface. Multi-Queue is applicable only if SecureXL is enabled (this is the default). Acronym: MQ.

N

Network Object
Logical object that represents different parts of corporate topology - computers, IP addresses, traffic protocols, and so on. Administrators use these objects in Security Policies.

Network Policy Management
Check Point Software Blade on a Management Server to manage an on-premises environment with an Access Control and Threat Prevention policies.

O

Open Server
Physical computer manufactured and distributed by a company, other than Check Point.

P

Provisioning
Check Point Software Blade on a Management Server that manages large-scale deployments of Check Point Security Gateways using configuration profiles. Synonyms: SmartProvisioning, SmartLSM, Large-Scale Management, LSM.

PSL

Passive Streaming Library. Packets may arrive at Security Gateway out of order, or may be legitimate retransmissions of packets that have not yet received an acknowledgment. In some cases, a retransmission may also be a deliberate attempt to evade IPS detection by sending the malicious payload in the retransmission. Security Gateway ensures that only valid packets are allowed to proceed to destinations. It does this with the Passive Streaming Library (PSL) technology. (1) The PSL is an infrastructure layer, which provides stream reassembly for TCP connections. (2) The Security Gateway makes sure that TCP data seen by the destination system is the same as seen by code above PSL. (3) The PSL handles packet reordering, congestion, and is responsible for various security aspects of the TCP layer, such as handling payload overlaps, some DoS attacks, and others. (4) The PSL is capable of receiving packets from the Firewall chain and from the SecureXL. (5) The PSL serves as a middleman between the various security applications and the network packets. It provides the applications with a coherent stream of data to work with, free of various network problems or attacks. (6) The PSL infrastructure is wrapped with well-defined APIs called the Unified Streaming APIs, which are used by the applications to register and access streamed data. For more details, see sk95193.

PSLXL

Technology name for combination of SecureXL and PSL (Passive Streaming Library) in versions R80.20 and higher. In versions R80.10 and lower, this technology was called PXL (PacketXL).

Q

QoS

Check Point Software Blade on a Security Gateway that provides policy-based traffic bandwidth management to prioritize business-critical traffic and guarantee bandwidth and control latency.

R

Rule

Set of traffic parameters and other conditions in a Rule Base (Security Policy) that cause specified actions to be taken for a communication session.

Rule Base

All rules configured in a given Security Policy. Synonym: Rulebase.

S

SecureXL

Check Point product on a Security Gateway that accelerates IPv4 and IPv6 traffic that passes through a Security Gateway.

Security Gateway

Dedicated Check Point server that runs Check Point software to inspect traffic and enforce Security Policies for connected network resources.

Security Group

A logical group of Security Appliances that provides Active/Active cluster functionality. A Security Group can contain one or more Security Appliances. Security Groups work separately and independently from each other. To the production networks, a Security Group appears a single Security Gateway. Every Security Group contains: (A) Applicable Uplink ports, to which your production networks are connected; (B) Security Appliances (the Quantum Maestro Orchestrator determines the applicable Downlink ports automatically); (C) Applicable management port, to which the Check Point Management Server is connected.

Security Management Server

Dedicated Check Point server that runs Check Point software to manage the objects and policies in a Check Point environment within a single management Domain. Synonym: Single-Domain Security Management Server.

Security Policy

Collection of rules that control network traffic and enforce organization guidelines for data protection and access to resources with packet inspection.

SGM

Role of a Security Appliance (Security Gateway Module). Part of the Security Group that contains the assigned Security Appliances. A Security Appliance in a Security Group has one IPv4 address and represents all assigned Security Appliances as one entity.

Shared Management

Feature that allows to assign the same Management Port (interface ethX-MgmtY) on a Quantum Maestro Orchestrator to different Security Groups. The assigned Management Port has a different IP address and a different MAC address in each Security Group, to which this port is assigned.

SIC

Secure Internal Communication. The Check Point proprietary mechanism with which Check Point computers that run Check Point software authenticate each other over SSL, for secure communication. This authentication is based on the certificates issued by the ICA on a Check Point Management Server.

Single Management Object

Single Security Gateway object in SmartConsole that represents a Security Group configured on Quantum Maestro Orchestrator. Acronym: SMO.

SmartConsole

Check Point GUI application used to manage a Check Point environment - configure Security Policies, configure devices, monitor products and events, install updates, and so on.

SmartDashboard

Legacy Check Point GUI client used to create and manage the security settings in versions R77.30 and lower. In versions R80.X and higher is still used to configure specific legacy settings.

SmartProvisioning

Check Point Software Blade on a Management Server (the actual name is "Provisioning") that manages large-scale deployments of Check Point Security Gateways using configuration profiles. Synonyms: Large-Scale Management, SmartLSM, LSM.

SmartUpdate

Legacy Check Point GUI client used to manage licenses and contracts in a Check Point environment.

SMO Master

The physical Security Appliance in a Security Group that handles management tasks for all Security Appliances in the Security Group. By default, this role is assigned to the Security Appliance with the lowest Member ID in the Security Group.

Software Blade

Specific security solution (module): (1) On a Security Gateway, each Software Blade inspects specific characteristics of the traffic (2) On a Management Server, each Software Blade enables different management capabilities.

SSM

Role of the Quantum Maestro Orchestrator (SSM) that manages the flow of network traffic to and from the Security Groups.

Standalone

Configuration in which the Security Gateway and the Security Management Server products are installed and configured on the same server.

T

Threat Emulation

Check Point Software Blade on a Security Gateway that monitors the behavior of files in a sandbox to determine whether or not they are malicious. Acronym: TE.

Threat Extraction

Check Point Software Blade on a Security Gateway that removes malicious content from files. Acronym: TEX.

U

Updatable Object

Network object that represents an external service, such as Microsoft 365, AWS, Geo locations, and more.

Uplink Ports

Interfaces on the Quantum Maestro Orchestrator used to connect to external and internal networks. Gaia operating system shows these interfaces in Gaia Portal and in Gaia Clish. SmartConsole shows these interfaces in the corresponding SMO Security Gateway object.

URL Filtering

Check Point Software Blade on a Security Gateway that allows granular control over which web sites can be accessed by a given group of users, computers or networks. Acronym: URLF.

User Directory

Check Point Software Blade on a Management Server that integrates LDAP and other external user management servers with Check Point products and security solutions.

V

VSX

Virtual System Extension. Check Point virtual networking solution, hosted on a computer or cluster with virtual abstractions of Check Point Security Gateways and other network devices. These Virtual Devices provide the same functionality as their physical counterparts.

VSX Gateway

Physical server that hosts VSX virtual networks, including all Virtual Devices that provide the functionality of physical network devices. It holds at least one Virtual System, which is called VS0.

Z

Zero Phishing

Check Point Software Blade on a Security Gateway (R81.20 and higher) that provides real-time phishing prevention based on URLs. Acronym: ZPH.

Introduction to Performance Tuning

There features improve the performance of Security Groups:

- **SecureXL** - accelerates traffic (see *"SecureXL" on the next page*)
- **CoreXL** - runs multiple Firewall instances at the same time (see *"CoreXL" on page 259*)
- **Multi-Queue** - configures multiple traffic queues for each network interface (see *"Multi-Queue" on page 341*)

SecureXL

R80.20SP includes enhancements for SecureXL acceleration.

Acceleration was boosted with enhancements to SecureXL.

SecureXL is automatically installed and enabled when you run the *First Time Configuration Wizard* on your Security Group. There is no configuration required.

Accelerated Features

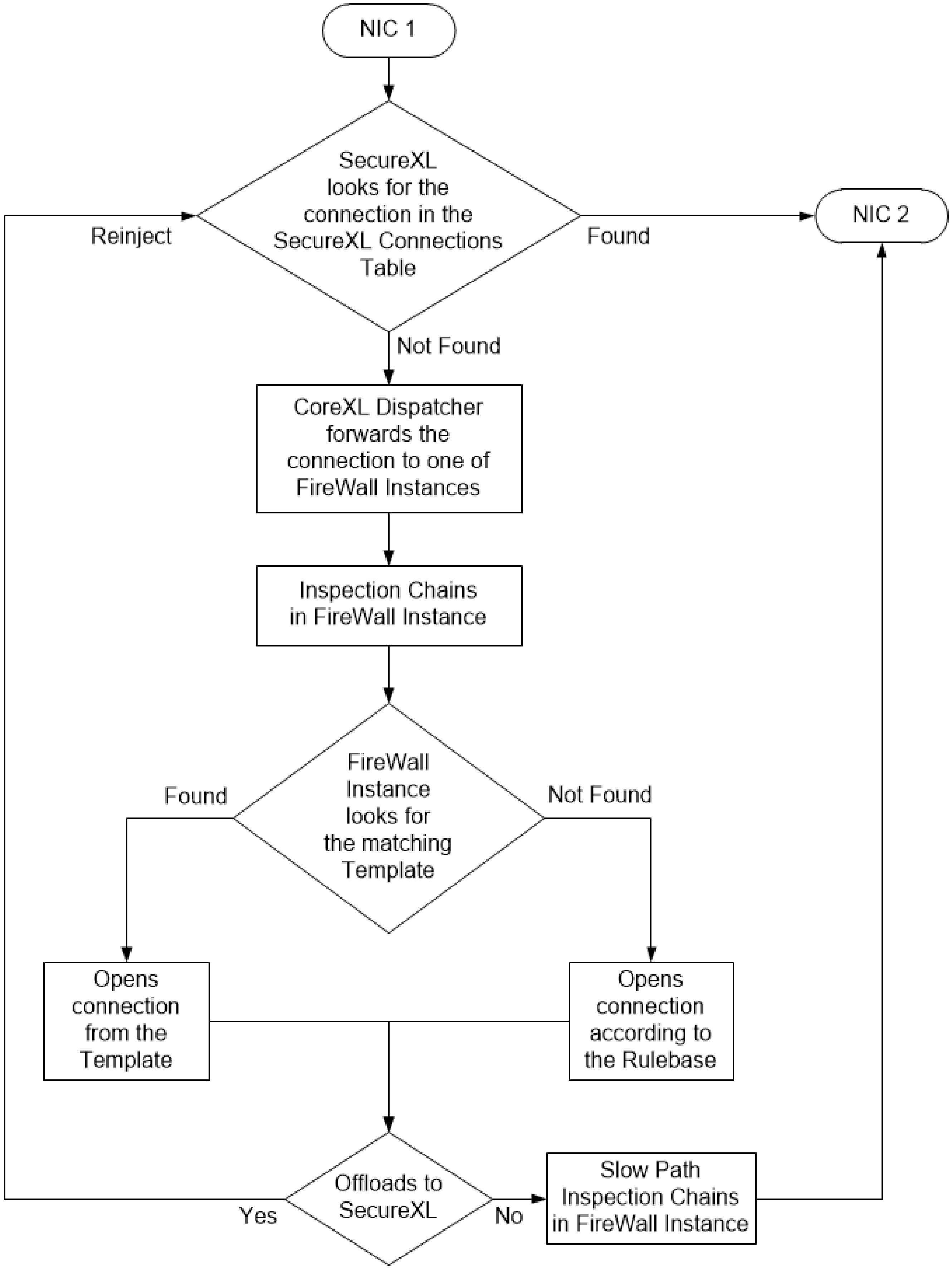
R80.20SP includes enhanced performance of these security functions:

- Access Control
- Encryption
- NAT
- Software Blades
  - Firewall
  - IPS features
  - Application Control
  - URL Filtering
  - Anti-Virus
  - Anti-Bot
  - Identity Awareness (SecureXL does not create templates for traffic from Identity Agents)
  - VPN Site-to-Site
  - HTTPS Inspection
  - QoS
- Policy installation
- Accounting and logging
- Connection/session rate
- General security checks
- TCP Sequence Verification
- Dynamic VPN

- Passive streaming
- Active streaming

Packet Flow

This is the general description of the packet flow through the Security Group:


NIC 1
SecureXL looks for the connection in the SecureXL Connections Table
Reinject
Found
NIC 2
Not Found
CoreXL Dispatcher forwards the connection to one of FireWall Instances
Inspection Chains in FireWall Instance
FireWall Instance looks for the matching Template
Found
Not Found
Opens connection from the Template
Opens connection according to the Rulebase
Offloads to SecureXL
Yes
No
Slow Path Inspection Chains in FireWall Instance

Connection Templates

The Connection Templates feature accelerates the speed, at which new connections from the same source IP address to the same destination IP address and to the same destination port are established.

To achieve the maximum acceleration enhancement, only the Firewall on the Host Security Group creates these Connection Templates from active connections according to the Rule Base.

Important - For the list of restrictions that apply to the Connection Templates, see sk32578.

Policy Installation Acceleration

Acceleration is enabled during policy installation. SecureXL continues to run and stay enabled during a policy installation. This decreases the load on the CPU.

Scalable Performance

R80.20 and higher versions include improved SecureXL scalability during high session rate.

As a result, there are no longer limitations on the number of CoreXL SND cores.

Configuring SecureXL

The Gaia First Time Configuration Wizard automatically installs and enables SecureXL on your Security Group. No additional configuration is required.

Starting from R80.20, you can disable the SecureXL only *temporarily*.

The SecureXL starts automatically when you start Check Point services (with the `cpstart` command), or reboot the Security Group.

Important:

- Disable the SecureXL only for debug purposes, if Check Point Support explicitly instructs you to do so.
- If you disable the SecureXL, this change does **not** survive reboot.
  SecureXL remains disabled until you enable it again on-the-fly, or reboot the Security Group.
- If you disable the SecureXL, this change applies only to new connections that arrive after you disabled the acceleration.
  SecureXL continues to accelerate the connections that are already accelerated.
  Other non-connection oriented processing continues to function (for example, virtual defragmentation and VPN decrypt).

To disable SecureXL for IPv4 temporarily

Step	Instructions
1	Connect to the command line on your Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

4	Examine the SecureXL status:
	- In Gaia gClish, run:
	`fwaccel stat`
	- In the Expert mode, run:
	`g_fwaccel stat`

5	Disable the SecureXL:
	- In Gaia gClish, run:
	`fwaccel off [-a]`
	- In the Expert mode, run:
	`g_fwaccel off [-a]`

6	Examine the SecureXL status again: - In Gaia gClish, run: `fwaccel stat` - In the Expert mode, run: `fwaccel stat`

To disable SecureXL for IPv6 temporarily

Step	Instructions
1	Connect to the command line on your Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

Step	Instructions

4	Examine the SecureXL status:
	■ In Gaia gClish, run:
	`fwaccel6 stat`
	■ In the Expert mode, run:
	`g_fwaccel6 stat`

5	Disable the SecureXL:
	■ In Gaia gClish, run:
	`fwaccel6 off [-a]`
	■ In the Expert mode, run:
	`g_fwaccel6 off [-a]`

6	Examine the SecureXL status again:
	■ In Gaia gClish, run:
	`fwaccel6 stat`
	■ In the Expert mode, run:
	`g_fwaccel6 stat`

To enable SecureXL again for IPv4

Step	Instructions
1	Connect to the command line on your Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

4	Examine the SecureXL status:
	■ In Gaia gClish, run:
	`fwaccel6 stat`
	■ In the Expert mode, run:
	`g_fwaccel6 stat`

Step	Instructions

5	Enable the SecureXL:
	■ In Gaia gClish, run:
	`fwaccel on [-a]`
	■ In the Expert mode, run:
	`g_fwaccel on [-a]`

6	Examine the SecureXL status again:
	■ In Gaia gClish, run:
	`fwaccel6 stat`
	■ In the Expert mode, run:
	`g_fwaccel6 stat`

To enable SecureXL again for IPv6

Step	Instructions
1	Connect to the command line on your Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

4	Examine the SecureXL status:
	■ In Gaia gClish, run:
	`fwaccel6 stat`
	■ In the Expert mode, run:
	`g_fwaccel6 stat`

5	Enable the SecureXL:
	■ In Gaia gClish, run:
	`fwaccel6 on [-a]`
	■ In the Expert mode, run:
	`g_fwaccel6 on [-a]`

Step	Instructions

6	Examine the SecureXL status again:
	■ In Gaia gClish, run:
	`fwaccel6 stat`
	■ In the Expert mode, run:
	`g_fwaccel6 stat`

For more information on these commands, see:

- *"fwaccel stat" on page 97*
- *"fwaccel off" on page 82*
- *"fwaccel on" on page 86*

Important:

- Disable the SecureXL only for debug purposes, if Check Point Support explicitly instructs you to do so.
- If you disable the SecureXL, this change does **not** survive reboot.
  SecureXL remains disabled until you enable it again on-the-fly, or reboot the Security Gateway.
- If you disable the SecureXL, this change applies only to new connections that arrive after you disabled the acceleration.
  SecureXL continues to accelerate the connections that are already accelerated.
  Other non-connection oriented processing continues to function (for example, virtual defragmentation and VPN decrypt).
- In Cluster, you must configure the SecureXL in the same way on all of the cluster members.

To temporarily disable SecureXL for IPv4

Step	Instructions
1	Connect to the command line on your Security Gateway.
2	Log in to Gaia Clish, or Expert mode.
3	Examine the SecureXL status: `fwaccel stat`
4	Disable the SecureXL: `fwaccel off [-a]`

Step	Instructions
5	Examine the SecureXL status again: `fwaccel stat`

To temporarily disable SecureXL for IPv6

Step	Instructions
1	Connect to the command line on your Security Gateway.
2	Log in to Gaia Clish, or Expert mode.
3	Examine the SecureXL status: `fwaccel6 stat`
4	Disable the SecureXL: `fwaccel6 off [-a]`
5	Examine the SecureXL status again: `fwaccel6 stat`

To enable SecureXL again for IPv4

Step	Instructions
1	Connect to the command line on your Security Gateway.
2	Log in to Gaia Clish, or Expert mode.
3	Examine the SecureXL status: `fwaccel stat`
4	Enable the SecureXL: `fwaccel on [-a]`
5	Examine the SecureXL status again: `fwaccel stat`

To enable SecureXL again for IPv6

Step	Instructions
1	Connect to the command line on your Security Gateway.
2	Log in to Gaia Clish, or Expert mode.
3	Examine the SecureXL status: `fwaccel6 stat`
4	Enable the SecureXL: `fwaccel6 on [-a]`
5	Examine the SecureXL status again: `fwaccel6 stat`

For more information on these commands, see:

- *"fwaccel stat" on page 97*
- *"fwaccel off" on page 82*
- *"fwaccel on" on page 86*

Analyzing the Accelerated Traffic

To capture and analyze the accelerated traffic, use the *"fw monitor" on page 163* command.

Rate Limiting for DoS Mitigation

In This Section:

Introduction

Rate Limiting is a defense against DoS (Denial of Service) attacks.

Rate Limiting rules allow to limit traffic coming from specified sources, or sent to specified destination and using specific services.

Rate limiting is enforced by SecureXL on these:

- Bandwidth and packet rate
- Number of concurrent connections
- Connection rate

For additional information, see sk112454.

Use these commands to configure Rate Limiting for DoS Mitigation:

Command in Gaia gClish	Command in the Expert mode	Comment

`fw sam_policy`
`fw6 sam_policy`
	`g_fw sam_policy`
	`g_fw6 sam_policy`
		See *"fw sam_policy" on page 196*.
		You must use this parameter:
		`quota <Quota Filter Arguments>`

`fwaccel dos config`
`fwaccel6 dos config`
	`g_fwaccel dos config`
	`g_fwaccel6 dos config`
		See *"fwaccel dos config" on page 61*.

Monitoring Events Related to DoS Mitigation

To see some information related to DoS Mitigation, run these commands:

Command in Gaia gClish	Command in the Expert mode	Instructions

`fwaccel stats`
`fwaccel6 stats`
	`g_fwaccel stats`
	`g_fwaccel6 stats`
		Shows all SecureXL statistics (for IPv4 and IPv6 kernel modules).
		See:
		- *"fwaccel stats" on page 102*
		- *"The /proc/ppk/ and /proc/ppk6/ entries" on page 221*

`fwaccel stats -d`
`fwaccel6 stats -d`
	`g_fwaccel stats -d` or `cat /proc/ppk/drop_statistics`
	`g_fwaccel6 stats -d` or `cat /proc/ppk6/drop_statistics`
		Shows SecureXL drop statistics only (for IPv4 and IPv6 kernel modules).
		See:
		- *"fwaccel stats" on page 102*
		- *"The /proc/ppk/ and /proc/ppk6/ entries" on page 221*
		- *"fw sam_policy" on page 196*

`fw samp get -l |\ grep '^<[0-9a-f,]*>$' |\ xargs fwaccel dos rate get`
`fw samp get -l |\ grep '^<[0-9a-f,]*>$' | xargs fwaccel6 dos rate get`
	`g_fw samp get -l |\ grep '^<[0-9a-f,]*>$' |\ xargs fwaccel dos rate get`
	`g_fw samp get -l |\ grep '^<[0-9a-f,]*>$' | xargs fwaccel6 dos rate get`
		Shows details of active policy rules in long format (for IPv4 and IPv6 kernel modules).
		See *"fw sam_policy get" on page 216*.

Command in Gaia gClish	Command in the Expert mode	Instructions
N / A	`cat /proc/ppk/rlc`	Shows: - Total drop packets - Total drop bytes See *"The /proc/ppk/ and /proc/ppk6/ entries" on page 221*.

In addition, see *"SecureXL Debug" on page 240*.

Accelerated SYN Defender

In This Section:

Introduction

A TCP SYN Flood attack occurs when a host, typically with a forged IP address, sends a flood of TCP [SYN] packets. Each of these TCP [SYN] packets is handled as a connection request, which causes the server to create a half-open (unestablished) TCP connection. This occurs because the server sends a TCP [SYN+ACK] packet, and waits for a response TCP packet that does not arrive.

These half-open TCP connections eventually exceed the maximum available TCP connections. This causes a denial of service condition.

To protect a Security Group, the Check Point Accelerated SYN Defender prevents excessive TCP connections from being created.

The Accelerated SYN Defender uses TCP [SYN] Cookies (particular choices of initial TCP sequence numbers) when under a suspected TCP SYN Flood attack. Using TCP [SYN] Cookies can reduce the load on Security Gateway and on computers behind the Security Group. The Accelerated SYN Defender acts as proxy for TCP connections and adjusts TCP {SEQ} and TCP {ACK} values in TCP packets.

This is a sample TCP timeline diagram that shows a TCP connection through the Security Group with the enabled Accelerated SYN Defender:

Note - In this example, we assume that there no TCP retransmissions and no early data.

```
               Security Group
Client         with Accelerated         Server
   |             SYN Defender             |
   |                   |                   |
   | -(1)--SYN-------> |                   |
   | <---SYN+ACK--(2)- |                   |
   | -(3)--ACK-------> |                   |
   |                   |                   |
   |                  (4)                  |
   |                   |                   |
   |                   | -(5)--SYN-------> |
   |                   | <---SYN+ACK--(6)- |
   |                   | -(7)--ACK-------> |
   |                   |                   |
```

1. A Client sends a TCP [SYN] packet to a Server.
2. The Accelerated SYN Defender replies to the Client with a TCP [SYN+ACK] packet that contains a special cookie in the `Seq` field.

   The Security Group does not maintain the connection state at this time.
3. The Client sends a reply TCP [ACK] packet. This completes the Client-side of the TCP connection.
4. The Accelerated SYN Defender checks if the SYN cookie in the Client's TCP [ACK] packet is legitimate.
5. If the SYN cookie in the Client's TCP [ACK] packet is legitimate, the Accelerated SYN Defender sends a TCP [SYN] packet to the Server to begin the Server-side of the TCP connection.
6. The Server replies with a TCP [SYN+ACK] packet.
7. The Accelerated SYN Defender sends a TCP [ACK] packet to complete the Server-size of the TCP 3-way handshake.
8. The Accelerated SYN Defender marks the TCP connection as established and records the TCP sequence adjustment between the two sides.

SecureXL handles the TCP [SYN] packets. The Security Group handles the rest of the TCP connection setup.

For each TCP connection the Accelerated SYN Defender establishes, the Security Group adjusts the TCP sequence number for the life of that TCP connection.

Command Line Interface

Use the *"fwaccel synatk" on page 121* commands to configure the Accelerated SYN Defender.

Configuring the 'SYN Attack' protection in SmartConsole

Configuring the 'SYN Attack' protection in SmartConsole is not supported for R80.20SP (Known Limitation MBS-5415).

SecureXL Commands and Debug

This section contains:

- SecureXL CLI Commands
- SecureXL Debug Procedure

Syntax Legend

Whenever possible, this guide lists commands, parameters and options in the alphabetical order.

This guide uses this convention in the Command Line Interface (CLI) syntax:

<table>
<thead>
<tr><th>Character</th><th>Instructions</th></tr>
</thead>
<tbody>
<tr>
<td>TAB</td>
<td>
Shows the available nested subcommands:
<pre>
main command
→ nested subcommand 1
→ → nested subsubcommand 1-1
→ → nested subsubcommand 1-2
→ nested subcommand 2
</pre>
Example:
<pre>
cpwd_admin
    config
        -a <options>
        -d <options>
        -p
        -r
    del <options>
</pre>
Meaning, you can run only <b>one</b> of these commands:
<ul>
<li>This command:
<pre>cpwd_admin config -a <options></pre></li>
<li>Or this command:
<pre>cpwd_admin config -d <options></pre></li>
<li>Or this command:
<pre>cpwd_admin config -p</pre></li>
<li>Or this command:
<pre>cpwd_admin config -r</pre></li>
<li>Or this command:
<pre>cpwd_admin del <options></pre></li>
</ul>
</td>
</tr>
<tr>
<td>Curly brackets or braces
<b>{ }</b></td>
<td>Enclose a list of available commands or parameters, separated by the vertical bar <b>|</b>.
User can enter only one of the available commands or parameters.</td>
</tr>
<tr>
<td>Angle brackets
<b>< ></b></td>
<td>Enclose a variable.
User must explicitly specify a supported value.</td>
</tr>
<tr>
<td>Square brackets or brackets
<b>[ ]</b></td>
<td>Enclose an optional command or parameter, which user can also enter.</td>
</tr>
</tbody>
</table>

'fwaccel' and 'fwaccel6'

Description

The `fwaccel` commands control the acceleration for IPv4 traffic.

The `fwaccel6` commands control the acceleration for IPv6 traffic.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4 in Gaia Clish

```
fwaccel help
```

```
fwaccel [-i <SecureXL ID>]
      cfg <options>
      conns <options>
      dbg <options>
      dos <options>
            feature
<options>
      off <options>
      on <options>
      ranges <options>
      stat <options>
      stats <options>
      synatk <options>
      tab <options>
      templates <options>
      ver
```

Syntax for IPv6 in Gaia Clish

```
fwaccel6 help
```

```
fwaccel6
      conns <options>
      dbg <options>
      dos <options>
            feature
<options>
      off <options>
      on <options>
      ranges <options>
      stat <options>
      stats <options>
      synatk <options>
      tab <options>
      templates <options>
      ver
```

Syntax for IPv4 in the Expert mode

```
g_fwaccel help
```

```
g_fwaccel [-i <SecureXL
ID>]
      cfg <options>
      conns <options>
      dbg <options>
      dos <options>
            feature
<options>
      off <options>
      on <options>
      ranges <options>
      stat <options>
      stats <options>
      synatk <options>
      tab <options>
      templates <options>
      ver
```

Syntax for IPv6 in the Expert mode

```
g_fwaccel6 help
```

```
g_fwaccel6
      conns <options>
      dbg <options>
      dos <options>
            feature
<options>
      off <options>
      on <options>
      ranges <options>
      stat <options>
      stats <options>
      synatk <options>
      tab <options>
      templates <options>
      ver
```

Parameters and Options

Parameter and Options	Instructions
`help`	Shows the built-in help.
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
`cfg <options>`	Controls the SecureXL acceleration parameters (for IPv4 only). See *"fwaccel cfg" on the next page*.
`conns <options>`	Shows all connections that pass through SecureXL. See *"fwaccel conns" on page 48*.
`dbg <options>`	Controls the *"SecureXL Debug" on page 240*. See *"fwaccel dbg" on page 241*.
`dos <options>`	Controls the Rate Limiting for DoS Mitigation in SecureXL. See *"fwaccel dos" on page 58*.
`feature <options>`	Controls the specified SecureXL features. See *"fwaccel feature" on page 79*.

Parameter and Options	Instructions
`off <options>`	Stops the acceleration on-the-fly. This does **not** survive reboot. See *"fwaccel off" on page 82*.
`on <options>`	Starts the acceleration on-the-fly, if it was previously stopped. See *"fwaccel on" on page 86*.
`ranges <options>`	Shows the loaded ranges. See *"fwaccel ranges" on page 90*.
`stat <options>`	Shows the SecureXL status. See *"fwaccel stat" on page 97*.
`stats <options>`	Shows the acceleration statistics. See *"fwaccel stats" on page 102*.
`synatk <options>`	Controls the Accelerated SYN Defender. See *"fwaccel synatk" on page 121*.
`tab <options>`	Shows the contents of the specified SecureXL table. See *"fwaccel tab" on page 143*.
`templates <options>`	Shows the SecureXL templates. See *"fwaccel templates" on page 146*.
`ver`	Shows the SecureXL and FireWall version. See *"fwaccel ver" on page 150*.

fwaccel cfg

Description

The "`fwaccel cfg`" command controls the SecureXL acceleration parameters (for IPv4 only).

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax

```
fwaccel cfg
      -h
      -a {<Number of Interface> | <Name of Interface> | reset}
      -b {on | off}
      -c <Number>
      -d <Number>
      -e <Number>
      -i {on | off}
      -l <Number>
      -m <Seconds>
      -p {on | off}
      -r <Number>
      -v <Seconds>
      -w {on | off}
```

Important:

- These commands do not provide output. You cannot see the currently configured values.
- Changes made with these commands do **not** survive reboot.

Parameters

Parameter	Description
`-h`	Shows the applicable built-in help.

Parameter	Description

`-a <Number of Interface>`
`-a <Name of Interface>`
`-a reset`
	- `-a <Number of Interface>`
	Configures the SecureXL not to accelerate traffic on the interface specified by its internal number in Check Point kernel.
	- `-a <Name of Interface>`
	Configures the SecureXL not to accelerate traffic on the interface specified by its name.
	- `-a reset`
	Configures the SecureXL to accelerate traffic on all interfaces (resets the non-accelerated configuration).
	Notes:
	- To see the required information about the interfaces, run these commands in the Expert mode in the specified order:
	`g_fw getifs`
	`g_fw ctl iflist`
	- To see if the "`fwaccel cfg -a ...`" command failed, run this command:
	`g_all tail -n 10 /var/log/messages`

`-b {on | off}`	Controls the SecureXL Drop Templates match (sk66402): - `on` - Enables the SecureXL Drop Templates match - `off` - Disables the SecureXL Drop Templates match **Note** - In R80.20SP, SecureXL does not support this parameter yet..
`-c <Number>`	Configures the maximal number of connections, when SecureXL disables the templates.
`-d <Number>`	Configures the maximal number of delete retries.
`-e <Number>`	Configures the maximal number of general errors.
`-i {on | off}`	Configures SecureXL to ignore API version mismatch: - `on` - Ignore API version mismatch. - `off` - Do not ignore API version mismatch (this is the default).

Parameter	Description
`-l <Number>`	Configures the maximal number of entries in the SecureXL templates database. Valid values are: ■ 0 - To disable the limit (this is the default). ■ Between 10 and 524288 - To configure the limit. **Important** - If you configure a limit, you must stop and start the acceleration for this change to take effect. Run the *"fwaccel off" on page 82* command and then the *"fwaccel on" on page 86* command.
`-m <Seconds>`	Configures the timeout for entries in the SecureXL templates database. Valid values are: ■ 0 - To disable the timeout (this is the default). ■ Between 10 and 524288 - To configure the timeout.
`-p {on | off}`	Configures the offload of Connection Templates (if possible): ■ `on` - Enables the offload of new templates (this is the default). ■ `off` - Disables the offload of new templates.
`-r <Number>`	Configures the maximal number of retries for SecureXL API calls.
`-v <Seconds>`	Configures the interval between SecureXL statistics request. Valid values are: ■ 0 - To disable the interval. ■ 1 and greater - To configure the interval.
`-w {on | off}`	Configures the support for warnings about the IPS protection **Sequence Verifier**: ■ `on` - Enable the support for these warnings. ■ `off` - Disables the support for these warnings.

fwaccel conns

Description

The code`fwaccel conns`" and "`fwaccel6 conns`" commands show the list of the SecureXL connections on the Security Group.

Warning - If the number of concurrent connections is large, when you run these commands, they can consume memory and CPU at very high level (see sk118716).

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] conns
        -h
        -f <filter>
        -m <Number of Entries>
        -s
```

Syntax for IPv6

```
fwaccel6 conns
        -h
        -f <Filter>
        -m <Number of Entries>
        -s
```

Parameters

Parameter	Description
`-h`	Shows the applicable built-in help.
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
`-f <Filter>`	Show the SecureXL Connections Table entries based on the specified filter flags. **Notes:** - To see the available filter flags, run: `fwaccel conns -h` - Each filter flag is one letter - capital, or small. - You can specify more than one flag. For example: `fwaccel conns -f AaQq`

Parameter	Description
	Available filter flags are: - `A` - Shows accounted connections (for which SecureXL counted the number of packets and bytes). - `a` - Shows not accounted connections. - `C` - Shows encrypted (VPN) connections. - `c` - Shows clear-text (not encrypted) connections. - `F` - Shows connections that SecureXL forwarded to Firewall. **Note** - In R80.20SP, SecureXL does not support this parameter. - `f` - Shows cut-through connections (which SecureXL accelerated). **Note** - In R80.20SP, SecureXL does not support this parameter. - `H` - Shows connections offloaded to the SAM card. **Note** - R80.20SP, does not support the SAM card (Known Limitation PMTR-18774). - `h` - Shows connections created in the SAM card. **Note** - R80.20SP, does not support the SAM card (Known Limitation PMTR-18774). - `L` - Shows connections, for which SecureXL created internal links. - `l` - Shows connections, for which SecureXL did not create internal links. - `N` - Shows connections that undergo NAT. **Note** - In R80.20SP, SecureXL does not support this parameter. - `n` - Shows connections that do not undergo NAT. **Note** - R80.20SP, SecureXL does not support this parameter. - `Q` - Shows connections that undergo QoS. - `q` - Shows connections that do not undergo QoS. - `S` - Shows connections that undergo PXL. - `s` - Shows connections that do not undergo PXL. - `U` - Shows unidirectional connections. - `u` - Shows bidirectional connections.
`-m <Number of Entries>`	Specifies the maximal number of connections to show. **Note** - In R80.20SP, SecureXL does not support this parameter.
`-s`	Shows the summary of SecureXL Connections Table (number of connections). **Warning** - Depending on the number of current connections, might consume memory at very high level.

Example - Default output from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel conns
Source          SPort Destination     DPort PR Flags       C2S i/f S2C i/f   Inst Identity
--------------- ----- --------------- ----- -- ----------- ------- ------- ---- -------
      1.1.1.200 50586       1.1.1.100 18191  6 F............ 2/2     2/-     3       0
  192.168.0.244 35925   192.168.0.242 18192  6 F............ 1/1     -/-     1       0
   192.168.0.93   257   192.168.0.242 53932  6 F............ 1/1     1/-     0       0
  192.168.0.242    22   172.30.168.15 57914  6 F............ 1/1     -/-     2       0
  192.168.0.244 34773   192.168.0.242 18192  6 F............ 1/1     -/-     2       0
   192.168.0.88   138   192.168.0.255   138 17 F............ 1/1     -/-     0       0
      1.1.1.100 18191       1.1.1.200 55336  6 F............ 2/2     2/-     4       0
  192.168.0.242 18192   192.168.0.244 38567  6 F............ 1/1     -/-     4       0
  192.168.0.242 53932    192.168.0.93   257  6 F............ 1/1     1/-     0       0
  192.168.0.242 18192   192.168.0.244 62714  6 F............ 1/1     -/-     1       0
  192.168.0.244 33558   192.168.0.242 18192  6 F............ 1/1     -/-     5       0
      1.1.1.200 36359       1.1.1.100 18191  6 F............ 2/2     2/-     5       0
      1.1.1.200 55336       1.1.1.100 18191  6 F............ 2/2     2/-     4       0
  192.168.0.242 60756    192.168.0.93   257  6 F............ 1/1     1/-     4       0
      1.1.1.100 18191       1.1.1.200 36359  6 F............ 2/2     2/-     5       0
      1.1.1.100 18191       1.1.1.200 50586  6 F............ 2/2     2/-     3       0
  192.168.0.244 38567   192.168.0.242 18192  6 F............ 1/1     -/-     4       0
  192.168.0.242 18192   192.168.0.244 32877  6 F............ 1/1     -/-     5       0
  192.168.0.242 53806   192.168.47.45    53 17 F............ 1/1     1/-     3       0
  192.168.0.242 18192   192.168.0.244 33558  6 F............ 1/1     -/-     5       0
  172.30.168.15 57914   192.168.0.242    22  6 F............ 1/1     -/-     2       0
  192.168.0.255   138    192.168.0.88   138 17 F............ 1/1     -/-     0       0
   192.168.0.93   257   192.168.0.242 60756  6 F............ 1/1     1/-     4       0
      1.1.1.200 18192       1.1.1.100 37964  6 F............ 2/2     -/-     1       0
      1.1.1.100 37964       1.1.1.200 18192  6 F............ 2/2     -/-     1       0
  192.168.0.244 32877   192.168.0.242 18192  6 F............ 1/1     -/-     5       0
  192.168.0.242 18192   192.168.0.244 34773  6 F............ 1/1     -/-     2       0
  192.168.0.242 18192   192.168.0.244 35925  6 F............ 1/1     -/-     1       0
  192.168.47.45    53   192.168.0.242 53806 17 F............ 1/1     1/-     3       0
  192.168.0.244 62714   192.168.0.242 18192  6 F............ 1/1     -/-     1       0

Idx Interface
--- ---------
  0 lo
  1 eth0
  2 eth1

Total number of connections: 30
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel dbg

Description

The "*fwaccel dbg*" command controls the SecureXL debug. See *"SecureXL Debug" on page 240*..

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax

```
fwaccel dbg
      -h
      -m <Name of SecureXL Debug Module>
      all
      + <Debug Flags>
      - <Debug Flags>
      reset
      -f {"<5-Tuple Debug Filter>" | reset}
      list
      resetall
```

Parameters

Parameter	Description
`-h`	Shows the applicable built-in help.
`-m <Name of SecureXL Debug Module>`	Specifies the name of the SecureXL debug module. To see the list of available debug modules, run: `fwaccel dbg`
`all`	Enables all debug flags for the specified debug module.

Parameter	Description
`+ <Debug Flags>`	Enables the specified debug flags for the specified debug module: Syntax: `+ Flag1 [Flag2 Flag3 ... FlagN]` **Note** - You must press the space bar key after the plus (+) character.
`- <Debug Flags>`	Disables all debug flags for the specified debug module. Syntax: `- Flag1 [Flag2 Flag3 ... FlagN]` **Note** - You must press the space bar key after the minus (-) character.
`reset`	Resets all debug flags for the specified debug module to their default state.
`-f "<5-Tuple Debug Filter>"`	Configures the debug filter to show only debug messages that contain the specified connection. The filter is a string of five numbers separated with commas: `"<Source IP Address>,<Source Port>,<Destination IP Address>,<Destination Port>,<Protocol Number>"` **Notes:** ■ You can configure only one debug filter at one time. ■ You can use the asterisk "*" as a wildcard for an IP Address, Port number, or Protocol number. ■ For more information, see *IANA Service Name and Port Number Registry* and *IANA Protocol Numbers*.
`-f reset`	Resets the current debug filter.
`list`	Shows all enabled debug flags in all debug modules.
`resetall`	Reset all debug flags for all debug modules to their default state.

Example 1 - Default output

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg
Usage: fwaccel dbg [-m <...>] [resetall | reset | list | all | +/- <flags>]
   -m <module>            - module of debugging
   -h                     - this help message
   resetall               - reset all debug flags for all modules
   reset                  - reset all debug flags for module
   all                    - set all debug flags for module
   list                   - list all debug flags for all modules
   -f reset | "<5-tuple>"  - filter debug messages
   + <flags>              - set the given debug flags
   - <flags>              - unset the given debug flags

List of available modules and flags:

Module: default (default)
err init drv tag lock cpdrv routing kdrv gtp tcp_sv gtp_pkt svm iter conn htab del update acct
conf stat queue ioctl corr util rngs relations ant conn_app rngs_print infra_ids offload nat

Module: db
err get save del tmpl tmo init ant profile nmr nmt

Module: api
err init add update del acct conf stat vpn notif tmpl sv pxl qos gtp infra tmpl_info upd_conf
upd_if_inf add_sa del_sa del_all_sas misc get_features get_tab get_stat reset_stat tag long_ver
del_all_tmpl get_state upd_link_sel

Module: pkt
err f2f frag spoof acct notif tcp_state tcp_state_pkt sv cpls routing drop pxl qos user deliver
vlan pkt nat wrp corr caf

Module: infras
err reorder pm

Module: tmpl
err dtmpl_get dtmpl_notif tmpl

Module: vpn
err vpnpkt linksel routing vpn

Module: nac
err db db_get pkt pkt_ex signature offload idnt ioctl nac

Module: cpaq
init client server exp cbuf opreg transport transport_utils error

Module: synatk
init conf conn err log pkt proxy state msg

Module: adp
err rt nh eth heth wrp inf mbs bpl bplinf mbeinf if drop bond xmode ipsctl xnp

Module: dos
fw1-cfg fw1-pkt sim-cfg sim-pkt err detailed drop

[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Enabling and disabling of debug flags

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -m default + err conn
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg list

Module: default (2001)
err conn

Module: db (1)
err

Module: api (1)
err

Module: pkt (1)
err

Module: infras (1)
err

Module: tmpl (1)
err

Module: vpn (1)
err

Module: nac (1)
err

Module: cpaq (100)
error

Module: synatk (0)


Module: adp (1)
err

Module: dos (10)
err

Debug filter not set.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -m default - conn
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg list

Module: default (1)
err

Module: db (1)
err

Module: api (1)
err

Module: pkt (1)
err

Module: infras (1)
err

Module: tmpl (1)
err
```

```
Module: vpn (1)
err

Module: nac (1)
err

Module: cpaq (100)
error

Module: synatk (0)


Module: adp (1)
err

Module: dos (10)
err

Debug filter not set.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -m default reset
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Resetting all debug flags in all debug modules

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg resetall
Debug state was reset to default.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Configuring debug filter for an SSH connection from 192.168.20.30 to 172.16.40.50

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -f 192.168.20.30,*,172.16.40.50,22,6
Debug filter was set.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg list

... ...

Debug filter: "<*,*,*,*,*>"
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel dos

Description

The "`fwaccel dos`" and "`fwaccel6 dos`" commands control the Rate Limiting for DoS mitigation techniques in SecureXL on the Security Group. See *"Rate Limiting for DoS Mitigation" on page 36*.

Important:

- You must run the applicable commands in the Expert mode on the applicable Security Group.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv <VSID>`

Syntax for IPv4

```
g_fwaccel [-i <SecureXL ID>] dos
      blacklist <options>
      config <options>
      pbox <options>
      rate <options>
      stats <options>
      whitelist <options>
```

Syntax for IPv6

```
g_fwaccel6 dos
      blacklist <options>
      config <options>
      rate <options>
      stats <options>
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
`blacklist <options>`	Controls the IP blacklist in SecureXL. See *"fwaccel dos blacklist" on the next page*.
`config <options>`	Controls the DoS mitigation configuration in SecureXL. See *"fwaccel dos config" on page 61*.

Parameter	Description
`pbox <options>`	Controls the Penalty Box whitelist in SecureXL. See *"fwaccel dos pbox" on page 67*.
`rate <options>`	Shows and installs the Rate Limiting policy in SecureXL. See *"fwaccel dos rate" on page 71*.
`stats <options>`	Shows and clears the DoS real-time statistics in SecureXL. See *"fwaccel dos stats" on page 73*.
`whitelist <options>`	Configures the whitelist for source IP addresses in the SecureXL Penalty Box. See *"fwaccel dos whitelist" on page 75*.

fwaccel dos blacklist

Description

The "`fwaccel dos blacklist`" and "`fwaccel6 dos blacklist`" commands control the IP blacklist in SecureXL.

The blacklist blocks all traffic to and from the specified IP addresses.

The blacklist drops occur in SecureXL, which is more efficient than an Access Control Policy to drop the packets.

Important:

- You must run the applicable commands in the Expert mode on the applicable Security Group.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv <VSID>`
- To enforce the IP blacklist in SecureXL, you must first enable the IP blacklists.
  See these commands:
  - *"fwaccel dos config" on page 61*
  - *"fw sam_policy" on page 196* (configures more granular rules)

Syntax for IPv4

```
g_fwaccel [-i <SecureXL ID>] dos blacklist
      -a <IPv4 Address>
      -d <IPv4 Address>
      -F
      -s
```

Syntax for IPv6

```
g_fwaccel6 dos blacklist
      -a <IPv6 Address>
      -d <IPv6 Address>
      -F
      -s
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the applicable built-in usage.
`-a <IP Address>`	Adds the specified IP address to the blacklist. To add more than one IP address, run this command for each applicable IP address.
`-d <IP Address>`	Removes the specified IP addresses from the blacklist. To remove more than one IP address, run this command for each applicable IP address.
`-F`	Removes (flushes) all IP addresses from the IP blacklist.
`-s`	Shows the configured blacklist.

Example from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -s
The blacklist is empty
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -a 1.1.1.1
Adding 1.1.1.1
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -s
1.1.1.1
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -a 2.2.2.2
Adding 2.2.2.2
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -s
2.2.2.2
1.1.1.1
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -d 2.2.2.2
Deleting 2.2.2.2
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -s
1.1.1.1
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -F
All blacklist entries deleted
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos blacklist -s
The blacklist is empty
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel dos config

Description

The "`fwaccel dos config`" and "`fwaccel6 dos config`" commands control the global configuration parameters of the Rate Limiting for DoS mitigation in SecureXL.

These global parameters apply to all configured Rate Limiting rules.

Important:

- You must run the applicable commands in the Expert mode on the applicable Security Group.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv` *`<VSID>`*

Syntax for IPv4

```
g_fwaccel [-i <SecureXL ID>] dos config
      get
      set
            {--disable-blacklists | --enable-blacklists}
            {--disable-drop-frags | --enable-drop-frags}
            {--disable-drop-opts | --enable-drop-opts}
            {--disable-internal | --enable-internal}
            {--disable-log-drops | --enable-log-drops}
            {--disable-log-pbox | --enable-log-pbox}
            {--disable-monitor | --enable-monitor}
            {--disable-pbox | --enable-pbox}
            {--disable-rate-limit | --enable-rate-limit}
            {-n <NOTIF_RATE> | --notif-rate <NOTIF_RATE>}
            {-p <PBOX_RATE> | --pbox-rate <PBOX_RATE>}
            {-t <PBOX_TMO> | --pbox-tmo <PBOX_TMO>}
```

Syntax for IPv6

```
g_fwaccel6 dos config
      get
      set
            {--disable-blacklists | --enable-blacklists}
            {--disable-drop-frags | --enable-drop-frags}
            {--disable-drop-opts | --enable-drop-opts}
            {--disable-internal | --enable-internal}
            {--disable-log-drops | --enable-log-drops}
            {--disable-log-pbox | --enable-log-pbox}
            {--disable-monitor | --enable-monitor}
            {--disable-pbox | --enable-pbox}
            {--disable-rate-limit | --enable-rate-limit}
            {-n <NOTIF_RATE> | --notif-rate <NOTIF_RATE>}
            {-p <PBOX_RATE> | --pbox-rate <PBOX_RATE>}
            {-t <PBOX_TMO> | --pbox-tmo <PBOX_TMO>}
```

Parameters and Options

Parameter or Option	Instructions
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).

Parameter or Option	Instructions
No Parameters	Shows the applicable built-in usage.
`get`	Shows the configuration parameters.
`set <options>`	Configuration the parameters.
`--disable-blacklists`	Disables the IP blacklists. This is the default configuration.
`--disable-drop-frags`	Disables the drops of all fragmented packets. This is the default configuration. ⓘ **Important** - This option applies to only VSX, and only for traffic that arrives at a Virtual System through a Virtual Switch (packets received through a Warp interface). From R80.20, IP Fragment reassembly occurs in SecureXL before the Warp-jump from a Virtual Switch to a Virtual System. To block IP fragments, the Virtual Switch must be configured with this option. Otherwise, this has no effect, because the IP fragments would already be reassembled when they arrive at the Virtual System's Warp interface.
`--disable-drop-opts`	Disables the drops of all packets with IP options. This is the default configuration.
`--disable-internal`	Disables the enforcement on internal interfaces. This is the default configuration.
`--disable-log-drops`	Disables the notifications when the DoS module drops a packet due to rate limiting policy.
`--disable-log-pbox`	Disables the notifications when administrator adds an IP address to the penalty box.
`--disable-monitor`	Disables the monitor-only mode. This is the default configuration. This command affects all Rate Limiting features.
`--disable-pbox`	Disables the IP penalty box. This is the default configuration. Also, see the *"fwaccel dos pbox" on page 67* command.
`--disable-rate-limit`	Disables the enforcement of the rate limiting policy. This is the default configuration.

Parameter or Option	Instructions
`--enable-blacklists`	Enables IP blacklists. Also, see the *"fwaccel dos blacklist" on page 59* command.
`--enable-drop-frags`	Enables the drops of all fragmented packets.
`--enable-drop-opts`	Enables the drops of all packets with IP options.
`--enable-internal`	Enables the enforcement on internal interfaces.
`--enable-log-drops`	Enables the notifications when the DoS module drops a packet due to rate limiting policy. This is the default configuration.
`--enable-log-pbox`	Enables the notifications when administrator adds an IP address to the penalty box. This is the default configuration.
`--enable-monitor`	Enables the monitor-only mode (accepts all packets that otherwise are dropped). This command affects all Rate Limiting features.
`--enable-pbox`	Enables the IP penalty box. Also, see the *"fwaccel dos pbox" on page 67* command.
`--enable-rate-limit`	Enables the enforcement of the rate limiting policy. **Important** - After you run this command, you must install the Access Control policy.

`-n <NOTIF_RATE>`
`--notif-rate <NOTIF_RATE>`
	Configures the maximal number of drop notifications per second for each SecureXL device.
	Range: 0 - (2^{32}-1)
	Default: 100

`-p <PBOX_RATE>`
`--pbox-rate <PBOX_RATE>`
	Configures the minimal number of reported dropped packets before SecureXL adds a source IPv4 address to the penalty box.
	Range: 0 - (2^{32}-1)
	Default: 500

Parameter or Option	Instructions

`-t <PBOX_TMO>`
`--pbox-tmo <PBOX_TMO>`
	Configures the number of seconds until SecureXL removes an IP is from the penalty box.
	Range: 0 - (2^{32}-1)
	Default: 180

Example 1 - Get the current DoS configuration on a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos config get
   rate limit: disabled (without policy)
         pbox: disabled
   blacklists: disabled
log blacklist: disabled
   drop frags: disabled
    drop opts: disabled
     internal: disabled
      monitor: disabled
    log drops: disabled
     log pbox: disabled
   notif rate: 100 notifications/second
    pbox rate: 500 packets/second
     pbox tmo: 180 seconds
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Enabling the Penalty Box on a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos config set --enable-pbox
OK
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos config get
   rate limit: disabled (without policy)
         pbox: enabled
   blacklists: disabled
   drop frags: disabled
    drop opts: disabled
     internal: disabled
      monitor: disabled
    log drops: enabled
     log pbox: enabled
   notif rate: 100 notifications/second
    pbox rate: 500 packets/second
     pbox tmo: 180 seconds
[Expert@MyChassis-ch0x-0x:0]#
```

Making the configuration persistent

The settings defined with the "`fwaccel dos config set`" and the "`fwaccel6 dos config set`" commands return to their default values during each reboot. To make these settings persistent, add the applicable commands to these configuration files on each Security Group Member:

File	Instructions

`$FWDIR/conf/fwaccel_dos_rate_on_install`	This shell script for IPv4 must contain only the "`g_fwaccel dos config set`" commands:
	`#!/bin/bash`
	`g_fwaccel dos config set <options>`

`$FWDIR/conf/fwaccel6_dos_rate_on_install`	This shell script for IPv6 must contain only the "`g_fwaccel6 dos config set`" commands:
	`#!/bin/bash`
	`g_fwaccel6 dos config set <options>`

Important - Do **not** include the *"fw sam_policy" on page 196* commands in these configuration files. The configured Rate Limiting policy survives reboot. If you add the "`g_fw sam_policy`" commands, the rate policy installer runs in an infinite loop.

Notes:

- To create or edit these files, log in to the Expert mode.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv <VSID>`
- If these files do not already exist, create them on every Security Group Member with this command:
  `g_all touch $FWDIR/conf/<Name of File>`
- These files must start with the "`#!/bin/bash`" line.
- These files must end with a new empty line.
- After you edit these files, you must assign the execute permission to them on every Security Group Member:
  `g_all chmod +x $FWDIR/conf/<Name of File>`

Example of a `$FWDIR/conf/fwaccel_dos_rate_on_install` file:

```
!/bin/bash
fwaccel dos config set --enable-internal
fwaccel dos config set --enable-pbox

```

fwaccel dos pbox

Description

The "`fwaccel dos pbox`" command controls the Penalty Box whitelist in SecureXL.

The SecureXL Penalty Box is a mechanism that performs an early drop of packets that arrive from suspected sources. The purpose of this feature is to allow the Security Gateway to cope better under high traffic load, possibly caused by a DoS/DDoS attack.

The SecureXL Penalty Box detects clients that send packets, which the Access Control Policy drops, and clients that violate the IPS protections. If the SecureXL Penalty Box detects a specific client frequently, it puts that client in a penalty box. From that point, SecureXL drops all packets that arrive from the blocked source IP address.

The Penalty Box whitelist in SecureXL lets you configure the source IP addresses, which the SecureXL Penalty Box never blocks.

Important:

- This command supports only IPv4.
- You must run the applicable commands in the Expert mode on the applicable Security Group.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv <VSID>`
- To enforce the Penalty Box in SecureXL, you must first enable the Penalty Box.
  See these commands:
  - *"fwaccel dos config" on page 61*
  - *"fwaccel dos whitelist" on page 75*
  - *"fwaccel synatk whitelist" on page 139*
- When you add a new Security Group Member to a Security Group, the new Security Group Member pulls the "`$FWDIR/conf/pbox-whitelist-v4.conf`" configuration file.

Syntax for IPv4

```
g_fwaccel [-i <SecureXL ID>] dos pbox
      flush
      whitelist
            -a <IPv4 Address>[/<Subnet Prefix>]
            -d <IPv4 Address>[/<Subnet Prefix>]
            -F
            -l /<Path>/<Name of File>
            -L
            -s
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the applicable built-in usage.
`flush`	Removes (flushes) all source IP addresses from the Penalty Box.
`whitelist <options>`	Configures the whitelist for source IP addresses in the SecureXL Penalty Box. **Important** - This whitelist overrides which packet the SecureXL Penalty Box drops. Before you use a 3rd-party or automatic blacklists, add trusted networks and hosts to the whitelist to avoid outages. **Note** - This command is similar to the *"fwaccel dos whitelist" on page 75* command.

`-a <IPv4 Address> [/<Subnet Prefix>]`	Adds the specified IP address to the Penalty Box whitelist.
	■ `<IPv4 Address>`
	Can be an IP address of a network or a host.
	■ `<Subnet Prefix>`
	Must specify the length of the subnet mask in the format `/<bits>`.
	Optional for a host IP address.
	Mandatory for a network IP address.
	Range - from /1 to /32.
	Important - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /32.
	Examples:
	■ For a host:
	`192.168.20.30`
	`192.168.20.30/32`
	■ For a network:
	`192.168.20.0/24`

Parameter	Description
`-d <IPv4 Address> [/<Subnet Prefix>]`	Removes the specified IP address from the Penalty Box whitelist. - `<IPv4 Address>` Can be an IP address of a network or a host. - `<Subnet Prefix>` Optional. Must specify the length of the subnet mask in the format `/<bits>`. Optional for a host IP address. Mandatory for a network IP address. Range - from /1 to /32. ⓘ **Important** - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /32.
`-F`	Removes (flushes) all entries from the Penalty Box whitelist.
`-l /<Path>/<Name of File>`	Loads the Penalty Box whitelist entries from the specified plain-text file. ⓘ **Important:** - You must manually create and configure this file with the "`g_all touch`" command. - You must assign at least the read permission to this file with the "`g_all chmod +x`" command. - Each entry in this file must be on a separate line. - Each entry in this file must be in this format: `<IPv4 Address>[/<Subnet Prefix>]` - SecureXL ignores empty lines and lines that start with the # character in this file.

Parameter	Description

`-L`	Loads the Penalty Box whitelist entries from the plain-text file with a predefined name:
	`$FWDIR/conf/pbox-whitelist-v4.conf`
	Security Group automatically runs this command "`g_fwaccel dos pbox whitelist -L`" during each boot.
	Important:
	■ This file does not exist by default.
	■ You must manually create and configure this file with the "`g_all touch`" command.
	■ You must assign at least the read permission to this file with the "`g_all chmod +x`" command.
	■ Each entry in this file must be on a separate line.
	■ Each entry in this file must be in this format:
	`<`*`IPv4 Address`*`>[/<`*`Subnet Prefix`*`>]`
	■ SecureXL ignores empty lines and lines that start with the # character in this file.

`-s`	Shows the current Penalty Box whitelist entries.

Example 1 - Adding a host IP address without optional subnet prefix

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -a 192.168.20.40
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -F
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Adding a host IP address with optional subnet prefix

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -a 192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -F
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Adding a network IP address with mandatory subnet prefix

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -a 192.168.20.0/24
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
192.168.20.0/24
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -F
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Deleting an entry

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -a 192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -a 192.168.20.70/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
192.168.20.40/32
192.168.20.70/32
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -d 192.168.20.70/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos pbox whitelist -s
192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel dos rate

Description

The "`fwaccel dos rate`" and "`fwaccel6 dos rate`" commands show and install the Rate Limiting policy in SecureXL.

Important:

- You must run the applicable commands in the Expert mode on the applicable Security Group.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv <VSID>`

Syntax for IPv4

```
g_fwaccel [-i <SecureXL ID>] dos rate
      get '<Rule UID>'
      install
```

Syntax for IPv6

```
g_fwaccel6 dos rate
      get '<Rule UID>'
      install
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the applicable built-in usage.
`get '<Rule UID>'`	Shows information about the rule specified by its Rule UID or its zero-based rule index. The quote marks and angle brackets (`'<...>'`) are mandatory.
`install`	Installs a new rate limiting policy. **Important** - This command requires input from the *stdin*. To use this command, run: `g_fw sam_policy get -l -k req_type -t in -v quota | g_fwaccel dos rate install` For more information about the "`g_fw sam_policy`" command, see *"fw sam_policy" on page 196*.

Notes

- If you install a new rate limiting policy with more than one rule, it automatically enables the rate limiting feature.

  To disable the rate limiting feature manually, run this command (see *"fwaccel dos config" on page 61*):

  ```
  g_fwaccel dos config set --disable-rate-limit
  ```

- To delete the current rate limiting policy, install a new policy with zero rules.

fwaccel dos stats

Description

The "`fwaccel dos stats`" and "`fwaccel6 dos stats`" commands show and clear the DoS real-time statistics in SecureXL.

Important:

- You must run the applicable commands in the Expert mode on the applicable Security Group.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv <VSID>`

Syntax for IPv4

```
g_fwaccel [-i <SecureXL ID>] stats
      clear
      get
```

Syntax for IPv6

```
g_fwaccel6 dos stats
      clear
      get
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the applicable built-in usage.
`clear`	Clears the real-time statistics counters.
`get`	Shows the real-time statistics counters.

Example - Get the current DoS statistics

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos stats get
Firewall:
    Number of Elements in Tables:
        Penalty Box Violating IPs: 0 (size: 8192)
        Blacklist Notification Handlers: 0 (size: 1024)
SXL Device 0:
    Total Active Connections: 0
    Total New Connections/Second: 0
    Total Packets/Second: 0
    Total Bytes/Second: 0
    Reasons Packets Dropped:
        IP Fragment: 0
        IP Option: 0
        Penalty Box: 0
        Blacklist: 0
        Rate Limit: 0
    Number of Elements in Tables:
        Penalty Box: 0 (size: 0)
        Non-Empty Blacklists: 0 (size: 0)
        Blacklisted IPs: 0 (size: 0)
        Rate Limit Matches: 0 (size: 0)
        Rate Limit Source Only Tracks: 0 (size: 0)
        Rate Limit Source and Service Tracks: 0 (size: 0)
SXL Devices in Aggregate:
    Reasons Packets Dropped:
        IP Fragment: 0
        IP Option: 0
        Penalty Box: 0
        Blacklist: 0
        Rate Limit: 0
    Number of Elements in Tables:
        Penalty Box: 0
        Non-Empty Blacklists: 0
        Blacklisted IPs: 0
        Rate Limit Matches: 0
        Rate Limit Source Only Tracks: 0
        Rate Limit Source and Service Tracks: 0
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel dos whitelist

Description

The "`fwaccel dos whitelist`" command configures the whitelist for source IP addresses in the SecureXL Penalty Box.

This whitelist overrides which packet the SecureXL Penalty Box drops.

Important:

- This command supports only IPv4.
- You must run the applicable commands in the Expert mode on the applicable Security Group.
- In VSX mode, you must go to the context of an applicable Virtual System.
  In the Expert mode, run: `vsenv <VSID>`
- This whitelist overrides entries in the blacklist.
  Before you use a 3rd-party or automatic blacklists, add trusted networks and hosts to the whitelist to avoid outages.
- This whitelist unblocks IP Options and IP fragments from trusted sources when you explicitly configure one these SecureXL features:
  - `--enable-drop-opts`
  - `--enable-drop-frags`

  See the *"fwaccel dos config" on page 61* command.

Notes:

- To whitelist the Rate Limiting policy, refer to the bypass action of the "`fw samp`" command.
  For example, `g_fw samp -a b ...`
  For more information about the "`fw sam_policy`" command, see *"fw sam_policy" on page 196*.
- This command is similar to the "`fwaccel dos pbox whitelist`" command (see *"fwaccel dos pbox" on page 67*).
- Also, see the *"fwaccel synatk whitelist" on page 139* command.

Syntax for IPv4

```
g_fwaccel [-i <SecureXL ID>] dos whitelist
      -a <IPv4 Address>[/<Subnet Prefix>]
      -d <IPv4 Address>[/<Subnet Prefix>]
      -F
      -l /<Path>/<Name of File>
      -L
      -s
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the applicable built-in usage.
`-a <IPv4 Address> [/<Subnet Prefix>]`	Adds the specified IP address to the Penalty Box whitelist. - `<IPv4 Address>` Can be an IPv4 address of a network or a host. - `<Subnet Prefix>` Must specify the length of the subnet mask in the format `/<bits>`. Optional for a host IPv4 address. Mandatory for a network IPv4 address. Range - from /1 to /32. **Important** - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /32. Examples: - For a host: `192.168.20.30` `192.168.20.30/32` - For a network: `192.168.20.0/24`
`-d <IPv4 Address> [/<Subnet Prefix>]`	Removes the specified IPv4 address from the Penalty Box whitelist. - `<IPv4 Address>` Can be an IPv4 address of a network or a host. - `<Subnet Prefix>` Optional. Must specify the length of the subnet mask in the format `/<bits>`. Optional for a host IPv4 address. Mandatory for a network IPv4 address. Range - from /1 to /32. **Important** - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /32.
`-F`	Removes (flushes) all entries from the Penalty Box whitelist.

Parameter	Description
`-l /<Path>/<Name of File>`	Loads the Penalty Box whitelist entries from the specified plain-text file. **Note** - To replace the current whitelist with the contents of a new file, use both the "`-F`" and "`-l`" parameters on the same command line. **Important:** ■ You must manually create and configure this file with the "`g_all touch`" command. ■ You must assign at least the read permission to this file with the "`g_all chmod +x`" command. ■ Each entry in this file must be on a separate line. ■ Each entry in this file must be in this format: `<IPv4 Address>[/<Subnet Prefix>]` ■ SecureXL ignores empty lines and lines that start with the # character in this file.
`-L`	Loads the Penalty Box whitelist entries from the plain-text file with a predefined name: `$FWDIR/conf/pbox-whitelist-v4.conf` Security Gateway automatically runs this command "`fwaccel dos pbox whitelist -L`" during each boot. **Note** - To replace the current whitelist with the contents of a new file, use both the "`-F`" and "`-L`" parameters on the same command line. **Important:** ■ This file does not exist by default. ■ You must manually create and configure this file with the "`g_all touch`" command. ■ You must assign at least the read permission to this file with the "`g_all chmod +x`" command. ■ Each entry in this file must be on a separate line. ■ Each entry in this file must be in this format: `<IPv4 Address>[/<Subnet Prefix>]` ■ SecureXL ignores empty lines and lines that start with the # character in this file.
`-s`	Shows the current Penalty Box whitelist entries.

Examples

Example 1 - Adding a host IP address without optional subnet prefix

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -a 192.168.20.40
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -F
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Adding a host IP address with optional subnet prefix

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -a 192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -F
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Adding a network IP address with mandatory subnet prefix

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -a 192.168.20.0/24
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
192.168.20.0/24
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -F
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Deleting an entry

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -a 192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -a 192.168.20.70/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
192.168.20.40/32
192.168.20.70/32
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -d 192.168.20.70/32
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dos whitelist -s
192.168.20.40/32
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel feature

Description

The "`fwaccel feature`" and "`fwaccel6 feature`" commands enable and disable the specified SecureXL features.

Important:

- If you disable a SecureXL feature, SecureXL does not accelerate the applicable traffic anymore.
- This change does **not** survive reboot.
- In VSX mode, this change is global and applies to all Virtual Systems.
- The same SecureXL command must run on all Security Group Members. Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.
  - In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
  - In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] feature <Name of Feature>
      get
      off
      on
```

Syntax for IPv6

```
fwaccel6 feature <Name of Feature>
      get
      off
      on
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the applicable built-in usage.
`<Name of Feature>`	Specifies the SecureXL feature. R80.20SP SecureXL supports only this feature: ■ Name: `sctp` ■ Description: Stream Control Transmission Protocol (SCTP) - see sk35113
`get`	Shows the current state of the specified SecureXL feature.
`off`	Disables the specified SecureXL feature. This means that SecureXL does not accelerate the applicable traffic anymore.
`on`	Enables the specified SecureXL feature. This means that SecureXL accelerates the applicable traffic again.

Disabling the '`sctp`' feature permanently

See *"Working with Kernel Parameters on a Security Gateway" on page 357*.

1. Configure the value of the kernel parameter **sim_sctp_disable_by_default** to **1** on every Security Group Member.

   Run in the Expert mode mode on the Security Group:

   ```
   g_update_conf_file fwkern.conf sim_sctp_disable_by_default=1
   ```

2. Reboot the Security Group.

Example 1 - Default output

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel feature
Usage: fwaccel feature <name> {on|off|get}

Available features: sctp
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Disabling and enabling a feature

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel feature sctp get
sim_sctp_disable_by_default = 0
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel feature sctp off
Set operation succeeded
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel feature sctp get
sim_sctp_disable_by_default = 1
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel feature sctp on
Set operation succeeded
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel feature sctp get
sim_sctp_disable_by_default = 0
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel off

Description

The *fwaccel off* and *fwaccel6 off* commands stop the SecureXL on-the-fly.

Starting from R80.20SP, you can stop the SecureXL only *temporarily*. The SecureXL starts automatically when you start Check Point services (with the `cpstart` command), or reboot a Security Group Member.

Important:

- Disable the SecureXL only for debug purposes, if Check Point Support explicitly instructs you to do so.
- If you disable the SecureXL, this change does **not** survive reboot.
  SecureXL remains disabled until you enable it again on-the-fly, or reboot the Security Group Member.
- If you disable the SecureXL, this change applies only to new connections that arrive after you disable the acceleration.
  SecureXL continues to accelerate the connections that are already accelerated.
  Other non-connection oriented processing continues to function (for example, virtual defragmentation, VPN decrypt).
- On a VSX Gateway:
  - If you wish to stop the acceleration only for a specific Virtual System, go to the context of that Virtual System.
    In Gaia gClish, run: `set virtual-system <VSID>`
    In Expert mode, run: `vsenv <VSID>`
  - If you wish to stop the acceleration for all Virtual Systems, you must use the "`-a`" parameter.
    In this case, it does not matter from which Virtual System context you run this command.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] off [-a] [-q]
```

Syntax for IPv6

```
fwaccel6 off [-a] [-q]
```

Parameters

Parameter	Description
`-i` *<SecureXL ID>*	Specifies the SecureXL instance ID (for IPv4 only).
`-a`	On a VSX Gateway, stops acceleration on all Virtual Systems.
`-q`	Suppresses the output (does not show a returned output).

Possible returned output

- `SecureXL device disabled`
- `SecureXL device is not active`
- `Failed to disable SecureXL device`
- `fwaccel_off: failed to set process context` *<VSID>*

Example 1 - Output from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel off
SecureXL device disabled.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Output from a VSX Gateway for a specific Virtual System

```
[Expert@MyChassis-ch0x-0x:1]# vsx stat -v
VSX Gateway Status
==================
Name:            VSX2_192.168.3.242
Access Control Policy: VSX_GW_VSX
Installed at:    17Sep2018 13:17:14
Threat Prevention Policy: <No Policy>
SIC Status:      Trust

Number of Virtual Systems allowed by license:          25
Virtual Systems [active / configured]:                  2 / 2
Virtual Routers and Switches [active / configured]:     0 / 0
Total connections [current / limit]:                    4 / 44700

Virtual Devices Status
======================

 ID  | Type &amp; Name     | Access Control Policy | Installed at    | Threat Prevention Policy
| SIC Stat
-----+---------------------+-----------------------+-----------------+--------------------------
+---------
   1 | S VS1               | VS1_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust
   2 | S VS2               | VS2_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust

Type: S - Virtual System, B - Virtual System in Bridge mode,
      R - Virtual Router, W - Virtual Switch.

[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel stat -t
+-----------------------------------------------------------------------------+
|Id|Name |Status     |Interfaces               |Features                      |
+-----------------------------------------------------------------------------+
|0 |SND  |enabled    |eth1,eth2,eth3           |Acceleration,Cryptography     |
+-----------------------------------------------------------------------------+

[Expert@MyChassis-ch0x-0x:1]#

[Expert@MyChassis-ch0x-0x:1]# fwaccel off
SecureXL device disabled. (Virtual ID 1)
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel stat -t
+-----------------------------------------------------------------------------+
|Id|Name |Status     |Interfaces               |Features                      |
+-----------------------------------------------------------------------------+
|0 |SND  |disabled   |eth1,eth2,eth3           |Acceleration,Cryptography     |
+-----------------------------------------------------------------------------+

[Expert@MyChassis-ch0x-0x:1]#
```

Example 3 - Output from a VSX Gateway for all Virtual Systems

```
[Expert@MyChassis-ch0x-0x:1]# vsx stat -v
VSX Gateway Status
==================
Name:            VSX2_192.168.3.242
Access Control Policy: VSX_GW_VSX
Installed at:    17Sep2018 13:17:14
Threat Prevention Policy: <No Policy>
SIC Status:      Trust

Number of Virtual Systems allowed by license:         25
Virtual Systems [active / configured]:                 2 / 2
Virtual Routers and Switches [active / configured]:    0 / 0
Total connections [current / limit]:                   4 / 44700

Virtual Devices Status
======================

 ID  | Type &amp; Name     | Access Control Policy | Installed at    | Threat Prevention Policy
| SIC Stat
-----+---------------------+-----------------------+-----------------+--------------------------
+---------
   1 | S VS1               | VS1_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust
   2 | S VS2               | VS2_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust

Type: S - Virtual System, B - Virtual System in Bridge mode,
      R - Virtual Router, W - Virtual Switch.

[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel off -a
SecureXL device disabled. (Virtual ID 0)
SecureXL device disabled. (Virtual ID 1)
SecureXL device disabled. (Virtual ID 2)
[Expert@MyChassis-ch0x-0x:1]#
```

fwaccel on

Description

The *fwaccel on* and *fwaccel6 on* commands start the acceleration on-the-fly, if it was previously stopped with the *fwaccel off* or *fwaccel6 off* command (see *"fwaccel off" on page 82*).

Important:

- On a VSX Gateway:
  - If you wish to start the acceleration only for a specific Virtual System, go to the context of that Virtual System.
    In Gaia gClish, run: `set virtual-system <VSID>`
    In Expert mode, run: `vsenv <VSID>`
  - If you wish to start the acceleration for all Virtual Systems, you must use the "`-a`" parameter.
    In this case, it does not matter from which Virtual System context you run this command.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] on [-a] [-q]
```

Syntax for IPv6

```
fwaccel6 on [-a] [-q]
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
`-a`	On a VSX Gateway, starts the acceleration on all Virtual Systems.
`-q`	Suppresses the output (does not show a returned output).

Possible returned output

- SecureXL device is enabled.
- Failed to start SecureXL.
- No license for SecureXL.
- SecureXL is disabled by the firewall. Please try again later.
- The installed SecureXL device is not compatible with the installed firewall (version mismatch).
- The SecureXL device is in the process of being stopped. Please try again later.
- SecureXL cannot be started while "flows" are active.
- SecureXL is already started.
- SecureXL will be started after a policy is loaded.
- fwaccel: Failed to check FloodGate-1 status. Acceleration will not be started.
- FW-1: SecureXL acceleration cannot be started while QoS is running in express mode.

  Please disable FloodGate-1 express mode or SecureXL.
- FW-1: SecureXL acceleration cannot be started while QoS is running with citrix printing rule.

  Please remove the citrix printing rule to enable SecureXL.
- FW-1: SecureXL acceleration cannot be started while QoS is running with UAS rule.

  Please remove the UAS rule to enable SecureXL.
- FW-1: SecureXL acceleration cannot be started while QoS is running.

  Please remove the QoS blade to enable SecureXL.
- Failed to enable SecureXL device
- fwaccel_on: failed to set process context <*VSID*>

Example 1 - Output from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel on
SecureXL device is enabled.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Output from a VSX Gateway for a specific Virtual System

```
[Expert@MyChassis-ch0x-0x:1]# vsx stat -v
VSX Gateway Status
==================
Name:            VSX2_192.168.3.242
Access Control Policy: VSX_GW_VSX
Installed at:    17Sep2018 13:17:14
Threat Prevention Policy: <No Policy>
SIC Status:      Trust

Number of Virtual Systems allowed by license:          25
Virtual Systems [active / configured]:                  2 / 2
Virtual Routers and Switches [active / configured]:     0 / 0
Total connections [current / limit]:                    4 / 44700

Virtual Devices Status
======================

 ID  | Type &amp; Name     | Access Control Policy | Installed at    | Threat Prevention Policy
| SIC Stat
-----+---------------------+-----------------------+-----------------+--------------------------
+---------
   1 | S VS1               | VS1_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust
   2 | S VS2               | VS2_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust

Type: S - Virtual System, B - Virtual System in Bridge mode,
      R - Virtual Router, W - Virtual Switch.

[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel stat -t
+-----------------------------------------------------------------------------+
|Id|Name |Status     |Interfaces               |Features                      |
+-----------------------------------------------------------------------------+
|0 |SND  |disabled   |eth1,eth2,eth3           |Acceleration,Cryptography     |
+-----------------------------------------------------------------------------+

[Expert@MyChassis-ch0x-0x:1]#

[Expert@MyChassis-ch0x-0x:1]# fwaccel on
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel stat -t
+-----------------------------------------------------------------------------+
|Id|Name |Status     |Interfaces               |Features                      |
+-----------------------------------------------------------------------------+
|0 |SND  |enabled    |eth1,eth2,eth3           |Acceleration,Cryptography     |
+-----------------------------------------------------------------------------+

[Expert@MyChassis-ch0x-0x:1]#
```

Example 3 - Output from a VSX Gateway for all Virtual Systems

```
[Expert@MyChassis-ch0x-0x:1]# vsx stat -v
VSX Gateway Status
==================
Name:            VSX2_192.168.3.242
Access Control Policy: VSX_GW_VSX
Installed at:    17Sep2018 13:17:14
Threat Prevention Policy: <No Policy>
SIC Status:      Trust

Number of Virtual Systems allowed by license:          25
Virtual Systems [active / configured]:                  2 / 2
Virtual Routers and Switches [active / configured]:     0 / 0
Total connections [current / limit]:                    4 / 44700

Virtual Devices Status
======================

 ID  | Type &amp; Name     | Access Control Policy | Installed at    | Threat Prevention Policy
| SIC Stat
-----+---------------------+-----------------------+-----------------+--------------------------
+---------
   1 | S VS1               | VS1_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust
   2 | S VS2               | VS2_Policy            | 17Sep2018 12:47 | <No Policy>
| Trust

Type: S - Virtual System, B - Virtual System in Bridge mode,
      R - Virtual Router, W - Virtual Switch.

[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel on -a
[Expert@MyChassis-ch0x-0x:1]#
```

fwaccel ranges

Description

The *fwaccel ranges* and *fwaccel6 ranges* commands show the SecureXL loaded ranges:

- Ranges of Rule Base source IP addresses
- Ranges of Rule Base destination IP addresses
- Ranges of Rule Base destination ports and protocols

The Security Group creates these ranges during the policy installation. The Firewall creates and offloads ranges to SecureXL when any of these feature is enabled:

- Rulebase ranges for Drop Templates
- Anti-Spoofing enforcement ranges on per-interface basis
- NAT64 ranges
- NAT46 ranges

These ranges are related to matching of connections to SecureXL Drop Templates. These ranges represent the **Source**, **Destination** and **Service** columns of the Rule Base.

These ranges are not exactly the same as the Rule Base, because as there are objects that cannot be represented as real (deterministic) IP addresses. For example, Domain objects and Dynamic objects. The Security Group converts such non-deterministic objects to "Any" IP address.

In addition, implied rules are represented in these ranges, except for some specific implied rules.

You can use these commands for troubleshooting.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] ranges
      -h
      -a
      -l
      -p <Range ID>
      -s <Range ID>
```

Syntax for IPv6

```
fwaccel6 ranges
      -h
      -a
      -l
      -p <Range ID>
      -s <Range ID>
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
`-h`	Shows the applicable built-in usage.
`-a` *or* No Parameters	Shows the full information for all loaded ranges. **Note** - In the list of SecureXL Drop Templates (output of the *"fwaccel templates" on page 146* command), each Drop Template is assembled from ranges indexes. To see mapping between range index and the range itself, run this command "`fwaccel ranges -a`". This way you understand better the practical ranges for Drop Templates and when it is appropriate to use them.
`-l`	Shows the list of loaded ranges: ■ 0 - Ranges of Rule Base source IP addresses ■ 1 - Ranges of Rule Base destination IP addresses ■ 2 - Ranges of Rule Base destination ports and protocols
`-p <Range ID>`	Shows the full information for the specified range.
`-s <Range ID>`	Shows the summary information for the specified range.

Examples

Example 1 - Show the list of ranges from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -l
SecureXL device 0:
        0 Rule base source ranges (ip):
        1 Rule base destination ranges (ip):
        2 Rule base dport ranges (port, proto):
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Show the full information for all loaded ranges from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges
SecureXL device 0:
    Rule base source ranges (ip):
        (0) 0.0.0.0 - 192.168.204.0
        (1) 192.168.204.1 - 192.168.204.1
        (2) 192.168.204.2 - 192.168.204.39
        (3) 192.168.204.40 - 192.168.204.40
        (4) 192.168.204.41 - 192.168.254.39
        (5) 192.168.254.40 - 192.168.254.40
        (6) 192.168.254.41 - 255.255.255.255
    Rule base destination ranges (ip):
        (0) 0.0.0.0 - 192.168.204.0
        (1) 192.168.204.1 - 192.168.204.1
        (2) 192.168.204.2 - 192.168.204.39
        (3) 192.168.204.40 - 192.168.204.40
        (4) 192.168.204.41 - 192.168.254.39
        (5) 192.168.254.40 - 192.168.254.40
        (6) 192.168.254.41 - 255.255.255.255
    Rule base dport ranges (port, proto):
        (0) 0, 0 - 138, 6
        (1) 139, 6 - 139, 6
        (2) 140, 6 - 18189, 6
        (3) 18190, 6 - 18190, 6
        (4) 18191, 6 - 18191, 6
        (5) 18192, 6 - 18192, 6
        (6) 18193, 6 - 19008, 6
        (7) 19009, 6 - 19009, 6
        (8) 19010, 6 - 136, 17
        (9) 137, 17 - 138, 17
        (10) 139, 17 - 65535, 65535
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Show the full information for the specified range from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -p 0
SecureXL device 0:
    Rule base source ranges (ip):
        (0) 0.0.0.0 - 192.168.204.0
        (1) 192.168.204.1 - 192.168.204.1
        (2) 192.168.204.2 - 192.168.204.39
        (3) 192.168.204.40 - 192.168.204.40
        (4) 192.168.204.41 - 192.168.254.39
        (5) 192.168.254.40 - 192.168.254.40
        (6) 192.168.254.41 - 255.255.255.255
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -p 1
SecureXL device 0:
    Rule base destination ranges (ip):
        (0) 0.0.0.0 - 192.168.204.0
        (1) 192.168.204.1 - 192.168.204.1
        (2) 192.168.204.2 - 192.168.204.39
        (3) 192.168.204.40 - 192.168.204.40
        (4) 192.168.204.41 - 192.168.254.39
        (5) 192.168.254.40 - 192.168.254.40
        (6) 192.168.254.41 - 255.255.255.255
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -p 2
SecureXL device 0:
    Rule base dport ranges (port, proto):
        (0) 0, 0 - 138, 6
        (1) 139, 6 - 139, 6
        (2) 140, 6 - 18189, 6
        (3) 18190, 6 - 18190, 6
        (4) 18191, 6 - 18191, 6
        (5) 18192, 6 - 18192, 6
        (6) 18193, 6 - 19008, 6
        (7) 19009, 6 - 19009, 6
        (8) 19010, 6 - 136, 17
        (9) 137, 17 - 138, 17
        (10) 139, 17 - 65535, 65535
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Show the summary information for the specified range from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -s 0
SecureXL device 0:
    List name "Rule base source ranges (ip):", ID 0, Number of ranges 7
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -s 1
SecureXL device 0:
    List name "Rule base destination ranges (ip):", ID 1, Number of ranges 7
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -s 2
SecureXL device 0:
    List name "Rule base dport ranges (port, proto):", ID 2, Number of ranges 11
[Expert@MyChassis-ch0x-0x:0]#
```

Example 5 - Show the list of ranges from a VSX Gateway

```
[Expert@MyChassis-ch0x-0x:2]# vsenv 0
Context is set to Virtual Device VSX2_192.168.3.242 (ID 0).
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges -l
SecureXL device 0:
        0 Anti spoofing ranges eth0:
        1 Anti spoofing ranges eth1:
[Expert@MyChassis-ch0x-0x:0]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]# fwaccel ranges -l
SecureXL device 0:
        0 Anti spoofing ranges eth3:
        1 Anti spoofing ranges eth2.52:
[Expert@MyChassis-ch0x-0x:1]# vsenv 2
Context is set to Virtual Device VS2 (ID 2).
[Expert@MyChassis-ch0x-0x:2]# fwaccel ranges -l
SecureXL device 0:
        0 Anti spoofing ranges eth4:
        1 Anti spoofing ranges eth2.53:
[Expert@MyChassis-ch0x-0x:2]#
```

Example 6 - Show the full information for all loaded ranges from a VSX Gateway

```
[Expert@MyChassis-ch0x-0x:2]# vsenv 0
Context is set to Virtual Device VSX2_192.168.3.242 (ID 0).
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ranges
SecureXL device 0:
    Anti spoofing ranges eth0:
        (0) 0.0.0.0 - 10.20.29.255
        (1) 10.20.31.0 - 126.255.255.255
        (2) 128.0.0.0 - 192.168.2.255
        (3) 192.168.3.1 - 192.168.3.241
        (4) 192.168.3.243 - 192.168.3.254
        (5) 192.168.4.0 - 223.255.255.255
        (6) 240.0.0.0 - 255.255.255.254
    Anti spoofing ranges eth1:
        (0) 10.20.30.1 - 10.20.30.241
        (1) 10.20.30.243 - 10.20.30.254
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]# fwaccel ranges
SecureXL device 0:
    Anti spoofing ranges eth3:
        (0) 40.50.60.0 - 40.50.60.255
        (1) 192.168.196.17 - 192.168.196.17
        (2) 192.168.196.19 - 192.168.196.30
    Anti spoofing ranges eth2.52:
        (0) 70.80.90.0 - 70.80.90.255
        (1) 192.168.196.1 - 192.168.196.1
        (2) 192.168.196.3 - 192.168.196.14
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 2
Context is set to Virtual Device VS2 (ID 2).
[Expert@MyChassis-ch0x-0x:2]# fwaccel ranges
SecureXL device 0:
    Anti spoofing ranges eth4:
        (0) 100.100.100.0 - 100.100.100.255
        (1) 192.168.196.17 - 192.168.196.17
        (2) 192.168.196.19 - 192.168.196.30
    Anti spoofing ranges eth2.53:
        (0) 192.168.196.1 - 192.168.196.1
        (1) 192.168.196.3 - 192.168.196.14
        (2) 200.200.200.0 - 200.200.200.255
[Expert@MyChassis-ch0x-0x:2]#
```

Example 7 - Show the summary information for the specified range from a VSX Gateway

```
[Expert@MyChassis-ch0x-0x:2]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel ranges -s 0
SecureXL device 0:
    List name "Anti spoofing ranges eth3:", ID 0, Number of ranges 3
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel ranges -s 1
SecureXL device 0:
    List name "Anti spoofing ranges eth2.52:", ID 1, Number of ranges 3
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel ranges -s 2
SecureXL device 0:
        The requested range table is empty
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 2
Context is set to Virtual Device VS2 (ID 2).
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:2]# fwaccel ranges -s 0
SecureXL device 0:
    List name "Anti spoofing ranges eth4:", ID 0, Number of ranges 3
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:2]# fwaccel ranges -s 1
SecureXL device 0:
    List name "Anti spoofing ranges eth2.53:", ID 1, Number of ranges 3
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:2]# fwaccel ranges -s 2
SecureXL device 0:
        The requested range table is empty
[Expert@MyChassis-ch0x-0x:2]#
```

fwaccel stat

Description

The *fwaccel stat* and *fwaccel6 stat* commands show the SecureXL status, the list of the accelerated interfaces and the list of the accelerated features on the Security Group.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] stat [-a] [-t] [-v]
```

Syntax for IPv6

```
fwaccel6 stat [-a] [-t] [-v]
```

Parameters

Parameter	Description
`-i` *`<SecureXL ID>`*	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows this information: - SecureXL instance ID - SecureXL instance role - SecureXL status - Accelerated interfaces - Accelerated features In addition, also shows: - More information about the Cryptography feature - The status of Accept Templates - The status of Drop Templates - The status of NAT Templates
`-a`	On a VSX Gateway, shows the information for all Virtual Systems.
`-t`	Shows this information only: - SecureXL instance ID - SecureXL instance role - SecureXL status - Accelerated interfaces - Accelerated features
`-v`	On a VSX Gateway, shows the information for all Virtual Systems. The same as the "`-a`" parameter.

Example 1 - Full output from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel stat
+------------------------------------------------------------------------------+
|Id|Name |Status     |Interfaces               |Features                       |
+------------------------------------------------------------------------------+
|0 |SND  |enabled    |eth0,eth1,eth2,eth3,eth4,|
|  |     |           |eth5,eth6                |Acceleration,Cryptography      |
|  |     |           |                         |Crypto: Tunnel,UDPEncap,MD5,   |
|  |     |           |                         |SHA1,NULL,3DES,DES,CAST,       |
|  |     |           |                         |CAST-40,AES-128,AES-256,ESP,   |
|  |     |           |                         |LinkSelection,DynamicVPN,      |
|  |     |           |                         |NatTraversal,AES-XCBC,SHA256   |
+------------------------------------------------------------------------------+

Accept Templates : disabled by Firewall
                   Layer MyGW_Policy Network disables template offloads from rule #1
                   Throughput acceleration still enabled.
Drop Templates   : disabled
NAT Templates    : disabled by Firewall
                   Layer MyGW_Policy Network disables template offloads from rule #1
                   Throughput acceleration still enabled.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Brief output from a non-VSX Gateway

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel stat -t
+------------------------------------------------------------------------------+
|Id|Name |Status     |Interfaces               |Features                       |
+------------------------------------------------------------------------------+
|0 |SND  |enabled    |eth0,eth1,eth2,eth3,eth4,|
|  |     |           |eth5,eth6,eth7           |Acceleration,Cryptography      |
+------------------------------------------------------------------------------+

[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Full output from a VSX Gateway

```
[Expert@MyChassis-ch0x-0x:1]# vsx stat -v
VSX Gateway Status
==================
Name:            VSX2_192.168.3.242
Access Control Policy: VSX_GW_VSX
Installed at:    17Sep2018 13:17:14
Threat Prevention Policy: <No Policy>
SIC Status:      Trust

Number of Virtual Systems allowed by license:          25
Virtual Systems [active / configured]:                  2 / 2
Virtual Routers and Switches [active / configured]:     0 / 0
Total connections [current / limit]:                    4 / 44700

Virtual Devices Status
======================

 ID  | Type & Name         | Access Control Policy | Installed at
  | Threat Prevention Policy | SIC Stat
-----+---------------------+-----------------------+--------------
---+------------------------+---------
   1 | S VS1               | VS1_Policy            | 17Sep2018
12:47 | <No Policy>              | Trust
   2 | S VS2               | VS2_Policy            | 17Sep2018
12:47 | <No Policy>              | Trust

Type: S - Virtual System, B - Virtual System in Bridge mode,
      R - Virtual Router, W - Virtual Switch.

[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# vsenv 1
Context is set to Virtual Device VS1 (ID 1).
[Expert@MyChassis-ch0x-0x:1]#
[Expert@MyChassis-ch0x-0x:1]# fwaccel stat
+-----------------------------------------------------------------
------------+
|Id|Name |Status     |Interfaces               |Features
           |
+-----------------------------------------------------------------
------------+
|0 |SND  |enabled    |eth1,eth2,eth3
|Acceleration,Cryptography     |
|  |     |           |                         |Crypto:
Tunnel,UDPEncap,MD5,  |
|  |     |           |
|SHA1,NULL,3DES,DES,CAST,      |
|  |     |           |                         |CAST-40,AES-
128,AES-256,ESP,  |
|  |     |           |
|LinkSelection,DynamicVPN,      |
|  |     |           |                          |NatTraversal,AES-
XCBC,SHA256  |
+------------------------------------------------------------------
------------+

Accept Templates : disabled by Firewall
                   Layer VS1_Policy Network disables template
offloads from rule #1
                   Throughput acceleration still enabled.
Drop Templates   : disabled
NAT Templates    : disabled by Firewall
                   Layer VS1_Policy Network disables template
offloads from rule #1
                   Throughput acceleration still enabled.
[Expert@MyChassis-ch0x-0x:1]#
```

fwaccel stats

Description

The *fwaccel stats* and *fwaccel6 stats* commands show acceleration statistics for IPv4 on the Security Group.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] stats
      [-c]
      [-d]
      [-l]
      [-m]
      [-n]
      [-o]
      [-p]
      [-q]
      [-r]
      [-s]
      [-x]
```

Syntax for IPv6

```
fwaccel6 stats
      [-c]
      [-d]
      [-l]
      [-m]
      [-n]
      [-o]
      [-p]
      [-q]
      [-r]
      [-s]
      [-x]
```

Parameters

Parameter	Description
-i <*SecureXL ID*>	Specifies the SecureXL instance ID (for IPv4 only).
-c	Shows the statistics for Cluster Correction.
-d	Shows the statistics for drops from device.
-l	Shows the statistics in legacy mode - as one table.
-m	Shows the statistics for multicast traffic.
-n	Shows the statistics for Identity Awareness (NAC).
-o	Shows the statistics for Reorder Infrastructure.
-p	Shows the statistics for SecureXL violations (F2F packets).
-q	Shows the statistics notifications the SecureXL sent to the Firewall.
-r	Resets all the counters.
-s	Shows the statistics summary only.
-x	Shows the statistics for PXL. **Note** - PXL is the technology name for combination of SecureXL and PSL (Passive Streaming Library).

In addition, see:

- *"Description of the Statistics Counters" below*
- *"Example Outputs of the "fwaccel stats" Commands" on page 113*

Description of the Statistics Counters

The "Accelerated Path" section

Counter	Instructions
`accel packets`	Number of accelerated packets.
`accel bytes`	Number of accelerated bytes.
`outbound packets`	Number of outbound packets.
`outbound bytes`	Number of outbound bytes.
`conns created`	Number of connections the SecureXL created.
`conns deleted`	Number of connections the SecureXL deleted.
`C total conns`	Total number of connections the SecureXL currently handles.
`C templates`	*Not in use* Total number of SecureXL templates the SecureXL currently handles.
`C TCP conns`	Number of TCP connections the SecureXL currently handles.
`C non TCP conns`	Number of non-TCP connections the SecureXL currently handles.
`conns from templates`	*Not in use* Number of connections the SecureXL created from SecureXL templates.
`nat conns`	Number of NAT connections.
`dropped packets`	Number of packets the SecureXL dropped.
`dropped bytes`	Number of bytes the SecureXL dropped.
`nat templates`	*Not in use*
`port alloc templates`	*Not in use*

Counter	Instructions
`conns from nat tmpl`	*Not in use*
`port alloc conns`	*Not in use*
`fragments received`	Number of received fragments.
`fragments transmit`	Number of transmitted fragments.
`fragments dropped`	Number of dropped fragments.
`fragments expired`	Number of expired fragments.
`IP options stripped`	Number of packets, from SecureXL stripped IP options.
`IP options restored`	Number of packets, in which SecureXL restored IP options.
`IP options dropped`	Number of packets with IP options that SecureXL dropped.
`corrs created`	Number of corrections the SecureXL made.
`corrs deleted`	Number of corrections the SecureXL deleted.
`C corrections`	Number of corrections the SecureXL currently handles.
`corrected packets`	Number of corrected packets.
`corrected bytes`	Number of corrected bytes.

The "Accelerated VPN Path" section

Counter	Instructions
`C crypt conns`	Number of encrypted connections the SecureXL currently handles.
`enc bytes`	Number of encrypted traffic bytes.
`dec bytes`	Number of decrypted traffic bytes.
`ESP enc pkts`	Number of ESP encrypted packets.
`ESP enc err`	Number of ESP encryption errors.
`ESP dec pkts`	Number of ESP decrypted packets.
`ESP dec err`	Number of ESP decryption errors.
`ESP other err`	Number of ESP general errors.
`espudp enc pkts`	*Not in use*
`espudp enc err`	*Not in use*
`espudp dec pkts`	*Not in use*
`espudp dec err`	*Not in use*
espudp other err	*Not in use*

The "Medium Streaming Path" section

Counter	Instructions
`PXL packets`	Number of PXL packets. PXL is combination of SecureXL and Passive Streaming Library (PSL), which is an IPS infrastructure that transparently listens to TCP traffic as network packets, and rebuilds the TCP stream out of these packets. Passive Streaming can listen to all TCP traffic, but process only the data packets, which belong to a previously registered connection.
`PXL async packets`	Number of PXL packets the SecureXL handled asynchronously.
`PXL bytes`	Number of PXL bytes.
`C PXL conns`	Number of PXL connections the SecureXL currently handles.
`C PXL templates`	*Not in use* Number of PXL templates.
`PXL FF conns`	Number of PXL Fast Forward connections.
`PXL FF packets`	Number of PXL Fast Forward packets.
`PXL FF bytes`	Number of PXL Fast Forward bytes.
`PXL FF acks`	Number of PXL Fast Forward acknowledgments.

The "Inline Streaming Path" section

Counter	Instructions
`PSL Inline packets`	Number of accelerated PSL packets.
`PSL Inline bytes`	Number of accelerated PSL bytes.
`CPAS Inline packets`	Number of accelerated CPAS packets.
`CPAS Inline bytes`	Number of accelerated CPAS bytes.

The "QoS General Information" section

Counter	Instructions
`Total QoS Conns`	Total number of QoS connections.
`QoS Classify Conns`	Number of classified QoS connections.
`QoS Classify flow`	Number of classified QoS flows.
`Reclassify QoS polic`	Number of reclassify QoS requests.

The "Firewall QoS Path" section

Counter	Instructions
`Enqueued IN packets`	Number of waiting packets in Firewall QoS inbound queue.
`Enqueued OUT packets`	Number of waiting packets in Firewall QoS outbound queue.
`Dequeued IN packets`	Number of processed packets in Firewall QoS inbound queue.
`Dequeued OUT packets`	Number of processed packets in Firewall QoS outbound queue.
`Enqueued IN bytes`	Number of waiting bytes in Firewall QoS inbound queue.
`Enqueued OUT bytes`	Number of waiting bytes in Firewall QoS outbound queue.
`Dequeued IN bytes`	Number of processed bytes in Firewall QoS inbound queue.
`Dequeued OUT bytes`	Number of processed bytes in Firewall QoS outbound queue.

The "Accelerated QoS Path" section

Counter	Instructions
`Enqueued IN packets`	Number of waiting packets in SecureXL QoS inbound queue.
`Enqueued OUT packets`	Number of waiting packets in SecureXL QoS outbound queue.
`Dequeued IN packets`	Number of processed packets in SecureXL QoS inbound queue.
`Dequeued OUT packets`	Number of processed packets in SecureXL QoS outbound queue.
`Enqueued IN bytes`	Number of waiting bytes in SecureXL QoS inbound queue.
`Enqueued OUT bytes`	Number of waiting bytes in SecureXL QoS outbound queue.
`Dequeued IN bytes`	Number of processed bytes in SecureXL QoS inbound queue.
`Dequeued OUT bytes`	Number of processed bytes in SecureXL QoS outbound queue.

The "Firewall Path" section

Counter	Instructions
`F2F packets`	Number of packets that SecureXL forwarded to the Firewall kernel in Slow Path.
`F2F bytes`	Number of bytes that SecureXL forwarded to the Firewall kernel in Slow Path.
`TCP violations`	Number of packets, which are in violation of the TCP state.
`C anticipated conns`	Number of anticipated connections SecureXL currently handles.
`port alloc f2f`	*Not in use*
`F2V conn match pkts`	Number of packets that matched a SecureXL connection and SecureXL forwarded to the Firewall kernel.
`F2V packets`	Number of packets that SecureXL forwarded to the Firewall kernel and the Firewall re-injected back to SecureXL.
`F2V bytes`	Number of bytes that SecureXL forwarded to the Firewall kernel and the Firewall re-injected back to the SecureXL.

The "GTP" section

Counter	Instructions
`gtp tunnels created`	Number of created GTP tunnels.
`gtp tunnels`	Number of GTP tunnels the SecureXL currently handles.
`gtp accel pkts`	Number of accelerated GTP packets.
`gtp f2f pkts`	Number of GTP packets the SecureXL forwarded to the Firewall kernel.
`gtp spoofed pkts`	Number of spoofed GTP packets.
`gtp in gtp pkts`	Number of GTP-in-GTP packets.
`gtp signaling pkts`	Number of signaling GTP packets.
`gtp tcpopt pkts`	Number of GTP packets with TCP Options.
`gtp apn err pkts`	Number of GTP packets with APN errors.

The "General" section

Counter	Instructions
`memory used`	*Not in use*
`free memory`	*Not in use*
`C used templates`	*Not in use*
`pxl tmpl conns`	*Not in use*
`C conns from tmpl`	*Not in use* Number of current connections that SecureXL created from SecureXL Templates.
`C tcp handshake conn`	Number of current TCP connections that are not yet established.
`C tcp established co`	Number of established TCP connections the SecureXL currently handles.
`C tcp closed conns`	Number of closed TCP connections the SecureXL currently handles.
`C tcp pxl handshake`	Number of not yet established PXL TCP connections the SecureXL currently handles.
`C tcp pxl establishe`	Number of established PXL TCP connections the SecureXL currently handles.
`C tcp pxl closed con`	Number of closed PXL TCP connections the SecureXL currently handles.
`outbound pxl packets`	*Not in use*

Example Outputs of the "fwaccel stats" Commands

Example: fwaccel stats -s

Example of statistics summary:

```
Accelerated conns/Total conns : 0/0 (0%)
Accelerated pkts/Total pkts   : 0/8 (0%)
F2Fed pkts/Total pkts         : 8/8 (100%)
F2V pkts/Total pkts           : 0/8 (0%)
CPASXL pkts/Total pkts        : 0/8 (0%)
PSLXL pkts/Total pkts         : 0/8 (0%)
QOS inbound pkts/Total pkts   : 0/8 (0%)
QOS outbound pkts/Total pkts  : 0/8 (0%)
Corrected pkts/Total pkts     : 0/8 (0%)
```

Example: fwaccel stats

Example of the default output:

```
Name                          Value         Name                          Value
----------------------------  ------------  ----------------------------  ------------

Accelerated Path
--------------------------------------------------------------------------------------
accel packets                            0    accel bytes                              0
outbound packets                         0    outbound bytes                           0
conns created                            0    conns deleted                            0
C total conns                            0    C TCP conns                              0
C non TCP conns                          0    nat conns                                0
dropped packets                          0    dropped bytes                            0
fragments received                       0    fragments transmit                       0
fragments dropped                        0    fragments expired                        0
IP options stripped                      0    IP options restored                      0
IP options dropped                       0    corrs created                            0
corrs deleted                            0    C corrections                            0
corrected packets                        0    corrected bytes                          0

Accelerated VPN Path
--------------------------------------------------------------------------------------
C crypt conns                            0    enc bytes                                0
dec bytes                                0    ESP enc pkts                             0
ESP enc err                              0    ESP dec pkts                             0
ESP dec err                              0    ESP other err                            0
espudp enc pkts                          0    espudp enc err                           0
espudp dec pkts                          0    espudp dec err                           0
espudp other err                         0

Medium Streaming Path
--------------------------------------------------------------------------------------
CPASXL packets                           0    PSLXL packets                            0
CPASXL async packets                     0    PSLXL async packets                      0
CPASXL bytes                             0    PSLXL bytes                              0
C CPASXL conns                           0    C PSLXL conns                            0
CPASXL conns created                     0    PSLXL conns created                      0
PXL FF conns                             0    PXL FF packets                           0
PXL FF bytes                             0    PXL FF acks                              0
PXL no conn drops                        0

Inline Streaming Path
--------------------------------------------------------------------------------------
PSL Inline packets                       0    PSL Inline bytes                         0
CPAS Inline packets                      0    CPAS Inline bytes                        0

QoS Paths
--------------------------------------------------------------------------------------
QoS General Information:
------------------------
Total QoS Conns                          0    QoS Classify Conns                       0
QoS Classify flow                        0    Reclassify QoS policy                    0

FireWall QoS Path:
------------------
Enqueued IN packets                      0    Enqueued OUT packets                     0
Dequeued IN packets                      0    Dequeued OUT packets                     0
Enqueued IN bytes                        0    Enqueued OUT bytes                       0
Dequeued IN bytes                        0    Dequeued OUT bytes                       0

Accelerated QoS Path:
---------------------
Enqueued IN packets                      0    Enqueued OUT packets                     0
Dequeued IN packets                      0    Dequeued OUT packets                     0
Enqueued IN bytes                        0    Enqueued OUT bytes                       0
Dequeued IN bytes                        0    Dequeued OUT bytes                       0

Firewall Path
--------------------------------------------------------------------------------------
F2F packets                          35324    F2F bytes                          1797781
TCP violations                           0    F2V conn match pkts                      0
F2V packets                              0    F2V bytes                                0
```

```
GTP
--------------------------------------------------------------------------------------
gtp tunnels created                      0    gtp tunnels                              0
gtp accel pkts                           0    gtp f2f pkts                             0
gtp spoofed pkts                         0    gtp in gtp pkts                          0
gtp signaling pkts                       0    gtp tcpopt pkts                          0
gtp apn err pkts                         0

General
--------------------------------------------------------------------------------------
memory used                       38798784    C tcp handshake conns                    0
C tcp established conns                  0    C tcp closed conns                       0
C tcp pxl handshake conns                0    C tcp pxl established conns              0
C tcp pxl closed conns                   0    outbound cpasxl packets                  0
outbound pslxl packets                   0    outbound cpasxl bytes                    0
outbound pslxl bytes                     0    DNS DoR stats                            0

(*) Statistics marked with C refer to current value, others refer to total value
```

Example: fwaccel stats -c

Example of statistics for Cluster Correction:

```
Cluster Correction stats:

 Name                     Value           Name                     Value
-----------------------  ------------    -----------------------  ------------
Sent pkts (total)                   0    Sent with metadata                  0
Received pkts (total)               0    Received with metadata              0
Sent bytes                          0    Received bytes                      0
Send errors                         0    Receive errors                      0
```

Example: fwaccel stats -d

Example of statistics for drops from device:

```
Reason                Value              Reason                Value
--------------------  ---------------    --------------------  ---------------
general reason                      0    CPASXL decision                     0
PSLXL decision                      0    clr pkt on vpn                      0
encrypt failed                      0    drop template                       0
decrypt failed                      0    interface down                      0
cluster error                       0    XMT error                           0
anti spoofing                       0    local spoofing                      0
sanity error                        0    monitored spoofed                   0
QOS decision                        0    C2S violation                       0
S2C violation                       0    Loop prevention                     0
DOS Fragments                       0    DOS IP Options                      0
DOS Blacklists                      0    DOS Penalty Box                     0
DOS Rate Limiting                   0    Syn Attack                          0
Reorder                             0    Expired Fragments                   0
```

Example: fwaccel stats -l

Example of the output in legacy mode (as one table):

```
Name                          Value         Name                          Value
----------------------------  ------------  ----------------------------  ------------
-                                       0    accel packets                           0
accel bytes                             0    outbound packets                        0
outbound bytes                          0    conns created                           0
conns deleted                           0    C total conns                           0
C TCP conns                             0    C non TCP conns                         0
nat conns                               0    dropped packets                         0
dropped bytes                           0    fragments received                      0
fragments transmit                      0    fragments dropped                       0
fragments expired                       0    IP options stripped                     0
IP options restored                     0    IP options dropped                      0
corrs created                           0    corrs deleted                           0
C corrections                           0    corrected packets                       0
corrected bytes                         0    C crypt conns                           0
enc bytes                               0    dec bytes                               0
ESP enc pkts                            0    ESP enc err                             0
ESP dec pkts                            0    ESP dec err                             0
ESP other err                           0    espudp enc pkts                         0
espudp enc err                          0    espudp dec pkts                         0
espudp dec err                          0    espudp other err                        0
acct update interval                 3600    CPASXL packets                          0
PSLXL packets                           0    CPASXL async packets                    0
PSLXL async packets                     0    CPASXL bytes                            0
PSLXL bytes                             0    C CPASXL conns                          0
C PSLXL conns                           0    CPASXL conns created                    0
PSLXL conns created                     0    PXL FF conns                            0
PXL FF packets                          0    PXL FF bytes                            0
PXL FF acks                             0    PXL no conn drops                       0
PSL Inline packets                      0    PSL Inline bytes                        0
CPAS Inline packets                     0    CPAS Inline bytes                       0
Total QoS Conns                         0    QoS Classify Conns                      0
QoS Classify flow                       0    Reclassify QoS policy                   0
Enqueued IN packets                     0    Enqueued OUT packets                    0
Dequeued IN packets                     0    Dequeued OUT packets                    0
Enqueued IN bytes                       0    Enqueued OUT bytes                      0
Dequeued IN bytes                       0    Dequeued OUT bytes                      0
Enqueued IN packets                     0    Enqueued OUT packets                    0
Dequeued IN packets                     0    Dequeued OUT packets                    0
Enqueued IN bytes                       0    Enqueued OUT bytes                      0
Dequeued IN bytes                       0    Dequeued OUT bytes                      0
F2F packets                         35383    F2F bytes                         1801493
TCP violations                          0    F2V conn match pkts                     0
F2V packets                             0    F2V bytes                               0
gtp tunnels created                     0    gtp tunnels                             0
gtp accel pkts                          0    gtp f2f pkts                            0
gtp spoofed pkts                        0    gtp in gtp pkts                         0
gtp signaling pkts                      0    gtp tcpopt pkts                         0
gtp apn err pkts                        0    memory used                      38798784
C tcp handshake conns                   0    C tcp established conns                 0
C tcp closed conns                      0    C tcp pxl handshake conns               0
C tcp pxl established conns             0    C tcp pxl closed conns                  0
outbound cpasxl packets                 0    outbound pslxl packets                  0
outbound cpasxl bytes                   0    outbound pslxl bytes                    0
DNS DoR stats                           0
(*) Statistics marked with C refer to current value, others refer to total value
```

Example: fwaccel stats -m

Example of statistics for multicast traffic:

```
Name                  Value              Name                  Value
--------------------  ---------------    --------------------  ---------------
in packets                          0    out packets                         0
if restricted                       0    conns with down if                  0
f2f packets                         0    f2f bytes                           0
dropped packets                     0    dropped bytes                       0
accel packets                       0    accel bytes                         0
mcast conns                         0
```

Example: fwaccel stats -n

Example of statistics for Identity Awareness (NAC):

```
Name                  Value              Name                  Value
--------------------  ---------------    --------------------  ---------------
NAC packets                         0    NAC bytes                           0
NAC connections                     0    complience failure                  0
```

Example: fwaccel stats -o

Example of statistics for Reorder Infrastructure:

```
Appliaction: F2V
        Statistic                       Value
-----------------------------------     --------------------
                        Queued pkts                    0
                    Max queued pkts                    0
                    Timer triggered                    0
          Callback hahndling unhold                    0
 Callback hahndling unhold and drop                    0
           Callback hahndling reset                    0
              Dequeued pkts resumed                    0
                Queue ent allocated                    0
                    Queue ent freed                    0
                   Queues allocated                    0
                       Queues freed                    0
                     Ack notif sent                    0
              Ack respones handling                    0
              Dequeued pkts dropped                    0
       Reached max queued pkt limit                    0
                   Set timer failed                    0
                 Error already held                    0
             Queue ent alloc failed                    0
                 Queue alloc failed                    0
                   Ack notif failed                    0
       Ack respones handling failed                    0
----------------------------------------------------

Appliaction: Route
        Statistic                       Value
-----------------------------------     --------------------
                        Queued pkts                    0
                    Max queued pkts                    0
                    Timer triggered                    0
          Callback hahndling unhold                    0
 Callback hahndling unhold and drop                    0
           Callback hahndling reset                    0
              Dequeued pkts resumed                    0
                Queue ent allocated                    0
                    Queue ent freed                    0
                   Queues allocated                    0
                       Queues freed                    0
                     Ack notif sent                    0
              Ack respones handling                    0
              Dequeued pkts dropped                    0
       Reached max queued pkt limit                    0
                   Set timer failed                    0
                 Error already held                    0
             Queue ent alloc failed                    0
                 Queue alloc failed                    0
                   Ack notif failed                    0
       Ack respones handling failed                    0
----------------------------------------------------

Appliaction: New connection
        Statistic                       Value
-----------------------------------     --------------------
                        Queued pkts                    0
                    Max queued pkts                    0
                    Timer triggered                    0
          Callback hahndling unhold                    0
 Callback hahndling unhold and drop                    0
           Callback hahndling reset                    0
              Dequeued pkts resumed                    0
                Queue ent allocated                    0
                    Queue ent freed                    0
                   Queues allocated                    0
                       Queues freed                    0
                     Ack notif sent                    0
              Ack respones handling                    0
              Dequeued pkts dropped                    0
       Reached max queued pkt limit                    0
                   Set timer failed                    0
                 Error already held                    0
             Queue ent alloc failed                    0
                 Queue alloc failed                    0
                   Ack notif failed                    0
       Ack respones handling failed                    0
----------------------------------------------------

Appliaction: F2P
        Statistic                       Value
-----------------------------------     --------------------
                        Queued pkts                    0
                    Max queued pkts                    0
                    Timer triggered                    0
          Callback hahndling unhold                    0
 Callback hahndling unhold and drop                    0
           Callback hahndling reset                    0
              Dequeued pkts resumed                    0
                Queue ent allocated                    0
                    Queue ent freed                    0
                   Queues allocated                    0
                       Queues freed                    0
                     Ack notif sent                    0
              Ack respones handling                    0
              Dequeued pkts dropped                    0
       Reached max queued pkt limit                    0
                   Set timer failed                    0
                 Error already held                    0
             Queue ent alloc failed                    0
                 Queue alloc failed                    0
                   Ack notif failed                    0
       Ack respones handling failed                    0
----------------------------------------------------
```

Example: fwaccel stats -p

Example of statistics for SecureXL violations (F2F packets):

```
F2F packets:
--------------
Violation             Packets            Violation             Packets
--------------------  ---------------    --------------------  ---------------
pkt has IP options                  0    ICMP miss conn                   3036
TCP-SYN miss conn                   8    TCP-other miss conn             32224
UDP miss conn                    3772    other miss conn                     0
VPN returned F2F                    0    uni-directional viol                0
possible spoof viol                 0    TCP state viol                      0
out if not def/accl                 0    bridge, src=dst                     0
routing decision err                0    sanity checks failed                0
fwd to non-pivot                    0    broadcast/multicast                 0
cluster message                     0    cluster forward                     0
chain forwarding                    0    F2V conn match pkts                 0
general reason                      0    route changes                       0
```

Example: fwaccel stats -q

Example of statistics for notifications the SecureXL sent to the Firewall:

```
Notification           Packets           Notification           Packets
---------------------  --------------    ---------------------  --------------
ntSAAboutToExpire                   0    ntSAExpired                         0
ntMSPIError                         0    ntNoInboundSA                       0
ntNoOutboundSA                      0    ntDataIntegrityFailed               0
ntPossibleReplay                    0    ntReplay                            0
ntNextProtocolError                 0    ntCPIError                          0
ntClearTextPacket                   0    ntFragmentation                     0
ntUpdateUdpEncTable                 0    ntSASync                            0
ntReplayOutOfWindow                 0    ntVPNTrafficReport                  0
ntConnDeleted                       0    ntConnUpdate                        0
ntPacketDropped                     0    ntSendLog                           0
ntRefreshGTPTunnel                  0    ntMcastDrop                         0
ntAccounting                        0    ntAsyncIndex                        0
ntACkReordering                     0    ntAccelAckInfo                      0
ntMonitorPacket                     0    ntPacketCapture                     0
ntCpasPacketCapture                 0    ntPSLGlueUpdateReject               0
ntSeqVerifyDrop                     0    ntPacketForwardBefore               0
ntICMPMessage                       0    ntQoSReclassifyPacket               0
ntQoSResumePacket                   0    ntVPNEncHaLinkFailure               0
ntVPNEncLsLinkFailure               0    ntVPNEncRouteChange                 0
ntVPNDecVerRouteChang               0    ntVPNDecRouteChange                 0
ntMuxSimToFw                        0    ntPSLEventLog                       0
ntSendCPHWDStats                14871    ntPacketTaggingViolat               0
ntDosNotify                        28    ntSynatkNotify                      0
ntSynatkStats                       0    ntQoSEventLog                       0
ntPrintGetParam                     0
```

Example: fwaccel stats -x

Example of statistics for PXL:

```
PXL Release Context statistics:

 Name                     Value           Name                     Value
-----------------------  ------------    -----------------------  ------------
End Handler                         0    Post Sync                           0
Stop Stream                         0    kbuf fail                           0
Set field failure                   0    Notif set field fail                0
Non SYN seq fail                    0    Tmpl kbuf fail                      0
Tmpl set field fail                 0    Segment Injection                   0
Init app fail                       0    Expiration                          0
Newconn set field fail              0    Newconn fail                        0
CPHWD dec                           0    No PSL policy                       0

PXL Exception statistics:

 Name                     Value           Name                     Value
-----------------------  ------------    -----------------------  ------------
urgent packets                      0    invalid SYN retrans                 0
SYN seq not init                    0    old pkts out win                    0
old pkts out win trunc              0    old pkts out win strip              0
new pkts out win                    0    incorrect retrans                   0
TCP pkts with bad csum              0    ACK unprocessed data                0
old ACK out win                     0    Max segments reached                0
No resources                        0    Hold timeout                        0
```

fwaccel synatk

Description

The *fwaccel synatk* and *fwaccel6 synatk* commands control the Accelerated SYN Defender on the Security Group

Important:

- The same SecureXL command must run on all Security Group Members. Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.
  - In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
  - In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.
- When you add a new Security Group Member to a Security Group, the new Security Group Member pulls the "`fwaccel synatk`" configuration that you saved it in a configuration file - in the default file `$FWDIR/conf/synatk.conf`, or in the file specified with the "`fwaccel synatk -c`" command.

Syntax for IPv4

```
fwaccel synatk
      -a
      -c <options>
      -d
      -e
      -g
      -m
      -t <options>
      config
      monitor <options>
      state <options>
      whitelist <options>
```

Syntax for IPv6

```
fwaccel6 synatk
      -a
      -c <options>
      -d
      -e
      -g
      -m
      -t <options>
      config
      monitor <options>
      state <options>
      whitelist <options>
```

Parameters

Parameter	Description
No Parameters	Shows the applicable built-in usage.
`-a`	Applies the configuration from the default file. See *"fwaccel synatk -a" on the next page*.
`-c <options>`	Applies the configuration from the specified file. See *"fwaccel synatk -c <Configuration File>" on page 124*.
`-d`	Disables the Accelerated SYN Defender on all interfaces. See *"fwaccel synatk -d" on page 124*.
`-e`	Enables the Accelerated SYN Defender on interfaces with topology "External". Enables the Accelerated SYN Defender in Monitor (Detect only) mode on interfaces with topology "Internal". See *"fwaccel synatk -e" on page 125*.
`-g`	Enables the Accelerated SYN Defender on all interfaces. See *"fwaccel synatk -g" on page 126*.
`-m`	Enables the Accelerated SYN Defender in Monitor (Detect only) mode on all interfaces. In this state, the Accelerated SYN Defender only sends a log when it recognizes a TCP SYN Flood attack. See *"fwaccel synatk -m" on page 127*.

Parameter	Description
`-t <options>`	Configures the threshold numbers of half-opened TCP connections that trigger the Accelerated SYN Defender. See *"fwaccel synatk -t <Threshold>" on page 128*.
`config`	Shows the current Accelerated SYN Defender configuration. See *"fwaccel synatk config" on page 129*.
`monitor <options>`	Shows the Accelerated SYN Defender status. See *"fwaccel synatk monitor" on page 132*.
`state <options>`	Controls the Accelerated SYN Defender states. See *"fwaccel synatk state" on page 137*.
`whitelist <options>`	Controls the Accelerated SYN Defender whitelist. See *"fwaccel synatk whitelist" on page 139*.

fwaccel synatk -a

Description

The "*fwaccel synatk -a*" and "*fwaccel6 synatk -a*" commands apply the Accelerated SYN Defender configuration from the default `$FWDIR/conf/synatk.conf` file.

Notes:

- Both IPv4 and IPv6 use the same configuration file.
- Interface specific state settings that you define in the configuration file, override the settings that you define with these commands:
  - *"fwaccel synatk -d" on the next page*
  - *"fwaccel synatk -e" on page 125*
  - *"fwaccel synatk -g" on page 126*
  - *"fwaccel synatk -m" on page 127*

Syntax for IPv4

```
g_fwaccel synatk -a
```

Syntax for IPv6

```
g_fwaccel6 synatk -a
```

fwaccel synatk -c <Configuration File>

Description

The "*fwaccel synatk -c <Configuration File>*" and "*fwaccel6 synatk -c <Configuration File>*" commands apply the Accelerated SYN Defender configuration from the specified file.

Important - If you use this parameter, then it must be the first parameter in the syntax.

Notes:

- Both IPv4 and IPv6 use the same configuration file.
- The state settings of a specific interface that you define in the configuration file, override the settings that you define with these commands:
  - *"fwaccel synatk -d" below*
  - *"fwaccel synatk -e" on the next page*
  - *"fwaccel synatk -g" on page 126*
  - *"fwaccel synatk -m" on page 127*

Syntax for IPv4

```
g_fwaccel synatk -c <Configuration File>
```

Syntax for IPv6

```
g_fwaccel6 synatk -c <Configuration File>
```

Parameters

Parameter	Description
`<Configuration File>`	Specifies the full path and the name of the file. For reference, see the default file: `$FWDIR/conf/synatk.conf`

fwaccel synatk -d

Description

The "*fwaccel synatk -d*" and "*fwaccel6 synatk -d*" commands disable the Accelerated SYN Defender on all interfaces.

Notes:

- This command:
  1. Modifies the default configuration file `$FWDIR/conf/synatk.conf`, or the configuration file specified with the "`-c`" parameter.
  2. Loads the modified file.
- Output of the *"fwaccel synatk monitor" on page 132* command shows:
  - Configuration: `Disabled`
  - Enforce: `Disable`
  - State: `Disable`
- Output of the *"fwaccel synatk config" on page 129* command shows:
  - `enabled 0`
  - `enforce 0`

Syntax for IPv4

```
g_fwaccel synatk -d
```

Syntax for IPv6

```
g_fwaccel6 synatk -d
```

fwaccel synatk -e

Description

The "*fwaccel synatk -e*" and "*fwaccel6 synatk -e*" commands:

- Enable the Accelerated SYN Defender on interfaces with topology "External".
- Enable the Accelerated SYN Defender in Monitor (Detect only) mode on interfaces with topology "Internal".

Notes:

- This command:
  1. Modifies the default configuration file `$FWDIR/conf/synatk.conf`, or the configuration file specified with the "`-c`" parameter.
  2. Loads the modified file.
- Output of the *"fwaccel synatk monitor" on page 132* command shows for "External" interfaces:
  - Configuration: `Enforcing`
  - Enforce: `Prevent`
  - State: `Ready` (may change later depending on what the SYN Defender detects)
- Output of the *"fwaccel synatk monitor" on page 132* command shows for "Internal" interfaces:
  - Configuration: `Enforcing`
  - Enforce: `Detect`
  - State: `Monitor`
- Output of the *"fwaccel synatk config" on page 129* command shows:
  - `enabled 1`
  - `enforce 1`

Syntax for IPv4

```
g_fwaccel synatk -e
```

Syntax for IPv6

```
g_fwaccel6 synatk -e
```

fwaccel synatk -g

Description

The "*fwaccel synatk -g*" and "*fwaccel6 synatk -g*" commands enable the Accelerated SYN Defender on all interfaces.

Notes:

- This command:
  1. Modifies the default configuration file `$FWDIR/conf/synatk.conf`, or the configuration file specified with the "`-c`" parameter.
  2. Loads the modified file.
- Output of the *"fwaccel synatk monitor" on page 132* command shows for "External" interfaces:
  - Configuration: `Enforcing`
  - Enforce: `Prevent`
  - State: `Ready` (may change later depending on what the SYN Defender detects)
- Output of the *"fwaccel synatk monitor" on page 132* command shows for "Internal" interfaces:
  - Configuration: `Enforcing`
  - Enforce: `Detect`
  - State: `Monitor`
- Output of the *"fwaccel synatk config" on page 129* command shows:
  - `enabled 1`
  - `enforce 2`

Syntax for IPv4

```
g_fwaccel synatk -g
```

Syntax for IPv6

```
g_fwaccel6 synatk -g
```

fwaccel synatk -m

Description

The "*fwaccel synatk -m*" and "*fwaccel6 synatk -m*" commands enable the Accelerated SYN Defender in Monitor (Detect only) mode on all interfaces.

In this state, the Accelerated SYN Defender only sends a log when it recognizes a TCP SYN Flood attack.

Notes:

- This command:
  1. Modifies the default configuration file `$FWDIR/conf/synatk.conf`, or the configuration file specified with the "`-c`" parameter.
  2. Loads the modified file.
- Output of the *"fwaccel synatk monitor" on page 132* command shows:
  - Configuration: `Monitoring`
  - Enforce: `Detect`
  - State: `Monitor`
- Output of the *"fwaccel synatk config" on the next page* command shows:
  - `enabled 1`
  - `enforce 0`

Syntax for IPv4

```
g_fwaccel synatk -m
```

Syntax for IPv6

```
g_fwaccel6 synatk -m
```

fwaccel synatk -t <Threshold>

Description

The "*fwaccel synatk -t <Threshold>*" and "*fwaccel6 synatk -t <Threshold>*" commands configure the threshold numbers of half-opened TCP connections that trigger the Accelerated SYN Defender.

Notes:

- This command:
  1. Modifies the default configuration file `$FWDIR/conf/synatk.conf`, or the configuration file specified with the "`-c`" parameter.
  2. Loads the modified file.
- Threshold values are independent for IPv4 and IPv6.

Syntax for IPv4

```
g_fwaccel synatk -t <Threshold>
```

Syntax for IPv6

```
g_fwaccel6 synatk -t <Threshold>
```

Thresholds

- The **Global high attack threshold** number is configured to the specified value *<Threshold>*.

  This is the number of half-open TCP connections on all interfaces required for the Accelerated SYN Defender to engage.

  - Valid values: 100 and greater
  - Default: 10000

- The **High attack threshold** number is configured to 1/2 of the specified value *<Threshold>*.

  This is the high number of half-open TCP connections on an interface required for the Accelerated SYN Defender to engage.

  - Valid values: (Low attack threshold) < (High attack threshold) <= (Global high attack threshold)
  - Default: 5000

- The **Low attack threshold** number is configured to 1/10 of the specified value *<Threshold>*.

  This is the low number of half-open TCP connections on an interface required for the Accelerated SYN Defender to engage.

  - Valid values: 10 and greater
  - Default: 1000

fwaccel synatk config

Description

The "*fwaccel synatk config*" and "*fwaccel6 synatk config*" commands show the current Accelerated SYN Defender configuration.

Syntax for IPv4

```
g_fwaccel synatk config
```

Syntax for IPv6

```
g_fwaccel6 synatk config
```

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk config
enabled 0
enforce 1
global_high_threshold 10000
periodic_updates 1
cookie_resolution_shift 6
min_frag_sz 80
high_threshold 5000
low_threshold 1000
score_alpha 100
monitor_log_interval (msec) 60000
grace_timeout (msec) 30000
min_time_in_active (msec) 60000
[Expert@MyChassis-ch0x-0x:0]#
```

Description of Configuration Parameters

Parameter	Description
`enabled`	Shows if the Accelerated SYN Defender is enabled or disabled. - Valid values: 0 (disabled), 1 (enabled) - Default: 0
`enforce`	When the Accelerated SYN Defender is enabled, shows it enforces the protection. Valid values: - 0 - The Accelerated SYN Defender is in Monitor (Detect only) mode on all interfaces. - 1 - The Accelerated SYN Defender is engaged only on external interfaces when the number of half-open TCP connections exceeds the threshold. - 2 - The Accelerated SYN Defender is engaged on both external and internal interfaces when the number of half-open TCP connections exceeds the threshold.
`global_high_threshold`	Global high attack threshold number. See the *"fwaccel synatk -t <Threshold>" on page 128* command.
`periodic_updates`	For internal Check Point use only. - Valid values: 0 (disabled), 1 (enabled) - Default: 1
`cookie_resolution_shift`	For internal Check Point use only. - Valid values: 1-7 - Default: 6
`min_frag_sz`	During the TCP SYN Flood attack, the Accelerated SYN Defender prevents TCP fragments smaller than this minimal size value. - Valid values: 80 and greater - Default: 80
`high_threshold`	High attack threshold number. See the *"fwaccel synatk -t <Threshold>" on page 128* command.
`low_threshold`	Low attack threshold number. See the *"fwaccel synatk -t <Threshold>" on page 128* command.

Parameter	Description
`score_alpha`	For internal Check Point use only. ■ Valid values: 1-127 ■ Default: 100
`monitor_log_interval (msec)`	Interval, in milliseconds, between successive warning logs in the Monitor (Detect only) mode. ■ Valid values: 1000 and greater ■ Default: 60000
`grace_timeout (msec)`	Maximal time, in milliseconds, to stay in the Grace state (which is a transitional state between Ready and Active). In the Grace state, the Accelerated SYN Defender stops challenging Clients for TCP SYN Cookie, but continues to validate TCP SYN Cookies it receives from Clients. ■ Valid values: 10000 and greater ■ Default: 30000
`min_time_in_active (msec)`	Minimal time, in milliseconds, to stay in the Active mode. In the Active mode, the Accelerated SYN Defender is actively challenging TPC SYN packets with SYN Cookies. ■ Valid values: 10000 and greater ■ Default: 60000

fwaccel synatk monitor

Description

The "*fwaccel synatk monitor*" and "*fwaccel6 synatk monitor*" commands show the Accelerated SYN Defender status.

Important - To enable the Accelerated SYN Defender in Monitor (Detect only) mode on all interfaces, you must run the *"fwaccel synatk -m" on page 127* command.

Syntax for IPv4

```
g_fwaccel synatk monitor
        [-p]
        [-p] -a
        [-p] -s
        [-p] -v
```

Syntax for IPv6

```
g_fwaccel6 synatk monitor
      [-p]
      [-p] -a
      [-p] -s
      [-p] -v
```

Parameters

Important - You can specify only one of these parameters: `-a`, `-s`, or `-v`.

Parameter	Description
`-p`	Shows the Accelerated SYN Defender status for each SecureXL instance ("`PPAK ID: 0`" is the Host Security Group Member).
`[-p] -a`	Shows the Accelerated SYN Defender statistics for all interfaces (for each SecureXL instance).
`[-p] -s`	Shows the attack state in short form (for each SecureXL instance).
`[-p] -v`	Shows the attack state in verbose form (for each SecureXL instance).

Examples

Example 1 - Default output before and after enabling the Accelerated SYN Defender

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk monitor
+-----------------------------------------------------------------------------+
| SYN Defender status                                                         |
+-----------------------------------------------------------------------------+
| Configuration                                                      Disabled |
| Status                                                               Normal |
| Non established connections                                               0 |
| Global Threshold                                                      10000 |
| Interface Threshold                                                    5000 |
+-----------------------------------------------------------------------------+
| IF              | Topology | Enforce | State (sec)  | Non-established conns |
|                 |          |         |              | Peak      | Current   |
+-----------------------------------------------------------------------------+
| eth0            | External | Disable | Disable      | N/A       | N/A       |
| eth1            | Internal | Disable | Disable      | N/A       | N/A       |
+-----------------------------------------------------------------------------+
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk -m
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk monitor
+-----------------------------------------------------------------------------+
| SYN Defender status                                                         |
+-----------------------------------------------------------------------------+
| Configuration                                                    Monitoring |
| Status                                                               Normal |
| Non established connections                                               0 |
| Global Threshold                                                      10000 |
| Interface Threshold                                                    5000 |
+-----------------------------------------------------------------------------+
| IF              | Topology | Enforce | State (sec)  | Non-established conns |
|                 |          |         |              | Peak      | Current   |
+-----------------------------------------------------------------------------+
| eth0            | External | Detect  | Monitor      | 0         | 0         |
| eth1            | Internal | Detect  | Monitor      | 0         | 0         |
+-----------------------------------------------------------------------------+
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Showing the Accelerated SYN Defender status for each SecureXL instance

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk monitor -p
+-----------------------------------------------------------------------------+
| SYN Defender status                                                         |
+-----------------------------------------------------------------------------+
| Configuration                                                    Monitoring |
| Status                                                               Normal |
| Non established connections                                               0 |
| Global Threshold                                                      10000 |
| Interface Threshold                                                    5000 |
+-----------------------------------------------------------------------------+
| IF              | Topology | Enforce | State (sec)  | Non-established conns |
|                 |          |         |              | Peak     | Current    |
+-----------------------------------------------------------------------------+
| eth0            | External | Detect  | Monitor      | 0        | 0          |
| eth1            | Internal | Detect  | Monitor      | 0        | 0          |
+-----------------------------------------------------------------------------+

PPAK ID: 0
----------
+-----------------------------------------------------------------------------+
| SYN Defender status                                                         |
+-----------------------------------------------------------------------------+
| Configuration                                                    Monitoring |
| Status                                                               Normal |
| Non established connections                                               0 |
| Global Threshold                                                      10000 |
| Interface Threshold                                                    5000 |
+-----------------------------------------------------------------------------+
| IF              | Topology | Enforce | State (sec)  | Non-established conns |
|                 |          |         |              | Peak     | Current    |
+-----------------------------------------------------------------------------+
| eth0            | External | Detect  | Monitor      | 0        | 0          |
| eth1            | Internal | Detect  | Monitor      | 0        | 0          |
+-----------------------------------------------------------------------------+
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Showing the Accelerated SYN Defender statistics for all interfaces and for each SecureXL instance.

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk monitor -p -a
Global:
  status            attached
  nr_active                0

Firewall
----------
Per-interface:
                            eth0        eth1
                      ----------  ----------
topology                External    Internal
state                    Monitor     Monitor
syn ready                      0           0
syn active prev                0           0
syn active curr                0           0
active_score                   0           0
msec grace                     0           0
msec active                    0           0
sent cookies                   0           0
fail validations               0           0
succ validations               0           0
early packets                  0           0
no conn data                   0           0
bogus syn                      0           0
peak non-estab                 0           0
int sent cookies               0           0
int succ validations           0           0
msec interval                  0           0

PPAK ID: 0
----------
Per-interface:
                            eth0        eth1
                      ----------  ----------
topology                External    Internal
state                    Monitor     Monitor
syn ready                      0           0
syn active prev                0           0
syn active curr                0           0
active_score                   0           0
msec grace                     0           0
msec active                    0           0
sent cookies                   0           0
fail validations               0           0
succ validations               0           0
early packets                  0           0
no conn data                   0           0
bogus syn                      0           0
peak non-estab                 0           0
int sent cookies               0           0
int succ validations           0           0
msec interval                  0           0
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Showing the attack state in short form (for each SecureXL instance)

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk monitor -p -s
M,N,0,0

PPAK ID: 0
----------
M,N,0,0
[Expert@MyChassis-ch0x-0x:0]#
```

Example 5 - Showing the attack state in verbose form (for each SecureXL instance)

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk monitor -p -v
+-----------------------------------------------------------------------------+
| SYN Defender statistics                                                     |
+-----------------------------------------------------------------------------+
| Status                                                               Normal |
| Spoofed SYN/sec                                                           0 |
+-----------------------------------------------------------------------------+
 PPAK ID: 0
----------
+-----------------------------------------------------------------------------+
| SYN Defender statistics                                                     |
+-----------------------------------------------------------------------------+
| Status                                                               Normal |
| Spoofed SYN/sec                                                           0 |
+-----------------------------------------------------------------------------+
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel synatk state

Description

The "*fwaccel synatk state*" and "*fwaccel6 synatk state*" commands control the Accelerated SYN Defender states.

The states are independent for IPv4 and IPv6.

Important - This command is **not** intended for end-user usage. Transitions between states (Ready, Grace, and Active) occur automatically. This command provides a way to force temporarily a state transition on an interface or group of interfaces.

Syntax for IPv4

```
g_fwaccel synatk state
      -h
      -a
      -d
      -g
      -i {all | external | internal | <Name of Interface>}
      -m
      -r
```

Syntax for IPv6

```
g_fwaccel6 synatk state
        -h
        -a
        -d
        -g
        -i {all | external | internal | <Name of Interface>}
        -m
        -r
```

Parameters

Important - You can specify only one of these parameters: `-a`, `-d`, `-g`, `-m`, or `-r`.

Parameter	Description
`-h`	Shows the applicable built-in usage.
`-a`	Sets the state to Active.
`-d`	Sets the state to Disabled.
`-g`	Sets the state to Grace.
`-i all`	Applies the change to all interfaces (this is the default).
`-i external`	Applies the change only to external interfaces.
`-i internal`	Applies the change only to internal interfaces.
`-i` *`<Name of Interface>`*	Applies the change to the specified interface.
`-m`	Sets the state to Monitor (Detect only) mode.
`-r`	Sets the state to Ready.

fwaccel synatk whitelist

Description

The "*fwaccel synatk whitelist*" and "*fwaccel6 synatk whitelist*" commands control the Accelerated SYN Defender whitelist.

Notes:

- This whitelist overrides which packet the Accelerated SYN Defender drops. Before you use a 3rd-party or automatic blacklists, add trusted networks and hosts to the whitelist to avoid outages.
- Also, see the *"fwaccel dos whitelist" on page 75* command.

Syntax for IPv4

```
g_fwaccel synatk whitelist
      -a <IPv4 Address>[/<Subnet Prefix>]
      -d <IPv4 Address>[/<Subnet Prefix>]
      -F
      -l /<Path>/<Name of File>
      -L
      -s
```

Syntax for IPv6

```
g_fwaccel6 synatk whitelist
      -a <IPv6 Address>[/<Subnet Prefix>]
      -d <IPv6 Address>[/<Subnet Prefix>]
      -F
      -l /<Path>/<Name of File>
      -L
      -s
```

Parameters

Parameter	Description
No Parameters	Shows the applicable built-in usage.

Parameter	Description

`-a <IPv4 Address> [/<Subnet Prefix>]`	Adds the specified IPv4 address to the Accelerated SYN Defender whitelist.
	■ `<IPv4 Address>`
	Can be an IPv4 address of a network or a host.
	■ `<Subnet Prefix>`
	Must specify the length of the subnet mask in the format `/<bits>`.
	Optional for a host IPv4 address.
	Mandatory for a network IPv4 address.
	Range - from /1 to /32.
	ⓘ **Important** - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /32.
	Examples:
	■ For a host:
	`192.168.20.30`
	`192.168.20.30/32`
	■ For a network:
	`192.168.20.0/24`

`-a <IPv6 Address> [/<Subnet Prefix>]`	Adds the specified IPv6 address to the Accelerated SYN Defender whitelist.
	■ `<IPv6 Address>`
	Can be an IPv6 address of a network or a host.
	■ `<Subnet Prefix>`
	Must specify the length of the subnet mask in the format `/<bits>`.
	Optional for a host IPv6 address.
	Mandatory for a network IPv6 address.
	Range - from /1 to /128.
	ⓘ **Important** - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /128.
	Examples:
	■ For a host:
	`2001:0db8:85a3:0000:0000:8a2e:0370:7334`
	`2001:0db8:85a3:0000:0000:8a2e:0370:7334/128`
	■ For a network:
	`2001:cdba:9abc:5678::/64`

Parameter	Description
`-d <IPv4 Address> [/<Subnet Prefix>]`	Removes the specified IPv4 address from the Accelerated SYN Defender whitelist. - `<IPv4 Address>` Can be an IPv4 address of a network or a host. - `<Subnet Prefix>` Optional. Must specify the length of the subnet mask in the format `/<bits>`. Optional for a host IPv4 address. Mandatory for a network IPv4 address. Range - from /1 to /32. ℹ **Important** - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /32.
`-d <IPv6 Address> [/<Subnet Prefix>]`	Removes the specified IPv6 address from the Accelerated SYN Defender whitelist. - `<IPv6 Address>` Can be an IPv6 address of a network or a host. - `<Subnet Prefix>` Optional. Must specify the length of the subnet mask in the format `/<bits>`. Optional for a host IPv6 address. Mandatory for a network IPv6 address. Range - from /1 to /128. ℹ **Important** - If you do not specify the subnet prefix explicitly, this command uses the subnet prefix /128.
`-F`	Removes (flushes) all entries from the Accelerated SYN Defender whitelist.

Parameter	Description
`-l /<`*`Path`*`>/<`*`Name of File`*`>`	Loads the Accelerated SYN Defender whitelist entries from the specified plain-text file. **Note** - To replace the current whitelist with the contents of a new file, use both the `-F` and `-l` parameters on the same command line. **Important:** ■ You must manually create and configure this file with the `touch` or `vi` command. ■ You must assign at least the read permission to this file with the `chmod +x` command. ■ Each entry in this file must be on a separate line. ■ Each entry in this file must be in this format: `<`*`IPv4 Address`*`>[/<`*`Subnet Prefix`*`>]` ■ SecureXL ignores empty lines and lines that start with the # character in this file.
`-L`	Loads the Accelerated SYN Defender whitelist entries from the plain-text file with a predefined name: `$FWDIR/conf/synatk-whitelist-v4.conf` Security Group automatically runs these commands "`{fwaccel | fwaccel6} synatk whitelist -L`" during each boot. **Note** - To replace the current whitelist with the contents of a new file, use both the "`-F`" and "`-L`" parameters on the same command line. **Important:** ■ This file does not exist by default. ■ You must manually create and configure this file with the `touch` or `vi` command. ■ You must assign at least the read permission to this file with the `chmod +x` command.. ■ Each entry in this file must be on a separate line. ■ Each entry in this file must be in this format: `<`*`IPv4 Address`*`>[/<`*`Subnet Prefix`*`>]` ■ SecureXL ignores empty lines and lines that start with the # character in this file.
`-s`	Shows the current Accelerated SYN Defender whitelist entries.

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk whitelist -a 192.168.20.0/24
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk whitelist -s
192.168.20.0/24
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk whitelist -d 192.168.20.0/24
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk whitelist -a 192.168.40.55
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk whitelist -s
192.168.40.55/32
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel synatk whitelist -d 192.168.40.55
```

fwaccel tab

Description

The *fwaccel tab* and *fwaccel6 tab* commands show the contents of the specified SecureXL kernel table.

Notes:

- Dynamic tables, such as the `connections` table can change while this command prints their contents.
  This may cause some values to be missed or reported twice.
- For some tables, the command prints their contents on the screen.
- For some tables, the command prints their contents to the `/var/log/messages` file.
- Also, see the "`fw tab`" command in the *R80.20 CLI Reference Guide*.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] tab [-f] [-m <Number of Rows>] -t <Name of Kernel Table>
```

```
fwaccel [-i <SecureXL ID>] tab -s -t <Name of Kernel Table>
```

Syntax for IPv6

```
fwaccel6 tab [-f] [-m <Number of Rows>] -t <Name of Kernel Table>
```

```
fwaccel6 tab -s -t <Name of Kernel Table>
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the applicable built-in usage.
`-f`	Formats the output. We recommend to always use this parameter.
`-m <Number of Rows>`	Specifies how many rows to show from the kernel table. Note - The command counts from the top of the table. Default : 1000
`-s`	Shows summary information only.
`-t <Name of Kernel Table>`	Specifies the kernel table. This command supports only these kernel tables: ■ `connections` ■ `dos_ip_blacklists` ■ `dos_pbox` ■ `dos_pbox_violating_ips` ■ `dos_rate_matches` ■ `dos_rate_track_src` ■ `dos_rate_track_src_svc` ■ `drop_templates` ■ `frag_table` ■ `gtp_apns` ■ `gtp_tunnels` ■ `if_by_name` ■ `inbound_SAs` ■ `invalid_replay_counter` ■ `ipsec_mtu_icmp` ■ `mcast_drop_conns` ■ `outbound_SAs` ■ `PMTU_table` ■ `<Profile>` ■ `reset_table` ■ `vpn_link_selection` ■ `vpn_trusted_ifs`

Examples

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -f -m 200 -t connections
Table connections is empty
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t inbound_SAs
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t outbound_SAs
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t vpn_link_selection
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t drop_templates
Table drop_templates is empty
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t vpn_trusted_ifs
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t profile
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t mcast_drop_conns
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t invalid_replay_counter
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t ipsec_mtu_icmp
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t gtp_tunnels
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t gtp_apns
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t if_by_name
Table contents written to /var/log/messages.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t PMTU_table
Table PMTU_table is empty
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t frag_table
Table frag_table is empty
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t reset_table
Table reset_table is empty
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t dos_ip_blacklists
Table dos_ip_blacklists is not active for SecureXL device 0.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t dos_pbox
Table dos_pbox is not active for SecureXL device 0.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t dos_rate_matches
Table dos_rate_matches is not active for SecureXL device 0.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t dos_rate_track_src
Table dos_rate_track_src is not active for SecureXL device 0.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t dos_rate_track_src_svc
Table dos_rate_track_src_svc is not active for SecureXL device 0.
[Expert@MyChassis-ch0x-0x:0]#
```

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel tab -t dos_pbox_violating_ips
Table dos_pbox_violating_ips is not active for SecureXL device 0.
[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel templates

Description

The *fwaccel templates* and *fwaccel6 templates* commands show the contents of the SecureXL templates tables:

- Accept Templates
- Drop Templates

Important - Based on the number of current templates, these commands can consume memory at very high level.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax for IPv4

```
fwaccel [-i <SecureXL ID>] templates
        [-h]
        [-d]
        [-m <Number of Rows>]
        [-s]
        [-S]
```

Syntax for IPv6

```
fwaccel6 templates
      [-h]
      [-d]
      [-m <Number of Rows>]
      [-s]
      [-S]
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
No Parameters	Shows the contents of the SecureXL Accept Templates table (Table Name - `cphwd_tmpl`, Table ID - 8111).
`-h`	Shows the applicable built-in usage.
`-d`	Shows the contents of the SecureXL Drop Templates table.
`-m <Number of Rows>`	Specifies how many rows to show from the templates table. Note - The command counts from the top of the table. Default : 1000
`-s`	Shows the summary of SecureXL Connections Templates (number of templates)
`-S`	Shows statistics for the SecureXL Connections Templates.

Accept Templates flags

One or more of these flags appears in the output:

Flag	Instructions
A	Connection is accounted (SecureXL counts the number of packets and bytes).
B	Connection is created for a rule that contains an Identity Awareness object, or for a rule below that rule.
D	Connection is created for a rule that contains a Domain object, or for a rule below that rule.
I	Identity Awareness (NAC) is enabled for this connection.
N	Connection is NATed.
O	Connection is created for a rule that contains a Dynamic object, or for a rule below that rule.
Q	QoS is enabled for this connection.
R	Connection is created for a rule that contains a Traceroute object, or for a rule below that rule.
S	PXL (combination of SecureXL and PSL (Passive Streaming Library)) is enabled for this connection.
T	Connection is created for a rule that contains a Time object, or for a rule below that rule.
U	Connection is unidirectional.
Z	Connection is created for a rule that contains a Security Zone object, or for a rule below that rule.

Drop Templates flags

One or more of these flags appears in the output:

Flag	Instructions
D	Drop template exists for this connection.
L	Log and Drop action for this connection.

Examples

Example 1 - Default output

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel templates
Source          SPort Destination     DPort PR Flags         LCT  DLY C2S i/f S2C i/f
--------------- ----- --------------- ----- -- ------------  ---- --- ------- -------
192.168.10.20       * 192.168.10.50      80  6            0     0   0 eth5/eth1 eth1/eth5
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Drop Templates

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel templates -d
The SecureXL drop templates table is empty
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Summary of SecureXL Connections Templates

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel templates -s
Total number of templates: 1
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Templates statistics

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel templates -S

Templates stats:

 Name                     Value           Name                     Value
--------------------     ------------    --------------------     ------------
C templates                         0    conns from templates                0
nat templates                       0    conns from nat tmpl                 0
C CPASXL templates                  0    C PSLXL templates                   0
C used templates                    0    cpasxl tmpl conns                   0
pslxl tmpl conns                    0    C conns from tmpl                   0

[Expert@MyChassis-ch0x-0x:0]#
```

fwaccel ver

Description

Shows this information:

- Firewall Version and Build
- Accelerator Version
- Firewall API version
- Accelerator API version

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax

```
fwaccel ver
```

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel ver
Firewall version: R80.20SP - Build 123
Acceleration Device: Performance Pack
Accelerator Version 2.1
Firewall API version: 3.0NG (19/11/2015)
Accelerator API version: 3.0NG (19/11/2015)
[Expert@MyChassis-ch0x-0x:0]#
```

'sim' and 'sim6'

Description

The `sim` command controls the SecureXL device (infrastructure) for IPv4 traffic while a Security Group is running.

The `sim6` command controls the SecureXL device (infrastructure) for IPv6 traffic while a Security Group is running.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`sim ...`" and "`sim6 ...`" commands.
- In the Expert mode, run the "`g_sim ...`" and "`g_sim6 ...`" commands.

Syntax for IPv4

```
sim [-i <SecureXL ID>]
      affinity <options>
      affinityload
      enable_aesni
      if
      nonaccel <options>
      ver <options>
```

Syntax for IPv6

```
sim6
      affinity <options>
      affinityload
      enable_aesni
      if
      nonaccel <options>
      ver <options>
```

Parameters

Parameter	Description
No Parameters `help`	Shows the built-in usage.

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).
`affinity <options>`	Controls the affinity settings of network interfaces to CPU cores. See *"sim affinity" below*.
`affinityload`	Applies the SecureXL SIM Affinity in the 'Automatic' mode. See *"sim affinityload" on page 154*.
`enable_aesni`	Enables AES-NI (if the CPU supports this feature). See *"sim enable_aesni" on page 155*.
`if`	Shows the list of interfaces that SecureXL uses. See *"sim if" on page 156*.
`nonaccel <options>`	Sets the specified interface(s) as non-accelerated. Clears the specified interface(s) from non-accelerated state. See *"sim nonaccel" on page 160*.
`ver <options>`	Shows this information: - SecureXL (Performance Pack) version - Kernel version See *"sim ver" on page 162*.

sim affinity

Description

Controls the SecureXL affinity settings of network interfaces to CPU cores.

Important - SecureXL can affine network interfaces only to CPU cores that run as CoreXL SND. For more information, see sk98737 - ATRG: CoreXL.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`sim ...`" and "`sim6 ...`" commands.
- In the Expert mode, run the "`g_sim ...`" and "`g_sim6 ...`" commands.

Syntax for IPv4

```
sim [-i <SecureXL ID>] affinity
      -a
      -h
      -l
      -s
```

Syntax for IPv6

```
sim6 affinity
      -a
      -h
      -l
      -s
```

Parameters

Parameter	Description
-i <*SecureXL ID*>	Specifies the SecureXL instance ID (for IPv4 only).
-a	Configures the affinity in 'Automatic' mode. SecureXL periodically examines the load on the CPU cores and the amount of traffic on the interfaces. Based on the results, SecureXL can reassign interfaces to other CPU cores to distribute their load better..
-h	Shows the applicable built-in usage.
-l	Shows the current affinity settings.
-s	Configures the affinity in 'Static' ('Manual') mode. SecureXL does not reassign interfaces to other CPU cores to distribute their load better.

Example 1 - Default output

```
[Expert@MyChassis-ch0x-0x:0]# sim affinity
Usage: sim affinity <options>

Options:
   -l -
   -s - set affinity settings manually
   -a - set affinity settings automatically
   -h - this help message

[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - SIM Affinity is in Automatic mode

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/cpuinfo | grep processor
processor : 0
processor : 1
processor : 2
processor : 3
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active | CPU | Connections | Peak
----------------------------------------------
 0 | Yes    | 3   |           3 |          21
 1 | Yes    | 2   |           6 |          13
 2 | Yes    | 1   |           5 |          13
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# sim affinity -l
eth6 : 0
eth0 : 0
eth3 : 0
eth1 : 0
eth4 : 0
eth2 : 0
eth5 : 0
[Expert@MyChassis-ch0x-0x:0]#
```

sim affinityload

Description

Configures the SecureXL affinity settings of network interfaces to CPU cores in 'Automatic' mode.

This command is the same as the *"sim affinity" on page 152* command.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`sim ...`" and "`sim6 ...`" commands.
- In the Expert mode, run the "`g_sim ...`" and "`g_sim6 ...`" commands.

Syntax for IPv4

```
sim [-i <SecureXL ID>] affinityload
```

Syntax for IPv6

```
sim6 affinityload
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).

Example

```
[Expert@MyChassis-ch0x-0x:0]# sim affinityload
[Expert@MyChassis-ch0x-0x:0]#
```

sim enable_aesni

Description

Enables SecureXL support for AES Instruction Set (AES-NI), if the CPU supports it.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`sim ...`" and "`sim6 ...`" commands.
- In the Expert mode, run the "`g_sim ...`" and "`g_sim6 ...`" commands.

Syntax for IPv4

```
sim [-i <SecureXL ID>] enable_aesni
```

Syntax for IPv6

```
sim6 enable_aesni
```

Possible command outputs

- `sim_aesni_enable: Enabled AES-NI, but machine does not have this feature`
- `sim_aesni_enable: Enabled AES-NI, and the machine supports this feature`
- `sim_aesni_enable: Failed to enable AES-NI. RC=-1`

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).

Example

```
[Expert@MyChassis-ch0x-0x:0]# sim enable_aesni
ioctl 33 to the sim device failed (ppak_id=0, rc=-1, errno=1)
sim_aesni_enable: Failed to enable AES-NI. RC=-1
[Expert@MyChassis-ch0x-0x:0]#
```

sim if

Description

Shows the list of interfaces that SecureXL uses.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`sim ...`" and "`sim6 ...`" commands.
- In the Expert mode, run the "`g_sim ...`" and "`g_sim6 ...`" commands.

Syntax for IPv4

```
sim [-i <SecureXL ID>] if
```

Syntax for IPv6

```
sim6 if
```

Parameters

Parameter	Description
`-i <SecureXL ID>`	Specifies the SecureXL instance ID (for IPv4 only).

Example

```
[Expert@MyChassis-ch0x-0x:0]# sim if
 Name       | Address          | Netmask   | CXL Address      | CXL Netmask      | MTU   |  F   | SIM F
| IRQ | IFN:FWN:DVN | Dev
------------------------------------------------------------------------------------------------
-----------------------------------
 eth0       | 192.168.3.242    | 0.0.0.0   | 192.168.3.243    | 255.255.255.0   | 1500 | 039 | 00080
|  67 |   2:  1:  2 | 0x0x3e836000
 eth1       | 10.20.30.242     | 0.0.0.0   | 0.0.0.0          | 0.0.0.0         | 1500 | 029 | 00088
|  75 |   3:  2:  3 | 0x0x3d508000
 eth2       | 0.0.0.0          | 0.0.0.0   | 0.0.0.0          | 0.0.0.0         | 1500 | 001 | 00080
|  59 |   4:  3:  4 | 0x0x3d6b4000
 eth3       | 192.168.196.18   | 0.0.0.0   | 40.50.60.52      | 0.0.0.0         | 1500 | 029 | 00080
|  67 |   5:  4:  5 | 0x0x3dbc1000
 eth4       | 192.168.196.18   | 0.0.0.0   | 100.100.100.53   | 0.0.0.0         | 1500 | 029 | 00080
|  83 |   6:  5:  6 | 0x0x3d678000
 eth5       | 0.0.0.0          | 0.0.0.0   | 0.0.0.0          | 0.0.0.0         | 1500 | 001 | 00080
|  75 |   7:  6:  7 | 0x0x3c6ba000
 eth6       | 0.0.0.0          | 0.0.0.0   | 0.0.0.0          | 0.0.0.0         | 1500 | 001 | 00080
|  59 |   8:  7:  8 | 0x0x3e370000
 eth2.53    | 192.168.196.2    | 0.0.0.0   | 200.200.200.53   | 0.0.0.0         | 1500 | 029 | 00580
|   0 |  11: 10: 11 | 0x0x2ca90000
 eth2.52    | 192.168.196.2    | 0.0.0.0   | 70.80.90.52      | 0.0.0.0         | 1500 | 029 | 00580
|   0 |  12: 11: 12 | 0x0x2c980000
[Expert@MyChassis-ch0x-0x:0]#
```

Explanation about the configuration flags in the "F" and "SIM F" columns

The "**F**" column shows the internal configuration flags that Firewall set on these interfaces.

The "**SIM F**" column shows the internal configuration flags that SecureXL set on these interfaces.

Flag	Instructions
0x001	If this flag is set, the SecureXL drops the packet at the end of the inbound inspection, if the packet is a "cut-through" packet. In outbound, SecureXL forwards all the packets to the network.
0x002	If this flag is set, the SecureXL sends an applicable notification when a TCP state change occurs (connection is established or torn down).

Flag	Instructions
0x004	If this flag is set, the SecureXL it sets the UDP header's checksum field correctly when the SecureXL encapsulates an encrypted packet (UDP encapsulation). If this flag is not set, SecureXL sets the UDP header's checksum field to zero. It is safe to ignore this flag, if it is set to 0 (SecureXL continues to calculate the UDP packet's checksum).
0x008	If this flag is set, the SecureXL does not create new connections that match a template, and SecureXL drops the packet that matches the template, when the number of entries in the Connections Table reaches the specified limit. If this flag is not set, the SecureXL forwards the packet to the Firewall.
0x010	If this flag is set, the SecureXL forwards fragments to the Firewall.
0x020	If this flag is set, the SecureXL does not create connections from TCP templates anymore. The Firewall offloads connections to SecureXL when necessary. This flag only disables the creation of TCP templates.
0x040	If this flag is set, the SecureXL notifies the Firewall at intervals, so it refreshes the accelerated connections in the Firewall kernel tables.
0x080	If this flag is set, the SecureXL does not create connections from non-TCP templates anymore. The Firewall offloads connections to SecureXL when necessary. This flag only disables the creation of non-TCP templates.
0x100	If this flag is set, the SecureXL allows sequence verification violations for connections that did not complete the TCP 3-way handshake process. If this flag is not set, SecureXL must forward the violating packets to the Firewall.
0x200	If this flag is set, the SecureXL allows sequence verification violations for connections that completed the TCP 3-way handshake process. If this flag is not set, SecureXL must forward the violating packets to the Firewall.
0x400	If this flag is set, the SecureXL forwards TCP [RST] packets to the Firewall.
0x0001	If this flag is set, the SecureXL notifies the Firewall about HitCount data.
0x0002	If this flag is set, the VSX Virtual System works as a junction, rather than a regular Virtual System (only the local Virtual System flag is applicable).

Flag	Instructions
0x0004	If this flag is set, the SecureXL disables the reply counter of inbound encrypted traffic. At a result, SecureXL kernel module works in the same way as the VPN kernel module.
0x0008	If this flag is set, the SecureXL enables the MSS Clamping. Refer to the kernel parameters "`fw_clamp_tcp_mss`" and "`fw_clamp_vpn_mss`" in sk101219.
0x0010	If this flag is set, the SecureXL disables the "No Match Ranges" (NMR) Templates (see sk117755).
0x0020	If this flag is set, the SecureXL disables the "No Match Time" (NMT) Templates (see sk117755).
0x0040	If this flag is set, the SecureXL does not send Drop Templates notifications about dropped packets to the Firewall (to update the drop counters). For example, if you set the value of the kernel parameter "`activate_optimize_drops_support_now`" to 1, it disables the Drop Templates notifications.
0x0080	If this flag is set, the SecureXL enables the MultiCore support for IPsec VPN (see sk118097).
0x0100	If this flag is set, the SecureXL enables the support for CoreXL Dynamic Dispatcher (see sk105261).
0x0800	If this flag is set, the SecureXL does not enforce the Path MTU Discovery for IP multicast packets.
0x1000	If this flag is set, the SecureXL disables the SIM "drop_templates" feature.
0x2000	If this flag is set, it indicates that an administrator enabled the Link Selection Load Sharing feature.
0x4000	If this flag is set, the SecureXL disables the asynchronous notification feature.
0x8000	If this flag is set, it indicates that the capacity of the Firewall Connections Table is unlimited.

Examples:

Value	Instructions
0x039	Means the sum of these flags: - 0x001 - 0x008 - 0x010 - 0x020
0x00008a16	Means the sum of these flags: - 0x0002 - 0x0004 - 0x0010 - 0x0200 - 0x0800 - 0x8000
0x00009a16	Means the sum of these flags: - 0x0002 - 0x0004 - 0x0010 - 0x0200 - 0x0800 - 0x1000 - 0x8000

sim nonaccel

Description

- Sets the specified interfaces as non-accelerated.
- Clears the specified interfaces from non-accelerated state.

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`sim ...`" and "`sim6 ...`" commands.
- In the Expert mode, run the "`g_sim ...`" and "`g_sim6 ...`" commands.

Syntax for IPv4

```
sim [-i <SecureXL ID>] nonaccel
      -c <Name of Interface 1> [<Name of Interface 2> ... <Name of
Interface N>]
      -s <Name of Interface 1> [<Name of Interface 2> ... <Name of
Interface N>]
```

Syntax for IPv6

```
sim6 nonaccel
      -c <Name of Interface 1> [<Name of Interface 2> ... <Name of
Interface N>]
      -s <Name of Interface 1> [<Name of Interface 2> ... <Name of
Interface N>]
```

Parameters

Parameter	Description
-i <SecureXL ID>	Specifies the SecureXL instance ID (for IPv4 only).
-c	Sets the specified interfaces as non-accelerated.
-s	Clears the specified interfaces from non-accelerated state.
<Name of Interface>	Specifies the interface.

Example

```
[Expert@MyChassis-ch0x-0x:0]# sim nonaccel -s eth0
Interface eth0 set as non-accelerated.

Note: Changes will not take affect until the next time acceleration
      is started or the relevant interface(s) are restarted.
[Expert@MyChassis-ch0x-0x:0]#

[Expert@MyChassis-ch0x-0x:0]# sim nonaccel -c eth0
Interface eth0 set as accelerated.

Note: Changes will not take affect until the next time acceleration
      is started or the relevant interface(s) are restarted.
[Expert@MyChassis-ch0x-0x:0]#
```

sim ver

Description

Shows this information:

- SecureXL (Performance Pack) version
- Kernel version

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`sim ...`" and "`sim6 ...`" commands.
- In the Expert mode, run the "`g_sim ...`" and "`g_sim6 ...`" commands.

Syntax for IPv4

```
sim ver [-k]
```

Syntax for IPv6

```
sim6 ver [-k]
```

Parameters

Parameter	Description
No Parameters	Shows only the SecureXL (Performance Pack) version
`-k`	Shows this information: ■ SecureXL (Performance Pack) version ■ Kernel version

Example

```
[Expert@MyChassis-ch0x-0x:0]# sim ver
This is Check Point Performance Pack version: R80.20SP - Build 123
Kernel version: R80.20SP - Build 456
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# sim ver -k
This is Check Point Performance Pack version: R80.20SP - Build 123
Kernel version: R80.20SP - Build 456
[Expert@MyChassis-ch0x-0x:0]#
```

fw monitor

Description

Firewall Monitor is the Check Point traffic capture tool.

In a Security Gateway, traffic passes through different inspection points - Chain Modules in the Inbound direction and then in the Outbound direction (see the "`fw ctl chain`" command in the *R80.20 CLI Reference Guide*).

The FW Monitor tool captures the traffic at each Chain Module in both directions.

You can later analyze the captured traffic with the same FW Monitor tool, or with special tools like Wireshark.

Important:
The same command must run on all Security Group Members.

- In Gaia gClish, run the "`fw monitor ...`" commands.
- In the Expert mode, run the "`g_fw monitor...`" commands.

Notes:

- Only one instance of "`fw monitor`" can run at a time.
- You can stop the "`fw monitor`" instance in one of these ways:
  - In the shell, in which the "`fw monitor`" instance runs, press **CTRL + C** keys
  - In another shell, run this command: `fw monitor -U`
- Each time you run the FW Monitor, it compiles its temporary policy files (`$FWDIR/tmp/monitorfilter.*`).
- From R80.20SP, the FW Monitor is able to show the traffic accelerated with SecureXL.
- For more information, see sk30583 and How to use FW Monitor.

Syntax for IPv4

```
fw monitor {-h | -help}
```

```
fw monitor [-d] [-D] [-ci <Number of Inbound Packets>] [-co
<Number of Outbound Packets>] [-e <INSPECT Expression> | -f
{<INSPECT Filter File> | -}] [-F "<Source IP>,<Source Port>,<Dest
IP>,<Dest Port>,<Protocol Number>"] [-i] [-l <Length>] [-m
{i,I,o,O,e,E}] [-o <Output File> [-w]] [[-pi <Position>] [-pI
<Position>] [-po <Position>] [-pO <Position>] | -p all [-a]] [-T]
[-u | -s] [-U] [-v <VSID>] [-x <Offset>[,<Length>] [-w]]
```

Syntax for IPv6

```
fw6 monitor {-h | -help}
```

```
fw6 monitor [-d] [-D] [-ci <Number of Inbound Packets>] [-co
<Number of Outbound Packets>] [-e <INSPECT Expression> | -f
{<INSPECT Filter File> | -}] [-F "<Source IP>,<Source Port>,<Dest
IP>,<Dest Port>,<Protocol Number>"] [-i] [-l <Length>] [-m
{i,I,o,O,e,E}] [-o <Output File> [-w]] [[-pi <Position>] [-pI
<Position>] [-po <Position>] [-pO <Position>] | -p all [-a]] [-T]
[-u | -s] [-U] [-v <VSID>] [-x <Offset>[,<Length>] [-w]]
```

Parameters

Parameter	Description
`{-h | -help}`	Shows the built-in usage.
`-d` `-D`	Runs the command in debug mode and shows some information about how the FW Monitor starts and compiles the specified INSPECT filter: ■ `-d` Simple debug output. ■ `-D` Verbose output. **Note** - You can specify both parameters to show more information.

`-ci <Number of Inbound Packets>`
`-co <Number of Outbound Packets>`
	Specifies how many packets to capture.
	The FW Monitor stops the traffic capture if it counted the specified number of packets.
	■ `-ci`
	Specifies the number of inbound packets to count.
	■ `-co`
	Specifies the number of inbound packets to count
	Best Practice - You can use the "`-ci`" and the "`-co`" parameters together. This is especially useful during large volumes of traffic. In such scenarios, FW Monitor may bind so many resources (for writing to the console, or to a file) that recognizing the break sequence (**CTRL+C**) might take a very long time.

Parameter	Description

`-e <INSPECT Expression>`
or
`-f {<INSPECT Filter File> | -}`
	Captures only specific packets of non-accelerated traffic:
	■ `"-e <INSPECT Expression>"`
	Defines the INSPECT filter expression on the command line.
	■ `"-f <INSPECT Filter File>"`
	Reads the INSPECT filter expression from the specified file. You must enter the full path and name of the plain-text file that contains the INSPECT filter expression.
	■ `"-f -"`
	Reads the INSPECT filter expression from the standard input. After you enter the INSPECT filter expression, you must enter the `^D` (**CTRL+D**) as the EOF (End Of File) character.
	Warning - These INSPECT filters do **not** apply to the accelerated traffic.
	Important - Make sure to enclose the INSPECT filter expression correctly in single quotes (ASCII value 39) or double quotes (ASCII value 34).
	Notes:
	■ Refer to the `$FWDIR/lib/fwmonitor.def` file for useful macro definitions.
	■ See syntax examples below (*"Examples for the "-e" parameter" on page 180*).

`-F "<Source IP>,<Source Port>,<Dest IP>,<Dest Port>,<Protocol Number>"`	Specifies the capture filter (for both accelerated and non-accelerated traffic): ■ `<Source IP>` - Specifies the source IP address ■ `<Source Port>` - Specifies the source Port Number (see *IANA Service Name and Port Number Registry*) ■ `<Dest IP>` - Specifies the destination IP address ■ `<Dest Port>` - Specifies the destination Port Number (see *IANA Service Name and Port Number Registry*) ■ `<Protocol Number>` - Specifies the Protocol Number (see *IANA Protocol Numbers*)

Parameter	Description

	Notes:
	■ See syntax examples below (*"Examples for the "-F" parameter" on page 194*).
	■ The "`-F`" parameter uses these Kernel Debug Filters (see *"Kernel Debug Filters" on page 379*):
	• For the Source IP address:
	`simple_debug_filter_saddr_<N> "<IP Address>"`
	• For the Source Ports:
	`simple_debug_filter_sport_<N> <1-65535>`
	• For the Destination IP address:
	`simple_debug_filter_daddr_<N> "<IP Address>"`
	• For the Destination Ports:
	`simple_debug_filter_dport_<N> <1-65535>`
	• For the Protocol Number:
	`command_simple_debug_filter_proto_<N> <0-254>`
	■ Value 0 means "`any`".
	■ This parameter supports up to 5 capture filters (up to 5 instances of the "`-F`" parameter in the syntax).
	The FW Monitor performs the logical "OR" between all specified simple capture filters.

`-H`	Creates an IP address filter. For more information, see *"Kernel Debug Filters" on page 379*. This parameter supports up to 3 capture filters (up to 3 instances of the "`-H`" parameter in the syntax). Example - Capture only HTTP traffic to and from the Host 1.1.1.1: `fw ctl debug -H "1.1.1.1"`

Parameter	Description
`-i`	Flushes the standard output. **Note** - This parameter is valid only with the "`-v <VSID>`" parameter. **Best Practice** - Use this parameter to make sure FW Monitor immediately writes the captured data for each packet to the standard output. This is especially useful if it is necessary to kill a running FW Monitor process, and want to be sure that FW Monitor writes all the data to the specified file.
`-l <Length>`	Specifies the maximal length of the captured packets. FW Monitor reads only the specified number of bytes from each packet. **Notes:** - This parameter is optional. - This parameter lets you capture only the headers from each packet (for example, IP and TCP) and omit the payload. This decreases the size of the output file. This also helps the internal FW Monitor buffer not to fill too fast. - Make sure to capture the minimal required number of bytes, to capture the Layer 3 IP header and Layer 4 Transport header.

Parameter	Description
`-m {i, I, o, O, e, E}`	Specifies the capture mask (inspection point) in relation to Chain Modules, in which the FW Monitor captures the traffic. These are the inspection points, through which each packet passes on a Security Gateway. ■ `-m i` Pre-Inbound only (before the packet enters a Chain Module in the inbound direction) ■ `-m I` Post-Inbound only (after the packet passes a Chain Module in the inbound direction) ■ `-m o` Pre-Outbound only (before the packet enters a Chain Module in the outbound direction) ■ `-m O` Post-Outbound only (after the packet passes through a Chain Module in the outbound direction) ■ `-m e` Pre-Outbound VPN only (before the packet enters a VPN Chain Module in the outbound direction) ■ `-m E` Post-Outbound VPN only (after the packet passes through a VPN Chain Module in the outbound direction)

Parameter	Description
	Notes: ■ You can specify several capture masks (for example, to see NAT on the egress packets, enter "`... -m o O ...`"). ■ You can use this capture mask parameter "`-m {i, I, o, O, e, E}`" together with the chain module position parameter "`-p{i | I | o | O}`". ■ In the inbound direction: • All chain positions *before* the FireWall Virtual Machine module are Pre-Inbound (the "`fw ctl chain`" command shows this module as "`fw VM inbound`"). • All chain modules *after* the FireWall Virtual Machine module are Post-Inbound. ■ In the outbound direction: • All chain position *before* the FireWall Virtual Machine module are Pre-Outbound. • All chain modules *after* the FireWall Virtual Machine module are Post-Outbound. ■ By default, the FW Monitor captures the traffic only in the FireWall Virtual Machine module. ■ The packet direction relates to each specific packet, and not to the connection's direction. ■ The letters "`q`" and "`Q`" after the inspection point mean that the QoS policy is applied to the interface.

	Example packet flows:
	■ From a Client to a Server through the FireWall Virtual Machine module:
	`[Client] --> ("i") {FW VM attached to eth1} ("I") [Security Group] ("o") {FW VM attached to eth2} ("O") --> [Server]`
	■ From a Server to a Client through the FireWall Virtual Machine module:
	`[Client] <-- ("O") {FW VM attached to eth1} ("o") [Security Group] ("I") {FW VM attached to eth2} ("i") <-- [Server]`

Parameter	Description
`-o <Output File>`	Specifies the output file, to which FW Monitor writes the captured raw data. ⓘ **Important** - If you do not specify the path explicitly, FW Monitor creates this output file in the current working directory. Because this output file can grow very fast to very large size, we always recommend to specify the full path to the largest partition `/var/log/`. The format of this output file is the same format used by tools like `snoop` (refer to RFC 1761). You can later analyze the captured traffic with the same FW Monitor tool, or with special tools like Wireshark.

`-pi <Position>`
`-pI <Position>`
`-po <Position>`
`-pO <Position>`
or
`-p all [-a]`
	Inserts the FW Monitor Chain Module at the specified position between the kernel Chain Modules (see the "`fw ctl chain`" command in the *R80.20 CLI Reference Guide*).
	If the FW Monitor writes the captured data to the specified output file (with the parameter "`-o <Output File>`"), it also writes the position of the FW Monitor chain module as one of the fields.
	You can insert the FW Monitor Chain Module in these positions only:
	▪ `-pi <Position>`
	Inserts the FW Monitor Chain Module in the specified Pre-Inbound position.
	▪ `-pI <Position>`
	Inserts the FW Monitor Chain Module in the specified Post-Inbound position.
	▪ `-po <Position>`
	Inserts the FW Monitor Chain Module in the specified Pre-Outbound position.
	▪ `-pO <Position>`
	Inserts the FW Monitor Chain Module in the specified Post-Outbound position
	▪ `-p all [-a]`
	Inserts the FW Monitor Chain Module at all positions (both Inbound and Outbound).
	❗ **Warning** - This parameter causes very high load on the CPU, but provides the most complete traffic capture.
	The "`-a`" parameter specifies to use absolute chain positions. This parameter changes the chain ID from a relative value (which only makes sense with the matching output from the "`fw ctl chain`" command) to an absolute value.

Parameter	Description
	Notes: ■ *<Position>* can be one of these: • A relative position number In the output of the "`fw ctl chain`" command, refer to the numbers in the leftmost column (for example, 0, 5, 14). • A relative position alias In the output of the "`fw ctl chain`" command, refer to the internal chain module names in the rightmost column in the parentheses (for example, `sxl_in`, `fw`, `cpas`). • An absolute position In the output of the "`fw ctl chain`" command, refer to the numbers in the second column from the left (for example, -7fffffff, -1fffff8, 7f730000). In the syntax, you must write these numbers in the hexadecimal format (for example, -0x7fffffff, -0x1fffff8, 0x7f730000). ■ You can use this chain module position parameter "`-p{i | I| o | O} ...`" together with the capture mask parameter "`-m {i, I, o, O, e, E}`". ■ In the inbound direction: • All chain positions *before* the FireWall Virtual Machine module are Pre-Inbound (the "`fw ctl chain`" command shows this modile as "`fw VM inbound`"). • All chain modules *after* the FireWall Virtual Machine module are Post-Inbound. ■ In the outbound direction: • All chain position *before* the FireWall Virtual Machine module are Pre-Outbound. • All chain modules *after* the FireWall Virtual Machine module are Post-Outbound. ■ By default, the FW Monitor captures the traffic only in the FireWall Virtual Machine module. ■ The chain module position parameters "`-p{i | I| o | O} ...`" parameters do **not** apply to the accelerated traffic, which is still monitored at the default inbound and outbound positions. ■ For more information about the inspection points, see the applicable table below.

Parameter	Description
`-T`	Shows the timestamp for each packet: `DDMMMYYYY HH:MM:SS.mmmmmm` **Best Practice** - Use this parameter if you do not save the output to a file, but print it on the screen.

`-u`
or
`-s`
	Shows UUID for each packet (it is only possible to print either the UUID, or the SUUID - not both):
	■ `-u`
	Prints connection's Universal-Unique-ID (UUID) for each packet
	■ `-s`
	Prints connection's Session UUID (SUUID) for each packet

`-U`	Removes the simple capture filters specified with this parameter: `-F "<Source IP>,<Source Port>,<Dest IP>,<Dest Port>,<Protocol Number>"`
`-v <VSID>`	In VSX mode, captures the packets on the specified Virtual System.. By default, FW Monitor captures the packets on all Virtual Systems. Example: `fw monitor -v 4 -e "accept;" -o /var/log/fw_mon.cap`
`-w`	Captures the entire packet, instead of only the header. Must be used together with one of these parameters: ■ `-o <Output File>` ■ `-x <Offset>[,<Length>]`

Parameter	Description
`-x <Offset>[,<Length>]`	Specifies the position in each packet, where the FW Monitor starts to capture the data from each packet. Optionally, it is also possible to limit the amount of data the FW Monitor captures. ■ `<Offset>` Specifies how many bytes to skip from the beginning of each packet. FW Monitor starts to capture the data from each packet only after the specified number of bytes. ■ `<Length>` Specifies the maximal length of the captured packets. FW Monitor reads only the specified number of bytes from each packet. For example, to skip over the IP header and TCP header, enter "`-x 52,96`"

Inspection points in Security Gateway and in the FW Monitor output

Note - The Inbound and Outbound traffic direction relates to each specific packet, and not to the connection.

- *Inbound*

Name of inspection point	Relation to the FireWall Virtual Machine	Notion of inspection point in the FW Monitor output
Pre-Inbound	Before the inbound FireWall VM	i (for example, `eth4:i`)
Post-Inbound	After the inbound FireWall VM	I (for example, `eth4:I`)
Pre-Inbound VPN	Inbound before decrypt	id (for example, `eth4:id`)
Post-Inbound VPN	Inbound after decrypt	ID (for example, `eth4:ID`)
Pre-Inbound QoS	Inbound before QoS	iq (for example, `eth4:iq`)
Post-Inbound QoS	Inbound after QoS	IQ (for example, `eth4:IQ`)

- *Outbound*

Name of inspection point	Relation to the FireWall Virtual Machine	Notion of inspection point in the FW Monitor output
Pre-Outbound	Before the outbound FireWall VM	o (for example, `eth4:o`)
Post-Outbound	After the outbound FireWall VM	O (for example, `eth4:O`)
Pre-Outbound VPN	Outbound before encrypt	e (for example, `eth4:e`)
Post-Outbound VPN	Outbound after encrypt	E (for example, `eth4:E`)
Pre-Outbound QoS	Outbound before QoS	oq (for example, `eth4:oq`)
Post-Outbound QoS	Outbound after QoS	OQ (for example, `eth4:OQ`)

Generic Examples

Example 1 - Default syntax

```
[Expert@HostName-ch0x-0x:0]# g_fw monitor
 monitor: getting filter (from command line)
 monitor: compiling
monitorfilter:
Compiled OK.
 monitor: loading
 monitor: monitoring (control-C to stop)
[vs_0][fw_1] eth0:i[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40 id=31789
TCP: 53901 -> 22 ....A. seq=761113cd ack=f92e2a13
[vs_0][fw_1] eth0:I[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40 id=31789
TCP: 53901 -> 22 ....A. seq=761113cd ack=f92e2a13
[vs_0][fw_1] eth0:i[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40 id=31790
TCP: 53901 -> 22 ....A. seq=761113cd ack=f92e2a47
... ... ...
 monitor: caught sig 2
 monitor: unloading
[Expert@HostName-ch0x-0x:0]#
```

Example 2 - Showing timestamps in the output for each packet

```
[Expert@HostName-ch0x-0x:0]# g_fw monitor -T
 monitor: getting filter (from command line)
 monitor: compiling
monitorfilter:
Compiled OK.
 monitor: loading
 monitor: monitoring (control-C to stop)
[vs_0][fw_1] 12Sep2018 19:08:05.453947 eth0:oq[124]: 192.168.3.53 -> 172.20.168.16 (TCP)
len=124 id=38414
TCP: 22 -> 64424 ...PA. seq=1c23924a ack=3c951092
[vs_0][fw_1] 12Sep2018 19:08:05.453960 eth0:OQ[124]: 192.168.3.53 -> 172.20.168.16 (TCP)
len=124 id=38414
TCP: 22 -> 64424 ...PA. seq=1c23924a ack=3c951092
[vs_0][fw_1] 12Sep2018 19:08:05.454059 eth0:oq[252]: 192.168.3.53 -> 172.20.168.16 (TCP)
len=252 id=38415
TCP: 22 -> 64424 ...PA. seq=1c23929e ack=3c951092
[vs_0][fw_1] 12Sep2018 19:08:05.454064 eth0:OQ[252]: 192.168.3.53 -> 172.20.168.16 (TCP)
len=252 id=38415
TCP: 22 -> 64424 ...PA. seq=1c23929e ack=3c951092
[vs_0][fw_1] 12Sep2018 19:08:05.454072 eth0:oq[252]: 192.168.3.53 -> 172.20.168.16 (TCP)
len=252 id=38416
TCP: 22 -> 64424 ...PA. seq=1c239372 ack=3c951092
[vs_0][fw_1] 12Sep2018 19:08:05.454074 eth0:OQ[252]: 192.168.3.53 -> 172.20.168.16 (TCP)
len=252 id=38416
TCP: 22 -> 64424 ...PA. seq=1c239372 ack=3c951092
[vs_0][fw_1] 12Sep2018 19:08:05.463165 eth0:iq[40]: 172.20.168.16 -> 192.168.3.53 (TCP)
len=40 id=17398
TCP: 64424 -> 22 ....A. seq=3c951092 ack=1c239446
[vs_0][fw_1] 12Sep2018 19:08:05.463177 eth0:IQ[40]: 172.20.168.16 -> 192.168.3.53 (TCP)
len=40 id=17398
TCP: 64424 -> 22 ....A. seq=3c951092 ack=1c239446
 monitor: unloading
[Expert@HostName-ch0x-0x:0]#
```

Example 3 - Capturing only three Pre-Inbound packets at the FireWall Virtual Machine module

```
[Expert@HostName-ch0x-0x:0]# g_fw monitor -m i -ci 3
 monitor: getting filter (from command line)
 monitor: compiling
monitorfilter:
Compiled OK.
 monitor: loading
 monitor: monitoring (control-C to stop)
[vs_0][fw_1] eth0:i[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40 id=31905
TCP: 53901 -> 22 ....A. seq=76111bb5 ack=f92e683b
[vs_0][fw_1] eth0:i[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40 id=31906
TCP: 53901 -> 22 ....A. seq=76111bb5 ack=f92e68ef
[vs_0][fw_1] eth0:i[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40 id=31907
TCP: 53901 -> 22 ....A. seq=76111bb5 ack=f92e69a3
 monitor: unloading
Read 3 inbound packets and 0 outbound packets
[Expert@HostName-ch0x-0x:0]#
```

Example 4 - Inserting the FW Monitor chain is before the chain #2 and capture only three Pre-Inbound packets

```
[Expert@HostName-ch0x-0x:0]# g_fw ctl chain
in chain (15):
        0: -7fffffff (0000000000000000) (00000000) SecureXL inbound (sxl_in)
        1: -7ffffffe (0000000000000000) (00000000) SecureXL inbound CT (sxl_ct)
        2: -7f800000 (ffffffff8b6718c0) (ffffffff) IP Options Strip (in) (ipopt_strip)
        3: - 1fffff8 (ffffffff8b66f6f0) (00000001) Stateless verifications (in) (asm)
        4: - 1fffff7 (ffffffff8b66f210) (00000001) fw multik misc proto forwarding
        5:         0 (ffffffff8b8506a0) (00000001) fw VM inbound  (fw)
        6:         2 (ffffffff8b671d10) (00000001) fw SCV inbound (scv)
        7:         4 (ffffffff8b061ed0) (00000003) QoS inbound offload chain module
        8:         5 (ffffffff8b564d30) (00000003) fw offload inbound (offload_in)
        9:        10 (ffffffff8b842710) (00000001) fw post VM inbound  (post_vm)
        10:    100000 (ffffffff8b7fd6c0) (00000001) fw accounting inbound (acct)
        11:  22000000 (ffffffff8b0638d0) (00000003) QoS slowpath inbound chain mod (fg_sched)
        12:  7f730000 (ffffffff8b3c40b0) (00000001) passive streaming (in) (pass_str)
        13:  7f750000 (ffffffff8b0e5b40) (00000001) TCP streaming (in) (cpas)
        14:  7f800000 (ffffffff8b671870) (ffffffff) IP Options Restore (in) (ipopt_res)
out chain (14):
        0: -7f800000 (ffffffff8b6718c0) (ffffffff) IP Options Strip (out) (ipopt_strip)
        1: - 1ffff0 (ffffffff8b0d0190) (00000001) TCP streaming (out) (cpas)
        2: - 1ffff50 (ffffffff8b3c40b0) (00000001) passive streaming (out) (pass_str)
        3: - 1f00000 (ffffffff8b66f6f0) (00000001) Stateless verifications (out) (asm)
        4: -     1ff (ffffffff8aeec0a0) (00000001) NAC Packet Outbound (nac_tag)
        5:         0 (ffffffff8b8506a0) (00000001) fw VM outbound (fw)
        6:        10 (ffffffff8b842710) (00000001) fw post VM outbound  (post_vm)
        7:  15000000 (ffffffff8b062540) (00000003) QoS outbound offload chain modul (fg_pol)
        8:  21000000 (ffffffff8b0638d0) (00000003) QoS slowpath outbound chain mod (fg_sched)
        9:  7f000000 (ffffffff8b7fd6c0) (00000001) fw accounting outbound (acct)
        10:  7f700000 (ffffffff8b0e4660) (00000001) TCP streaming post VM (cpas)
        11:  7f800000 (ffffffff8b671870) (ffffffff) IP Options Restore (out) (ipopt_res)
        12:  7f900000 (0000000000000000) (00000000) SecureXL outbound (sxl_out)
        13:  7fa00000 (0000000000000000) (00000000) SecureXL deliver (sxl_deliver)
[Expert@HostName-ch0x-0x:0]#
[Expert@HostName-ch0x-0x:0]# g_fw monitor -pi 2 -ci 3
 monitor: getting filter (from command line)
 monitor: compiling
monitorfilter:
Compiled OK.
 monitor: loading
in chain (17):
        0: -7fffffff (0000000000000000) (00000000) SecureXL inbound (sxl_in)
        1: -7ffffffe (0000000000000000) (00000000) SecureXL inbound CT (sxl_ct)
        2: -7f800001 (ffffffff8b6774d0) (ffffffff) fwmonitor (i/f side)
        3: -7f800000 (ffffffff8b6718c0) (ffffffff) IP Options Strip (in) (ipopt_strip)
        4: - 1fffff8 (ffffffff8b66f6f0) (00000001) Stateless verifications (in) (asm)
        5: - 1fffff7 (ffffffff8b66f210) (00000001) fw multik misc proto forwarding
        6:         0 (ffffffff8b8506a0) (00000001) fw VM inbound  (fw)
        7:         2 (ffffffff8b671d10) (00000001) fw SCV inbound (scv)
        8:         4 (ffffffff8b061ed0) (00000003) QoS inbound offload chain module
        9:         5 (ffffffff8b564d30) (00000003) fw offload inbound (offload_in)
        10:        10 (ffffffff8b842710) (00000001) fw post VM inbound  (post_vm)
        11:    100000 (ffffffff8b7fd6c0) (00000001) fw accounting inbound (acct)
        12:  22000000 (ffffffff8b0638d0) (00000003) QoS slowpath inbound chain mod (fg_sched)
        13:  70000000 (ffffffff8b6774d0) (ffffffff) fwmonitor (IP  side)
        14:  7f730000 (ffffffff8b3c40b0) (00000001) passive streaming (in) (pass_str)
        15:  7f750000 (ffffffff8b0e5b40) (00000001) TCP streaming (in) (cpas)
        16:  7f800000 (ffffffff8b671870) (ffffffff) IP Options Restore (in) (ipopt_res)
out chain (16):
        0: -7f800000 (ffffffff8b6718c0) (ffffffff) IP Options Strip (out) (ipopt_strip)
        1: -70000000 (ffffffff8b6774d0) (ffffffff) fwmonitor (i/f side)
        2: - 1ffff0 (ffffffff8b0d0190) (00000001) TCP streaming (out) (cpas)
        3: - 1ffff50 (ffffffff8b3c40b0) (00000001) passive streaming (out) (pass_str)
        4: - 1f00000 (ffffffff8b66f6f0) (00000001) Stateless verifications (out) (asm)
        5: -     1ff (ffffffff8aeec0a0) (00000001) NAC Packet Outbound (nac_tag)
        6:         0 (ffffffff8b8506a0) (00000001) fw VM outbound (fw)
        7:        10 (ffffffff8b842710) (00000001) fw post VM outbound  (post_vm)
        8:  15000000 (ffffffff8b062540) (00000003) QoS outbound offload chain modul (fg_pol)
        9:  21000000 (ffffffff8b0638d0) (00000003) QoS slowpath outbound chain mod (fg_sched)
        10:  70000000 (ffffffff8b6774d0) (ffffffff) fwmonitor (IP side)
        11:  7f000000 (ffffffff8b7fd6c0) (00000001) fw accounting outbound (acct)
        12:  7f700000 (ffffffff8b0e4660) (00000001) TCP streaming post VM (cpas)
```

```
       13:  7f800000 (ffffffff8b671870) (ffffffff) IP Options Restore (out) (ipopt_res)
       14:  7f900000 (0000000000000000) (00000000) SecureXL outbound (sxl_out)
       15:  7fa00000 (0000000000000000) (00000000) SecureXL deliver (sxl_deliver)
 monitor: monitoring (control-C to stop)
[vs_0][fw_1] eth0:oq1 (TCP streaming (out))[1228]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=1228 id=37575
TCP: 22 -> 51702 ...PA. seq=34e2af31 ack=e6c995ce
[vs_0][fw_1] eth0:OQ10 (TCP streaming post VM)[1228]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=1228 id=37575
TCP: 22 -> 51702 ...PA. seq=34e2af31 ack=e6c995ce
[vs_0][fw_1] eth0:iq2 (IP Options Strip (in))[40]: 192.168.204.1 -> 192.168.204.40 (TCP)
len=40 id=32022
TCP: 51702 -> 22 ....A. seq=e6c995ce ack=34e2af31
[vs_0][fw_1] eth0:IQ13 (TCP streaming (in))[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40
id=32022
TCP: 51702 -> 22 ....A. seq=e6c995ce ack=34e2af31
[vs_0][fw_1] eth0:oq1 (TCP streaming (out))[1356]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=1356 id=37576
TCP: 22 -> 51702 ...PA. seq=34e2b3d5 ack=e6c995ce
[vs_0][fw_1] eth0:OQ10 (TCP streaming post VM)[1356]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=1356 id=37576
TCP: 22 -> 51702 ...PA. seq=34e2b3d5 ack=e6c995ce
[vs_0][fw_1] eth0:iq2 (IP Options Strip (in))[40]: 192.168.204.1 -> 192.168.204.40 (TCP)
len=40 id=32023
TCP: 51702 -> 22 ....A. seq=e6c995ce ack=34e2b8f9
[vs_0][fw_1] eth0:IQ13 (TCP streaming (in))[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40
id=32023
TCP: 51702 -> 22 ....A. seq=e6c995ce ack=34e2b8f9
[vs_0][fw_1] eth0:oq1 (TCP streaming (out))[1356]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=1356 id=37577
TCP: 22 -> 51702 ...PA. seq=34e2b8f9 ack=e6c995ce
[vs_0][fw_1] eth0:OQ10 (TCP streaming post VM)[1356]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=1356 id=37577
TCP: 22 -> 51702 ...PA. seq=34e2b8f9 ack=e6c995ce
[vs_0][fw_1] eth0:oq1 (TCP streaming (out))[412]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=412 id=37578
TCP: 22 -> 51702 ...PA. seq=34e2be1d ack=e6c995ce
[vs_0][fw_1] eth0:OQ10 (TCP streaming post VM)[412]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=412 id=37578
TCP: 22 -> 51702 ...PA. seq=34e2be1d ack=e6c995ce
[vs_0][fw_1] eth0:iq2 (IP Options Strip (in))[40]: 192.168.204.1 -> 192.168.204.40 (TCP)
len=40 id=32024
TCP: 51702 -> 22 ....A. seq=e6c995ce ack=34e2bf91
[vs_0][fw_1] eth0:IQ13 (TCP streaming (in))[40]: 192.168.204.1 -> 192.168.204.40 (TCP) len=40
id=32024
TCP: 51702 -> 22 ....A. seq=e6c995ce ack=34e2bf91
[vs_0][fw_1] eth0:oq1 (TCP streaming (out))[716]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=716 id=37579
TCP: 22 -> 51702 ...PA. seq=34e2bf91 ack=e6c995ce
[vs_0][fw_1] eth0:OQ10 (TCP streaming post VM)[716]: 192.168.204.40 -> 192.168.204.1 (TCP)
len=716 id=37579
TCP: 22 -> 51702 ...PA. seq=34e2bf91 ack=e6c995ce
 monitor: unloading
Read 3 inbound packets and 5 outbound packets
[Expert@HostName-ch0x-0x:0]#
```

Example 5 - Showing list of Chain Modules with the FW Monitor, when you do not change the default capture positions

```
[Expert@HostName-ch0x-0x:0]# g_fw ctl chain
in chain (17):
        0: -7fffffff (0000000000000000) (00000000) SecureXL inbound (sxl_in)
        1: -7ffffffe (0000000000000000) (00000000) SecureXL inbound CT (sxl_ct)
        2: -7f800000 (ffffffff8b6718c0) (ffffffff) IP Options Strip (in) (ipopt_strip)
        3: -70000000 (ffffffff8b6774d0) (ffffffff) fwmonitor (i/f side)
        4: - 1ffffff8 (ffffffff8b66f6f0) (00000001) Stateless verifications (in) (asm)
        5: - 1ffffff7 (ffffffff8b66f210) (00000001) fw multik misc proto forwarding
        6:         0 (ffffffff8b8506a0) (00000001) fw VM inbound  (fw)
        7:         2 (ffffffff8b671d10) (00000001) fw SCV inbound (scv)
        8:         4 (ffffffff8b061ed0) (00000003) QoS inbound offload chain module
        9:         5 (ffffffff8b564d30) (00000003) fw offload inbound (offload_in)
        10:        10 (ffffffff8b842710) (00000001) fw post VM inbound  (post_vm)
        11:    100000 (ffffffff8b7fd6c0) (00000001) fw accounting inbound (acct)
        12:  22000000 (ffffffff8b0638d0) (00000003) QoS slowpath inbound chain mod (fg_sched)
        13:  70000000 (ffffffff8b6774d0) (ffffffff) fwmonitor (IP  side)
        14:  7f730000 (ffffffff8b3c40b0) (00000001) passive streaming (in) (pass_str)
        15:  7f750000 (ffffffff8b0e5b40) (00000001) TCP streaming (in) (cpas)
        16:  7f800000 (ffffffff8b671870) (ffffffff) IP Options Restore (in) (ipopt_res)
out chain (16):
        0: -7f800000 (ffffffff8b6718c0) (ffffffff) IP Options Strip (out) (ipopt_strip)
        1: -70000000 (ffffffff8b6774d0) (ffffffff) fwmonitor (i/f side)
        2: - 1ffffff0 (ffffffff8b0d0190) (00000001) TCP streaming (out) (cpas)
        3: - 1ffff50 (ffffffff8b3c40b0) (00000001) passive streaming (out) (pass_str)
        4: - 1f00000 (ffffffff8b66f6f0) (00000001) Stateless verifications (out) (asm)
        5: -     1ff (ffffffff8aeec0a0) (00000001) NAC Packet Outbound (nac_tag)
        6:         0 (ffffffff8b8506a0) (00000001) fw VM outbound (fw)
        7:        10 (ffffffff8b842710) (00000001) fw post VM outbound  (post_vm)
        8:  15000000 (ffffffff8b062540) (00000003) QoS outbound offload chain modul (fg_pol)
        9:  21000000 (ffffffff8b0638d0) (00000003) QoS slowpath outbound chain mod (fg_sched)
        10:  70000000 (ffffffff8b6774d0) (ffffffff) fwmonitor (IP side)
        11:  7f000000 (ffffffff8b7fd6c0) (00000001) fw accounting outbound (acct)
        12:  7f700000 (ffffffff8b0e4660) (00000001) TCP streaming post VM (cpas)
        13:  7f800000 (ffffffff8b671870) (ffffffff) IP Options Restore (out) (ipopt_res)
        14:  7f900000 (0000000000000000) (00000000) SecureXL outbound (sxl_out)
        15:  7fa00000 (0000000000000000) (00000000) SecureXL deliver (sxl_deliver)
[Expert@HostName-ch0x-0x:0]#
```

Examples for the "-e" parameter

Example 1 - Capture everything

```
[Expert@MyChassis]# fw monitor -e "accept;" -o /var/log/fw_
mon.cap
```

Example 2 - Capture traffic to / from specific hosts

To specify a host, you can use one of these expressions:

- Use "host(<*IP_Address_in_Doted_Decimal_format*>)", which applies to both Source IP address and Destination IP address
- Use a specific Source IP address "src=<*IP_Address_in_Doted_Decimal_format*>" and a specific Destination IP address "dst=<*IP_Address_in_Doted_Decimal_format*>"

Example filters:

- Capture everything between host X and host Y:

```
[Expert@MyChassis]# fw monitor -e "host(x.x.x.x) and host
(y.y.y.y), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "((src=x.x.x.x ,
dst=y.y.y.y) or (src=y.y.y.y , dst=x.x.x.x)), accept;" -o
/var/log/fw_mon.cap
```

- Capture everything between hosts X,Z and hosts Y,Z in *all* Firewall kernel chains:

```
[Expert@MyChassis]# fw monitor -p all -e "((src=x.x.x.x or
dst=z.z.z.z) and (src=y.y.y.y or dst=z.z.z.z)), accept ;" -o
/var/log/fw_mon.cap
```

- Capture everything to/from host X or to/from host Y or to/from host Z:

```
[Expert@MyChassis]# fw monitor -e "host(x.x.x.x) or host
(y.y.y.y) or host(z.z.z.z), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "((src=x.x.x.x or
dst=x.x.x.x) or (src=y.y.y.y or dst=y.y.y.y) or (src=z.z.z.z
or dst=z.z.z.z)), accept;" -o /var/log/fw_mon.cap
```

Example 3 - Capture traffic to / from specific ports

Note - You must specify port numbers in Decimal format. Refer to the `/etc/services` file on the Security Group, or to *IANA Service Name and Port Number Registry*.

To specify a port, you can use one of these expressions:

- Use "`port(`*`<IANA_Port_Number>`*`)`", which applies to both Source Port and Destination Port
- Use a specific Source Port "`sport=`*`<IANA_Port_Number>`*" and a specific Destination Port "`dport=`*`<IANA_Port_Number>`*"
- In addition:
  - For specific TCP port, you can use "`tcpport(`*`<IANA_Port_Number>`*`)`", which applies to both Source TCP Port and Destination TCP Port
  - For specific UDP port, you can use "`udpport(`*`<IANA_Port_Number>`*`)`", which applies to both Source UDP Port and Destination UDP Port

Example filters:

- Capture everything to/from port X:

```
[Expert@MyChassis]# fw monitor -e "port(x), accept;" -o
/var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "(sport=x or dport=x),
accept;" -o /var/log/fw_mon.cap
```

- Capture everything except port X:

```
[Expert@MyChassis]# fw monitor -e "((sport=!x) or
(dport=!x)), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "not (sport=x or dport=x),
accept;" -o /var/log/fw_mon.cap
```

- Capture everything except SSH:

```
[Expert@MyChassis]# fw monitor -e "((sport!=22) or
(dport!=22)), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "not (sport=22 or
dport=22), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "not tcpport(22), accept;"
-o /var/log/fw_mon.cap
```

- Capture everything to/from host X except SSH:

```
[Expert@MyChassis]# fw monitor -e "(host(x.x.x.x) and
(sport!=22 or dport!=22)), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "((src=x.x.x.x or
dst=x.x.x.x) and (not (sport=22 or dport=22))), accept;" -o
/var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "(host(x.x.x.x) and not
tcpport(22)), accept;" -o /var/log/fw_mon.cap
```

- Capture everything except NTP:

```
[Expert@MyChassis]# fw monitor -e "not udpport(123),
accept;" -o /var/log/fw_mon.cap
```

Example 4 - Capture traffic over specific protocol

Note - You must specify protocol numbers in Decimal format. Refer to the `/etc/protocols` file on the Security Group, or to *IANA Protocol Numbers*.

To specify a protocol, you can use one of these expressions:

- Use "`ip_p=<IANA_Protocol_Number>`"

  Examples:

  - To specify TCP protocol with byte offset, use "`ip_p=6`"
  - To specify UDP protocol with byte offset, use "`ip_p=11`"
  - To specify ICMP protocol with byte offset, use "`ip_p=1`"

- Use "`accept [9:1]=<IANA_Protocol_Number>`"

  Examples:

  - To specify TCP protocol with byte offset, use "`accept [9:1]=6`"
  - To specify UDP protocol with byte offset, use "`accept [9:1]=11`"
  - To specify ICMP protocol with byte offset, use "`accept [9:1]=1`"

- In addition, you can explicitly use these expressions to specify protocols:

  Summary Table

Which protocol to specify	On which port(s) traffic is captured	Expression
TCP	N / A	`"tcp, accept;"`
UDP	N / A	`"udp, accept;"`

ICMPv4	N / A	`"icmp, accept;"`
		or
		`"icmp4, accept;"`

ICMPv6	N / A	`"icmp6, accept;"`
HTTP	TCP 80	`"http, accept;"`
HTTPS	TCP 443	`"https, accept;"`
PROXY	TCP 8080	`"proxy, accept;"`
DNS	UDP 53	`"dns, accept;"`
IKE	UDP 500	`"ike, accept;"`
NAT-T	UDP 4500	`"natt, accept;"`
ESP and IKE	IP proto 50 and UDP 500	`"vpn, accept;"`

Which protocol to specify	On which port(s) traffic is captured	Expression
All VPN-related data: a. ESP b. IPsec over UDP c. IKE d. NAT-T e. CRL f. RDP g. Tunnel Test h. Topology i. L2TP j. SCV k. Multi-Portal l. and so on	a. IP proto 50 b. UDP 2746 c. UDP 500 d. UDP 4500 e. TCP 18264 f. UDP 259 g. UDP 18234 h. TCP 264 i. TCP 1701 j. UDP 18233 k. TCP 443 + TCP 444 l. and so on	`"vpnall, accept;"`
Multi-Portal connections	TCP 443 and TCP 444	`"multi, accept;"`
SSH	TCP 22	`"ssh, accept;"`
FTP	TCP 20 and TCP 21	`"ftp, accept;"`
Telnet	TCP 23	`"telnet, accept;"`
SMTP	TCP 25	`"smtp, accept;"`
POP3	TCP 110	`"pop3, accept;"`

Example filters:

- Filter to capture everything on protocol X:

```
[Expert@MyChassis]# fw monitor -e "ip_p=X, accept;" -o
/var/log/fw_mon.cap
```

- Filter to capture rverything on protocol X and port Z on protocol Y:

```
[Expert@MyChassis]# fw monitor -e "(ip_p=X) or (ip_p=Y, port
(Z)), accept;" -o /var/log/fw_mon.cap
```

- Filter to capture capture everything TCP between host X and host Y:

```
[Expert@MyChassis]# fw monitor -e "ip_p=6, host(x.x.x.x) or
host(y.y.y.y), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "tcp, host(x.x.x.x) or
host(y.y.y.y), accept;" -o /var/log/fw_mon.cap
```

```
[Expert@MyChassis]# fw monitor -e "accept [9:1]=6 ,
((src=x.x.x.x , dst=y.y.y.y) or (src=y.y.y.y ,
dst=x.x.x.x));"
```

```
[Expert@MyChassis]# fw monitor -e "ip_p=6, ((src=x.x.x.x ,
dst=y.y.y.y) or (src=y.y.y.y , dst=x.x.x.x)), accept;" -o
/var/log/fw_mon.cap
```

Example 5 - Capture traffic with specific protocol options

Note - Refer to the `$FWDIR/lib/tcpip.def` file on Security Group.

Summary Table for IPv4

Option Description	Expression	Example
Source IPv4 address of the IPv4 packet	`ip_src = <IPv4_Address>`	`fw monitor -e "ip_src = 192.168.22.33, accept;"`
Destination IPv4 address of the IPv4 packet	`ip_dst = <IPv4_Address>`	`fw monitor -e "ip_dst = 192.168.22.33, accept;"`
Time To Live of the IPv4 packet	`ip_ttl = <Number>`	`fw monitor -e "ip_ttl = 255, accept;"`
Total Length of the IPv4 packet in bytes	`ip_len = <Length_in_Bytes>`	`fw monitor -e "ip_len = 64, accept;"`

Option Description	Expression	Example
TOS field of the IPv4 packet	`ip_tos = <Number>`	`fw monitor -e "ip_tos = 0, accept;"`

IANA Protocol Number (either in Dec or in Hex) encapsulated in the IPv4 packet	`ip_p = <IANA_Protocol_Number>`	Example for TCP:
		`fw monitor -e "ip_p = 6, accept;"`
		Examples for UDP:
		`fw monitor -e "ip_p = 17, accept;"`
		`fw monitor -e "ip_p = 0x11, accept;"`
		Example for ICMPv4:
		`fw monitor -e "ip_p = 1, accept;"`

Summary Table for IPv6

Option Description	Expression	Example
Source IPv6 address of the IPv6 packet	ip_src6p = <IPv6_Address>	`fw monitor -e "ip_src6p = 0:0:0:0:0:ffff:c0a8:1621, accept;"`
Destination IPv6 address of the IPv6 packet	ip_dst6p = <IPv6_Address>	`fw monitor -e "ip_dst6p = 0:0:0:0:0:ffff:c0a8:1621, accept;"`
Payload Length of the IPv6 packet in bytes	ip_len6 = <Length_in_Bytes>	`fw monitor -e "ip_len6 = 1000, accept;"`
Hop Limit ("Time To Live") of the IPv6 packet	ip_ttl6 = <Number>	`fw monitor -e "ip_ttl6 = 255, accept;"`
Next Header of the IPv6 packet - encapsulated IANA Protocol Number	ip_p6 = <IANA_Protocol_Number>	`fw monitor -e "ip_p6 = 6, accept;"`

Summary Table for TCP

Option Description	Expression	Example
SYN flag is set in TCP packet	`syn`	`fw monitor -e "ip_p = 6, syn, accept;"`
ACK flag is set in TCP packet	`ack`	`fw monitor -e "ip_p = 6, ack, accept;"`
RST flag is set in TCP packet	`rst`	`fw monitor -e "ip_p = 6, rst, accept;"`
FIN flag is set in TCP packet	`fin`	`fw monitor -e "ip_p = 6, fin, accept;"`
First packet of TCP connection (SYN flag is set, but ACK flag is not set in TCP packet)	`first`	`fw monitor -e "ip_p = 6, first, accept;"`
Not the first packet of TCP connection (SYN flag is not set in TCP packet)	`not_first`	`fw monitor -e "ip_p = 6, not_first, accept;"`
Established TCP connection (either ACK flag is set, or SYN flag is not set in TCP packet)	`established`	`fw monitor -e "ip_p = 6, established, accept;"`
Last packet of TCP connection (both ACK flag and FIN flag are set in TCP packet)	`last`	`fw monitor -e "ip_p = 6, last, accept;"`
End of TCP connection (either RST flag is set, or FIN flag is set in TCP packet)	`tcpdone`	`fw monitor -e "ip_p = 6, tcpdone, accept;"`

<table>
<tr><th>Option Description</th><th>Expression</th><th>Example</th></tr>
<tr><td>General way to match the flags inside in TCP packets</td><td><code>th_flags = <i><Sum_of_Flags_Hex_Values></i></code></td><td>
<table>
<tr><th>TCP Flag</th><th>Example</th></tr>
<tr><td>SYN (0x2)</td><td><code>fw monitor -e "th_flags = 0x2, accept;"</code></td></tr>
<tr><td>ACK (0x10)</td><td><code>fw monitor -e "th_flags = 0x10, accept;"</code></td></tr>
<tr><td>PSH (0x8)</td><td><code>fw monitor -e "th_flags = 0x8, accept;"</code></td></tr>
<tr><td>FIN (0x1)</td><td><code>fw monitor -e "th_flags = 0x1, accept;"</code></td></tr>
<tr><td>RST (0x4)</td><td><code>fw monitor -e "th_flags = 0x4, accept;"</code></td></tr>
<tr><td>URG (0x20)</td><td><code>fw monitor -e "th_flags = 0x20, accept;"</code></td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Option Description</th><th>Expression</th><th>Example</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>TCP Flag</th><th>Example</th></tr>
<tr><td>SYN + ACK</td><td><code>fw monitor -e "th_flags = 0x12, accept;"</code></td></tr>
<tr><td>PSH + ACK</td><td><code>fw monitor -e "th_flags = 0x18, accept;"</code></td></tr>
<tr><td>FIN + ACK</td><td><code>fw monitor -e "th_flags = 0x11, accept;"</code></td></tr>
<tr><td>RST + ACK</td><td><code>fw monitor -e "th_flags = 0x14, accept;"</code></td></tr>
</table>
</td></tr>
<tr><td>TCP source port</td><td><code>th_sport = <i><Port_Number></i></code></td><td><code>fw monitor -e "th_sport = 59259, accept;"</code></td></tr>
<tr><td>TCP destination port</td><td><code>th_dport = <i><Port_Number></i></code></td><td><code>fw monitor -e "th_dport = 22, accept;"</code></td></tr>
<tr><td>TCP sequence number (either in Dec or in Hex)</td><td><code>th_seq = <i><Number></i></code></td><td>Example for Dec format:
<code>fw monitor -e "th_seq = 3937833514, accept;"</code>
Example for Hex format:
<code>fw monitor -e "th_seq = 0xeab6922a, accept;"</code></td></tr>
</table>

Option Description	Expression	Example

TCP acknowledged number (either in Dec or in Hex)	`th_ack = <Number>`	Example for Dec format:
		`fw monitor -e "th_ack = 509054325, accept;"`
		Example for Hex format:
		`fw monitor -e "th_ack = 0x1e578d75, accept;"`

Summary Table for UDP

Option Description	Expression	Example
UDP source port	`uh_sport = <Port_Number>`	`fw monitor -e "uh_sport = 53, accept;"`
UDP destination port	`uh_dport = <Port_Number>`	`fw monitor -e "uh_dport = 53, accept;"`

Summary Table for ICMPv4

Option Description	Expression	Example
ICMPv4 packets with specified Type	`icmp_type = <Number>`	`fw monitor -e "icmp_type = 0, accept;"`
ICMPv4 packets with specified Code	`icmp_code = <Number>`	`fw monitor -e "icmp_code = 0, accept;"`
ICMPv4 packets with specified Identifier	`icmp_id = <Number>`	`fw monitor -e "icmp_id = 20583, accept;"`
ICMPv4 packets with specified Sequence number	`icmp_seq = <Number>`	`fw monitor -e "icmp_seq = 1, accept;"`
ICMPv4 Echo Request packets (Type 8, Code 0)	`echo_req`	`fw monitor -e "echo_req, accept;"`
ICMPv4 Echo Reply packets (Type 0, Code 0)	`echo_reply`	`fw monitor -e "echo_reply, accept;"`
ICMPv4 Echo Request and ICMPv4 Echo Reply packets	`ping`	`fw monitor -e "ping, accept;"`

Option Description	Expression	Example
Traceroute packets as implemented in Unix OS (UDP packets on ports above 30000 and with TTL<30; or ICMP Time exceeded packets)	`traceroute`	`fw monitor -e "traceroute, accept;"`
Traceroute packets as implemented in Windows OS (ICMP Request packets with TTL<30; or ICMP Time exceeded packets)	`tracert`	`fw monitor -e "tracert, accept;"`
Length of ICMPv4 packets	`icmp_ip_len = <length>`	`fw monitor -e "icmp_ip_len = 84, accept;"`

Summary Table for ICMPv6

Option Description	Expression	Example
ICMPv6 packets with specified Type	`icmp6_type = <Number>`	`fw monitor -e "icmp6_type = 1, accept;"`
ICMPv6 packets with specified Code	`icmp6_code = <Number>`	`fw monitor -e "icmp6_code = 3, accept;"`

Example 6 - Capture specific bytes in packets

Syntax:

```
fw monitor -e "accept [ <Offset> : <Length> , <Byte Order> ]
<Relational-Operator> <Value>;"
```

Parameters:

Parameter	Explanation
`<Offset>`	Specifies the offset relative to the beginning of the IP packet from where the value should be read.

Parameter	Explanation
<Length>	Specifies the number of bytes: ■ `1` = byte ■ `2` = word ■ `4` = dword If length is not specified, FW Monitor assumes 4 (dword).
<Byte Order>	Specifies the byte order: ■ `b` = big endian, or network order ■ `l` = little endian, or host order If order is not specified, FW Monitor assumes little endian byte order.
<Relational-Operator	Relational operator to express the relation between the packet data and the value: ■ `<` - less than ■ `>` - greater than ■ `<=` - less than or equal to ■ `>=` - greater than ■ `=` or `is` - equal to ■ `!=` or `is not` - not equal to
<Value>	One of the data types known to INSPECT (for example, an IP address, or an integer).

Explanations:

- The IP-based protocols are stored in the IP packet as a byte at offset 9.
  - To filter based on a Protocol encapsulated into IP, use this syntax:

```
[Expert@MyChassis]# fw monitor -e "accept [9:1]=<IANA_
Protocol_Number>;"
```

- The Layer 3 IP Addresses are stored in the IP packet as double words at offset 12 (Source address) and at offset 16 (Destination address).

- To filter based on a Source IP address, use this syntax:

```
[Expert@MyChassis]# fw monitor -e "accept [12:4,b]=<IP_
Address_in_Doted_Decimal_format>;"
```

- To filter based on a Destination IP address, use this syntax:

```
[Expert@MyChassis]# fw monitor -e "accept [16:4,b]=<IP_
Address_in_Doted_Decimal_format>;"
```

- The Layer 4 Ports are stored in the IP packet as a word at offset 20 (Source port) and at offset 22 (Destination port).

- To filter based on a Source port, use this syntax:

```
[Expert@MyChassis]# fw monitor -e "accept
[20:2,b]=<Port_Number_in_Decimal_format>;"
```

- To filter based on a Destination port, use this syntax:

```
[Expert@MyChassis]# fw monitor -e "accept
[22:2,b]=<Port_Number_in_Decimal_format>;"
```

Example filters:

- Capture everything between host X and host Y:

```
[Expert@MyChassis]# fw monitor -e "accept (([12:4,b]=x.x.x.x
, [16:4,b]=y.y.y.y) or ([12:4,b]=y.y.y.y ,
[16:4,b]=x.x.x.x));"
```

- Capture everything on port X:

```
[Expert@MyChassis]# fw monitor -e "accept [20:2,b]=x or
[22:2,b]=x;" -o /var/log/fw_mon.cap
```

Example 7 - Capture traffic to/from specific network

You must specify the *network address* and *length of network mask* (number of bits).

There are 3 options:

Traffic direction	Expression
To or From a network	`"net(<Network_IP_Address>, <Mask_Length>), accept;"`

Traffic direction	Expression
To a network	`"to_net(<Network_IP_Address>, <Mask_Length>), accept;"`
From a network	`"from_net(<Network_IP_Address>, <Mask_Length>), accept;"`

Example filters:

- Capture everything to/from network 192.168.33.0 / 24:

```
[Expert@MyChassis]# fw monitor -e "net(192.168.33.0, 24),
accept;"
```

- Capture everything sent to network 192.168.33.0 / 24:

```
[Expert@MyChassis]# fw monitor -e "to_net(192.168.33.0, 24),
accept;"
```

- Capture everything sent from network 192.168.33.0 / 24:

```
[Expert@MyChassis]# fw monitor -e "from_net(192.168.33.0,
24), accept;"
```

Example 8 - Filter out irrelevant "noise"

Filter in only TCP protocol, and HTTP and HTTPS ports

Filter out the SSH and FW Logs

```
[Expert@MyChassis]# fw monitor -e "accept (ip_p=6) and (not
(sport=22 or dport=22)) and (not (sport=257 or dport=257)) and
((dport=80 or dport=443) or (sport=80 or sport=443);" -o
/var/log/fw_mon.cap
```

Examples for the "-F" parameter

You can specify up to 5 capture filters with this parameter (up to 5 instances of the "`-F`" parameter in the syntax).

The FW Monitor performs the logical "OR" between all specified simple capture filters.

Value 0 is used as "`any`".

Example 1 - Capture everything

```
[Expert@MyChassis]# fw monitor -F "0,0,0,0,0" -o /var/log/fw_
mon.cap
```

Example 2 - Capture traffic to / from specific hosts

- Capture all traffic from Source IP x.x.x.x (any port) to Destination IP y.y.y.y (any port), over all protocols:

```
[Expert@MyChassis]# fw monitor -F "x.x.x.x,0,y.y.y.y,0,0" -o
/var/log/fw_mon.cap
```

- Capture all traffic between Host x.x.x.x (any port) and Host y.y.y.y (any port), over all protocols:

```
[Expert@MyChassis]# fw monitor -F "x.x.x.x,0,y.y.y.y,0,0" -F
"y.y.y.y,0, x.x.x.x ,0,0" -o /var/log/fw_mon.cap
```

Example 3 - Capture traffic to / from specific ports

- Capture traffic from any Source IP from Source Port X to any Destination IP to Destination Port Y, over all protocols:

```
[Expert@MyChassis]# fw monitor -F "0,x,0,y,0" -o
/var/log/fw_mon.cap
```

- Capture traffic between all hosts, between Port X and Port Y, over all protocols:

```
[Expert@MyChassis]# fw monitor -F "0,x,0,y,0" -F "0,y,0,x,0"
-o /var/log/fw_mon.cap
```

Example 4 - Capture traffic over specific protocol

- Capture traffic between all hosts, between all ports, over a Protocol with assigned number X:

```
[Expert@MyChassis]# fw monitor -F "0,0,0,0,x" -o
/var/log/fw_mon.cap
```

Example 5 - Capture traffic between specific hosts between specific ports over specific protocol

```
[Expert@MyChassis]# fw monitor -F "a.a.a.a,b,c.c.c.c,d,e" -F
"c.c.c.c,d,a.a.a.a,b,e" -o /var/log/fw_mon.cap
```

To capture only HTTP traffic between the Client 1.1.1.1 and the Server 2.2.2.2:

```
fw montior -F "1.1.1.1,0,2.2.2.2,80,6" -F
"2.2.2.2,80,1.1.1.1,0,6" -o /var/log/fw_mon.cap
```

fw sam_policy

Description

Manages the Suspicious Activity Policy editor to works with the Rate Limiting rules.

See sk112454: How to configure Rate Limiting rules for DoS Mitigation.

Also, see the "`sam_alert`" command in the *R80.20 CLI Reference Guide*.

Important:

- This configuration is supported only from the Command Line.
  You must run these commands in the Expert mode on *one* of the Security Group Members.
- The Rate Limit configuration applies to each Security Group Member and not globally.
- The Rate Limit configuration you make with these commands, survives reboot.
- VSX mode supports the Rate Limiting rules only from R80.20SP Jumbo Hotfix Accumulator Take 266 (see MBS-4895 in sk155832).
  In VSX mode, you must go to the context of an applicable Virtual System.
  - In Gaia gClish, run: `set virtual-system <VSID>`
  - In the Expert mode, run: `vsenv <VSID>`
- R80.20SP does **not** support the Suspicious Activity Monitoring (SAM) rules and the "`fw sam`" command (see 02641733 in sk113255 and in sk148074).

Notes:

- These commands are interchangeable:
  - For IPv4: "`g_fw sam_policy`" and "`g_fw samp`"
  - For IPv6: "`g_fw6 sam_policy`" and "`g_fw6 samp`"
- Security Group Members store the SAM Policy rules in the `$FWDIR/database/sam_policy.db` file.
- Security Group Members store the SAM Policy management settings in the `$FWDIR/database/sam_policy.mng` file.

Best Practice - SAM Policy rules consume some CPU resources on Security Group Members. Set an expiration for rules that gives you time to investigate, but does not affect performance. Keep only the required SAM Policy rules. If you confirm that an activity is risky, edit the Security Policy, educate users, or otherwise handle the risk.

Syntax for IPv4

```
g_fw [-d] sam_policy
      add <options>
      batch
      del <options>
      get <options>
```

```
g_fw [-d] samp
      add <options>
      batch
      del <options>
      get <options>
```

Syntax for IPv6

```
g_fw6 [-d] sam_policy
      add <options>
      batch
      del <options>
      get <options>
```

```
g_fw6 [-d] samp
      add <options>
      batch
      del <options>
      get <options>
```

Parameters

Parameter	Description
`-d`	Runs the command in debug mode. Use only if you troubleshoot the command itself. ★ **Best Practice** - If you use this parameter, then redirect the output to a file, or use the `script` command to save the entire CLI session.
`add` *`<options>`*	Adds one Rate Limiting rule one at a time. See *"fw sam_policy add" on the next page*.
`batch`	Adds or deletes many Rate Limiting rules at a time. R80.20SP does **not** support this parameter (Known Limitation MBS-8143).
`del` *`<options>`*	Deletes one configured Rate Limiting rule one at a time. See *"fw sam_policy del" on page 212*.
`get` *`<options>`*	Shows all the configured Rate Limiting rules. See *"fw sam_policy get" on page 216*.

fw sam_policy add

Description

The "*fw sam_policy add*" and "*fw6 sam_policy add*" commands add one Rate Limiting rule at a time.

Important:

- This configuration is supported only from the Command Line.
  You must run these commands in the Expert mode on *one* of the Security Group Members.
- The Rate Limit configuration applies to each Security Group Member and not globally.
- The Rate Limit configuration you make with these commands, survives reboot.
- VSX mode supports the Rate Limiting rules only from R80.20SP Jumbo Hotfix Accumulator Take 266 (see MBS-4895 in sk155832).
  In VSX mode, you must go to the context of an applicable Virtual System.
  - In Gaia gClish, run: `set virtual-system <VSID>`
  - In the Expert mode, run: `vsenv <VSID>`
- R80.20SP does **not** support the Suspicious Activity Monitoring (SAM) rules and the "`fw sam`" command (see 02641733 in sk113255 and in sk148074).

Notes:

- These commands are interchangeable:
  - For IPv4: "`g_fw sam_policy`" and "`g_fw samp`"
  - For IPv6: "`g_fw6 sam_policy`" and "`g_fw6 samp`"
- Security Group Members store the SAM Policy rules in the `$FWDIR/database/sam_policy.db` file.
- Security Group Members store the SAM Policy management settings in the `$FWDIR/database/sam_policy.mng` file.

Best Practice - SAM Policy rules consume some CPU resources on Security Group Members. Set an expiration for rules that gives you time to investigate, but does not affect performance. Keep only the required SAM Policy rules. If you confirm that an activity is risky, edit the Security Policy, educate users, or otherwise handle the risk.

Syntax to configure a Suspicious Activity Monitoring (SAM) rule for IPv4

```
g_fw [-d] sam_policy add [-u] -a {d|n|b} [-l {r|a}] [-t <Timeout>]
[-f <Target>] [-n <"Rule Name">] [-c <"Rule Comment">] [-o <"Rule
Originator">] [-z "<Zone>"] ip <IP Filter Arguments>
```

Syntax to configure a Suspicious Activity Monitoring (SAM) rule for IPv6

```
g_fw6 [-d] sam_policy add [-u] -a {d|n|b} [-l {r|a}] [-t
<Timeout>] [-f <Target>] [-n <"Rule Name">] [-c <"Rule Comment">]
[-o <"Rule Originator">] [-z "<Zone>"] ip <IP Filter Arguments>
```

Syntax to configure a Rate Limiting rule for IPv4

```
g_fw [-d] sam_policy add [-u] -a {d|n|b} [-l {r|a}] [-t <Timeout>]
[-f <Target>] [-n <"Rule Name">] [-c <"Rule Comment">] [-o <"Rule
Originator">] [-z "<Zone>"] quota <Quota Filter Arguments>
```

Syntax to configure a Rate Limiting rule for IPv6

```
g_fw6 [-d] sam_policy add [-u] -a {d|n|b} [-l {r|a}] [-t
<Timeout>] [-f <Target>] [-n <"Rule Name">] [-c <"Rule Comment">]
[-o <"Rule Originator">] [-z "<Zone>"] quota <Quota Filter
Arguments
```

Parameters

Parameter	Description
`-d`	Runs the command in debug mode. Use only if you troubleshoot the command itself. **Best Practice** - If you use this parameter, then redirect the output to a file, or use the `script` command to save the entire CLI session.
`-u`	Optional. Specifies that the rule category is `User-defined`. Default rule category is `Auto`.
`-a {d | n | b}`	Mandatory. Specifies the rule action if the traffic matches the rule conditions: ■ `d` - Drop the connection. ■ `n` - Notify (generate a log) about the connection and let it through. ■ `b` - Bypass the connection - let it through without checking it against the policy rules. **Note** - Rules with action set to *Bypass* cannot have a log or limit specification. Bypassed packets and connections do not count towards overall number of packets and connection for limit enforcement of type ratio.

Parameter	Description
`-l {r | a}`	Optional. Specifies which type of log to generate for this rule for all traffic that matches: - `-r` - Generate a regular log - `-a` - Generate an alert log
`-t <Timeout>`	Optional. Specifies the time period (in seconds), during which the rule will be enforced. Default timeout is indefinite.
`-f <Target>`	Optional. Specifies the target Security Gateways, on which to enforce the Rate Limiting rule. `<Target>` can be one of these: - `all` - This is the default option. Specifies that the rule should be enforced on all managed Security Gateways. - Name of the Security Gateway or Cluster object - Specifies that the rule should be enforced only on this Security Gateway or Cluster object (the object name must be as defined in the SmartConsole). - Name of the Group object - Specifies that the rule should be enforced on all Security Gateways that are members of this Group object (the object name must be as defined in the SmartConsole).
`-n "<Rule Name>"`	Optional. Specifies the name (label) for this rule. **Notes:** - You must enclose this string in double quotes. - The length of this string is limited to 128 characters. - Before each space or a backslash character in this string, you must write a backslash (\) character. Example: `"This\ is\ a\ rule\ name\ with\ a\ backslash\ \\"`

Parameter	Description
`-c "<Rule Comment>"`	Optional. Specifies the comment for this rule. **Notes:** ■ You must enclose this string in double quotes. ■ The length of this string is limited to 128 characters. ■ Before each space or a backslash character in this string, you must write a backslash (\) character. Example: `"This\ is\ a\ comment\ with\ a\ backslash\ \\"`
`-o "<Rule Originator>"`	Optional. Specifies the name of the originator for this rule. **Notes:** ■ You must enclose this string in double quotes. ■ The length of this string is limited to 128 characters. ■ Before each space or a backslash character in this string, you must write a backslash (\) character. Example: `"Created\ by\ John\ Doe"`
`-z "<Zone>"`	Optional. Specifies the name of the Security Zone for this rule. **Notes:** ■ You must enclose this string in double quotes. ■ The length of this string is limited to 128 characters.
`ip <IP Filter Arguments>`	Mandatory (use this `ip` parameter, or the `quota` parameter). Configures the *Suspicious Activity Monitoring (SAM)* rule. Specifies the IP Filter Arguments for the SAM rule (you must use at least one of these options): `[-C] [-s <Source IP>] [-m <Source Mask>] [-d <Destination IP>] [-M <Destination Mask>] [-p <Port>] [-r <Protocol>]` See the explanations below.

Parameter	Description
`quota <Quota Filter Arguments>`	Mandatory (use this `quota` parameter, or the `ip` parameter). Configures the *Rate Limiting* rule. Specifies the Quota Filter Arguments for the Rate Limiting rule (see the explanations below): ■ `[flush true]` ■ `[source-negated {true | false}] source <Source>` ■ `[destination-negated {true | false}] destination <Destination>` ■ `[service-negated {true | false}] service <Protocol and Port numbers>` ■ `[<Limit1 Name> <Limit1 Value>] [<Limit2 Name> <Limit2 Value>] ...[<LimitN Name> <LimitN Value>]` ■ `[track <Track>]` **Important:** ■ The Quota rules are not applied immediately to the Security Gateway. They are only registered in the Suspicious Activity Monitoring (SAM) policy database. To apply all the rules from the SAM policy database immediately, add "`flush true`" in the `fw samp add` command syntax. ■ Explanation: For new connections rate (and for any rate limiting in general), when a rule's limit is violated, the Security Gateway also drops all packets that match the rule. The Security Gateway computes new connection rates on a per-second basis. At the start of the 1-second timer, the Security Gateway allows all packets, including packets for existing connections. If, at some point, during that 1 second period, there are too many new connections, then the Security Gateway blocks all remaining packets for the remainder of that 1-second interval. At the start of the next 1-second interval, the counters are reset, and the process starts over - the Security Gateway allows packets to pass again up to the point, where the rule’s limit is violated.

Explanation for the *IP Filter Arguments* syntax for Suspicious Activity Monitoring (SAM) rules

Argument	Instructions
`-C`	Specifies that open connections should be closed.
`-s` *`<Source IP>`*	Specifies the Source IP address.
`-m` *`<Source Mask>`*	Specifies the Source subnet mask (in dotted decimal format - x.y.z.w).
`-d` *`<Destination IP>`*	Specifies the Destination IP address.
`-M` *`<Destination Mask>`*	Specifies the Destination subnet mask (in dotted decimal format - x.y.z.w).
`-p` *`<Port>`*	Specifies the port number (see *IANA Service Name and Port Number Registry*).
`-r` *`<Protocol>`*	Specifies the protocol number (see *IANA Protocol Numbers*).

Explanation for the *Quota Filter Arguments* syntax for Rate Limiting rules

Argument	Instructions
`flush true`	Specifies to compile and load the quota rule to the SecureXL immediately.
`[source-negated {true | false}] source <Source>`	Specifies the source type and its value: ■ `any` The rule is applied to packets sent from all sources. ■ `range:<IP Address>` or `range:<IP Address Start>-<IP Address End>` The rule is applied to packets sent from: • Specified IPv4 addresses (x.y.z.w) • Specified IPv6 addresses (xxxx:yyyy:...:zzzz) ■ `cidr:<IP Address>/<Prefix>` The rule is applied to packets sent from: • IPv4 address with Prefix from 0 to 32 • IPv6 address with Prefix from 0 to 128 ■ `cc:<Country Code>` The rule matches the country code to the source IP addresses assigned to this country, based on the Geo IP database. The two-letter codes are defined in ISO 3166-1 alpha-2. ■ `asn:<Autonomous System Number>` The rule matches the AS number of the organization to the source IP addresses that are assigned to this organization, based on the Geo IP database. The valid syntax is *ASnnnn*, where *nnnn* is a number unique to the specific organization. **Notes:** ■ Default is: `source-negated false` ■ The `source-negated true` processes all source types, *except* the specified type.

Argument	Instructions
`[destination-negated {true | false}] destination` *`<Destination>`*	Specifies the destination type and its value: ■ `any` The rule is applied to packets sent to all destinations. ■ `range:`*`<IP Address>`* or `range:`*`<IP Address Start>`*`-`*`<IP Address End>`* The rule is applied to packets sent to: • Specified IPv4 addresses (x.y.z.w) • Specified IPv6 addresses (xxxx:yyyy:...:zzzz) ■ `cidr:`*`<IP Address>`*`/`*`<Prefix>`* The rule is applied to packets sent to: • IPv4 address with Prefix from 0 to 32 • IPv6 address with Prefix from 0 to 128 ■ `cc:`*`<Country Code>`* The rule matches the country code to the destination IP addresses assigned to this country, based on the Geo IP database. The two-letter codes are defined in ISO 3166-1 alpha-2. ■ `asn:`*`<Autonomous System Number>`* The rule matches the AS number of the organization to the destination IP addresses that are assigned to this organization, based on the Geo IP database. The valid syntax is *ASnnnn*, where *nnnn* is a number unique to the specific organization. **Notes:** ■ Default is: `destination-negated false` ■ The `destination-negated true` will process all destination types except the specified type

Argument	Instructions
`[service-negated {true | false}] service <Protocol and Port numbers>`	Specifies the Protocol number (see *IANA Protocol Numbers*) and Port number (see *IANA Service Name and Port Number Registry*): ■ `<Protocol>` IP protocol number in the range 1-255 ■ `<Protocol Start>-<Protocol End>` Range of IP protocol numbers ■ `<Protocol>/<Port>` IP protocol number in the range 1-255 and TCP/UDP port number in the range 1-65535 ■ `<Protocol>/<Port Start>-<Port End>` IP protocol number and range of TCP/UDP port numbers from 1 to 65535 **Notes:** ■ Default is: `service-negated false` ■ The `service-negated true` will process all traffic except the traffic with the specified protocols and ports

Argument	Instructions
`[<Limit 1 Name> <Limit 1 Value>] [<Limit 2 Name> <Limit 2 Value>] ... [<Limit N Name> <Limit N Value>]`	Specifies quota limits and their values. **Note** - Separate multiple quota limits with spaces. ■ `concurrent-conns <Value>` Specifies the maximal number of concurrent active connections that match this rule. ■ `concurrent-conns-ratio <Value>` Specifies the maximal ratio of the *concurrent-conns* value to the total number of active connections through the Security Gateway, expressed in parts per 65536 (formula: `N / 65536`). ■ `pkt-rate <Value>` Specifies the maximum number of packets per second that match this rule. ■ `pkt-rate-ratio <Value>` Specifies the maximal ratio of the *pkt-rate* value to the rate of all connections through the Security Gateway, expressed in parts per 65536 (formula: `N / 65536`). ■ `byte-rate <Value>` Specifies the maximal total number of bytes per second in packets that match this rule. ■ `byte-rate-ratio <Value>` Specifies the maximal ratio of the *byte-rate* value to the bytes per second rate of all connections through the Security Gateway, expressed in parts per 65536 (formula: `N / 65536`). ■ `new-conn-rate <Value>` Specifies the maximal number of connections per second that match the rule. ■ `new-conn-rate-ratio <Value>` Specifies the maximal ratio of the *new-conn-rate* value to the rate of all connections per second through the Security Gateway, expressed in parts per 65536 (formula: `N / 65536`).

Argument	Instructions
`[track <Track>]`	Specifies the tracking option: ■ `source` Counts connections, packets, and bytes for specific source IP address, and not cumulatively for this rule. ■ `source-service` Counts connections, packets, and bytes for specific source IP address, and for specific IP protocol and destination port, and not cumulatively for this rule.

Examples

Example 1 - Rate Limiting rule with a range

```
g_fw sam_policy add -a d -l r -t 3600 quota service any source range:172.16.7.11-172.16.7.13 new-conn-rate 5 flush true
```

Explanations:

- This rule drops packets for all connections (`-a d`) that exceed the quota set by this rule, including packets for existing connections.
- This rule logs packets (`-l r`) that exceed the quota set by this rule.
- This rule will expire in 3600 seconds (`-t 3600`).
- This rule limits the rate of creation of new connections to 5 connections per second (`new-conn-rate 5`) for any traffic (`service any`) from the source IP addresses in the range 172.16.7.11 - 172.16.7.13 (`source range:172.16.7.11-172.16.7.13`).

  Note - The limit of the total number of log entries per second is configured with the *fwaccel dos config set -n <rate>* command.
- This rule will be compiled and loaded on the SecureXL, together with other rules in the Suspicious Activity Monitoring (SAM) policy database immediately, because this rule includes the "`flush true`" parameter.

Example 2 - Rate Limiting rule with a service specification

```
g_fw sam_policy add -a n -l r quota service 1,50-51,6/443,17/53 service-negated true source cc:QQ byte-rate 0
```

Explanations:

- This rule logs and lets through all packets (`-a n`) that exceed the quota set by this rule.
- This rule does not expire (the `timeout` parameter is not specified). To cancel it, you must delete it explicitly.
- This rule applies to all packets except (`service-negated true`) the packets with IP protocol number 1, 50-51, 6 port 443 and 17 port 53 (`service 1,50-51,6/443,17/53`).
- This rule applies to all packets from source IP addresses that are assigned to the country with specified country code (`cc:QQ`).
- This rule does not let any traffic through (`byte-rate 0`) except the packets with IP protocol number 1, 50-51, 6 port 443 and 17 port 53.
- This rule will not be compiled and installed on the SecureXL immediately, because it does not include the "`flush true`" parameter.

Example 3 - Rate Limiting rule with ASN

```
g_fw sam_policy -a d quota source asn:AS64500,cidr:[::FFFF:C0A8:1100]/120 service any pkt-rate 0
```

Explanations:

- This rule drops (`-a d`) all packets that match this rule.
- This rule does not expire (the `timeout` parameter is not specified). To cancel it, you must delete it explicitly.
- This rule applies to packets from the Autonomous System number 64500 (`asn:AS64500`).
- This rule applies to packets from source IPv6 addresses FFFF:C0A8:1100/120 (`cidr:[::FFFF:C0A8:1100]/120`).
- This rule applies to all traffic (`service any`).
- This rule does not let any traffic through (`pkt-rate 0`).
- This rule will not be compiled and installed on the SecureXL immediately, because it does not include the "`flush true`" parameter.

Example 4 - Rate Limiting rule with whitelist

```
g_fw sam_policy add -a b quota source range:172.16.8.17-172.16.9.121 service 6/80
```

Explanations:

- This rule bypasses (`-a b`) all packets that match this rule.

  Note - The Access Control Policy and other types of security policy rules still apply.

- This rule does not expire (the `timeout` parameter is not specified). To cancel it, you must delete it explicitly.
- This rule applies to packets from the source IP addresses in the range 172.16.8.17 - 172.16.9.121 (`range:172.16.8.17-172.16.9.121`).
- This rule applies to packets sent to TCP port 80 (`service 6/80`).
- This rule will not be compiled and installed on the SecureXL immediately, because it does not include the "`flush true`" parameter.

Example 5 - Rate Limiting rule with tracking

```
g_fw sam_policy add -a d quota service any source-negated true source cc:QQ concurrent-conns-ratio 655 track source
```

Explanations:

- This rule drops (`-a d`) all packets that match this rule.
- This rule does not log any packets (the `-l r` parameter is not specified).
- This rule does not expire (the `timeout` parameter is not specified). To cancel it, you must delete it explicitly.
- This rule applies to all traffic (`service any`).
- This rule applies to all sources except (`source-negated true`) the source IP addresses that are assigned to the country with specified country code (`cc:QQ`).
- This rule limits the maximal number of concurrent active connections to 655/65536=~1% (`concurrent-conns-ratio 655`) for any traffic (`service any`) except (`service-negated true`) the connections from the source IP addresses that are assigned to the country with specified country code (`cc:QQ`).
- This rule counts connections, packets, and bytes for traffic only from sources that match this rule, and not cumulatively for this rule.
- This rule will not be compiled and installed on the SecureXL immediately, because it does not include the "`flush true`" parameter.

fw sam_policy del

Description

The "*g_fw sam_policy del*" and "*g_fw6 sam_policy del*" commands delete one configured Rate Limiting rule at a time.

Important:

- This configuration is supported only from the Command Line.
  You must run these commands in the Expert mode on *one* of the Security Group Members.
- The Rate Limit configuration applies to each Security Group Member and not globally.
- The Rate Limit configuration you make with these commands, survives reboot.
- VSX mode supports the Rate Limiting rules only from R80.20SP Jumbo Hotfix Accumulator Take 266 (see MBS-4895 in sk155832).
  In VSX mode, you must go to the context of an applicable Virtual System.
  - In Gaia gClish, run: `set virtual-system <VSID>`
  - In the Expert mode, run: `vsenv <VSID>`
- R80.20SP does **not** support the Suspicious Activity Monitoring (SAM) rules and the "`fw sam`" command (see 02641733 in sk113255 and in sk148074).

Notes:

- These commands are interchangeable:
  - For IPv4: "`g_fw sam_policy`" and "`g_fw samp`"
  - For IPv6: "`g_fw6 sam_policy`" and "`g_fw6 samp`"
- Security Group Members store the SAM Policy rules in the `$FWDIR/database/sam_policy.db` file.
- Security Group Members store the SAM Policy management settings in the `$FWDIR/database/sam_policy.mng` file.

Best Practice - SAM Policy rules consume some CPU resources on Security Group Members. Set an expiration for rules that gives you time to investigate, but does not affect performance. Keep only the required SAM Policy rules. If you confirm that an activity is risky, edit the Security Policy, educate users, or otherwise handle the risk.

Syntax for IPv4

```
g_fw [-d] sam_policy del '<Rule UID>'
```

Syntax for IPv6

```
g_fw6 [-d] sam_policy del '<Rule UID>'
```

Parameters

Parameter	Description
`-d`	Runs the command in debug mode. Use only if you troubleshoot the command itself. ★ **Best Practice** - If you use this parameter, then redirect the output to a file, or use the `script` command to save the entire CLI session.
`'<Rule UID>'`	Specifies the UID of the rule you wish to delete. ℹ **Important:** ■ The quote marks and angle brackets (`'<...>'`) are mandatory. ■ To see the Rule UID, run the *"fw sam_policy get" on page 216* command.

Procedure

1. **List all the existing rules in the Suspicious Activity Monitoring policy database**

   List all the existing rules in the Suspicious Activity Monitoring policy database.

   - For IPv4, run:

     ```
     g_fw sam_policy get
     ```

   - For IPv6, run:

     ```
     g_fw6 sam_policy get
     ```

   The rules show in this format:

   ```
   operation=add uid=<Value1,Value2,Value3,Value4> target=...
   timeout=... action=... log= ... name= ... comment=...
   originator= ... src_ip_addr=... req_tpe=...
   ```

   Example for IPv4:

   ```
   operation=add uid=<5ac3965f,00000000,3403a8c0,0000264a>
   target=all timeout=300 action=notify log=log name=Test\ Rule
   comment=Notify\ about\ traffic\ from\ 1.1.1.1
   originator=John\ Doe src_ip_addr=1.1.1.1 req_tpe=ip
   ```

2. **Delete a rule from the list by its UID**

   - For IPv4, run:

     ```
     g_fw [-d] sam_policy del '<Rule UID>'
     ```

   - For IPv6, run:

     ```
     g_fw6 [-d] sam_policy del '<Rule UID>'
     ```

   Example for IPv4:

   ```
   g_fw samp del '<5ac3965f,00000000,3403a8c0,0000264a>'
   ```

3. **Add the flush-only rule**

   - For IPv4, run:

     ```
     g_fw samp add -t 2 quota flush true
     ```

   - For IPv6, run:

     ```
     g_fw6 samp add -t 2 quota flush true
     ```

   Explanation:

   The "`g_fw samp del`" and "`g_fw6 samp del`" commands only remove a rule from the persistent database. The Security Group Members continue to enforce the deleted rule until the next time you compiled and load a policy. To force the rule deletion immediately, you must enter a flush-only rule right after the "`g_fw samp del`" and "`g_fw6 samp del`" command. This flush-only rule immediately deletes the rule you specified in the previous step, and times out in 2 seconds.

   Best Practice - Specify a short timeout period for the flush-only rules. This prevents accumulation of rules that are obsolete in the database.

fw sam_policy get

Description

The "*fw sam_policy get* and "*fw6 sam_policy get*" commands show all the configured Rate Limiting rules.

Also, see the "`sam_alert`" command in the *R80.20 CLI Reference Guide*.

Important:

- This configuration is supported only from the Command Line.
  You must run these commands in the Expert mode on *one* of the Security Group Members.
- The Rate Limit configuration applies to each Security Group Member and not globally.
- The Rate Limit configuration you make with these commands, survives reboot.
- VSX mode supports the Rate Limiting rules only from R80.20SP Jumbo Hotfix Accumulator Take 266 (see MBS-4895 in sk155832).
  In VSX mode, you must go to the context of an applicable Virtual System.
  - In Gaia gClish, run: `set virtual-system <VSID>`
  - In the Expert mode, run: `vsenv <VSID>`
- R80.20SP does **not** support the Suspicious Activity Monitoring (SAM) rules and the "`fw sam`" command (see 02641733 in sk113255 and in sk148074).

Notes:

- These commands are interchangeable:
  - For IPv4: "`g_fw sam_policy`" and "`g_fw samp`"
  - For IPv6: "`g_fw6 sam_policy`" and "`g_fw6 samp`"
- Security Group Members store the SAM Policy rules in the `$FWDIR/database/sam_policy.db` file.
- Security Group Members store the SAM Policy management settings in the `$FWDIR/database/sam_policy.mng` file.

Best Practice - SAM Policy rules consume some CPU resources on Security Group Members. Set an expiration for rules that gives you time to investigate, but does not affect performance. Keep only the required SAM Policy rules. If you confirm that an activity is risky, edit the Security Policy, educate users, or otherwise handle the risk.

Syntax for IPv4

```
g_fw [-d] sam_policy get [-l] [-u '<Rule UID>'] [-k '<Key>' -t
<Type> [+{-v '<Value>'}] [-n]]
```

Syntax for IPv6

```
g_fw6 [-d] sam_policy get [-l] [-u '<Rule UID>'] [-k '<Key>' -t
<Type> [+{-v '<Value>'}] [-n]]
```

Parameters

Note - All these parameters are optional.

Parameter	Description
`-d`	Runs the command in debug mode. Use only if you troubleshoot the command itself. **Best Practice** - If you use this parameter, then redirect the output to a file, or use the `script` command to save the entire CLI session.
`-l`	Controls how to print the rules: ■ In the default format (without "`-l`"), the output shows each rule on a separate line. ■ In the list format (with "`-l`"), the output shows each parameter of a rule on a separate line. ■ See *"fw sam_policy add" on page 199*.
`-u '<Rule UID>'`	Prints the rule specified by its Rule UID or its zero-based rule index. The quote marks and angle brackets ('<...>') are mandatory.
`-k '<Key>'`	Prints the rules with the specified predicate key. The quote marks are mandatory.
`-t <Type>`	Prints the rules with the specified predicate type. For Rate Limiting rules, you must always use "`-t in`".
`+{-v '<Value>'}`	Prints the rules with the specified predicate values. The quote marks are mandatory.
`-n`	Negates the condition specified by these predicate parameters: ■ `-k` ■ `-t` ■ `+-v`

Examples

Example 1 - Output in the default format

```
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get

operation=add uid=<5ac3965f,00000000,3403a8c0,0000264a> target=all timeout=300 action=notify
log=log name=Test\ Rule comment=Notify\ about\ traffic\ from\ 1.1.1.1 originator=John\ Doe
src_ip_addr=1.1.1.1 req_tpe=ip
```

Example 2 - Output in the list format

```
[Expert@MyChassis-ch0x-0x:0] g_fw samp get -l

uid
<5ac3965f,00000000,3403a8c0,0000264a>
target
all
timeout
2147483647
action
notify
log
log
name
Test\ Rule
comment
Notify\ about\ traffic\ from\ 1.1.1.1
originator
John\ Doe
src_ip_addr
1.1.1.1
req_type
ip
```

Example 3 - Printing a rule by its Rule UID

```
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -u '<5ac3965f,00000000,3403a8c0,0000264a>'
0
operation=add uid=<5ac3965f,00000000,3403a8c0,0000264a> target=all timeout=300 action=notify
log=log name=Test\ Rule comment=Notify\ about\ traffic\ from\ 1.1.1.1 originator=John\ Doe
src_ip_addr=1.1.1.1 req_tpe=ip
```

Example 4 - Printing rules that match the specified filters

```
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get
no corresponding SAM policy requests
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp add -a d -l r -t 3600 quota service any source
range:172.16.7.11-172.16.7.13 new-conn-rate 5 flush true
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp add -a n -l r quota service 1,50-51,6/443,17/53
service-negated true source cc:QQ byte-rate 0
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp add -a b quota source range:172.16.8.17-172.16.9.121
service 6/80
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp add -a d quota service any source-negated true source
cc:QQ concurrent-conns-ratio 655 track source
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get
operation=add uid=<5bab3acf,00000000,3503a8c0,00003ddc> target=all timeout=indefinite
action=drop service=any source-negated=true source=cc:QQ concurrent-conns-ratio=655
track=source req_type=quota
operation=add uid=<5bab3ac6,00000000,3503a8c0,00003dbf> target=all timeout=3586 action=drop
log=log service=any source=range:172.16.7.11-172.16.7.13 new-conn-rate=5 flush=true req_
type=quota
operation=add uid=<5bab3acc,00000000,3503a8c0,00003dd7> target=all timeout=indefinite
action=bypass source=range:172.16.8.17-172.16.9.121 service=6/80 req_type=quota
operation=add uid=<5bab3ac9,00000000,3503a8c0,00003dd5> target=all timeout=indefinite
action=notify log=log service=1,50-51,6/443,17/53 service-negated=true source=cc:QQ byte-
rate=0 req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k 'service' -t in -v '6/80'
operation=add uid=<5bab3acc,00000000,3503a8c0,00003dd7> target=all timeout=indefinite
action=bypass source=range:172.16.8.17-172.16.9.121 service=6/80 req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k 'service-negated' -t in -v 'true'
operation=add uid=<5bab3ac9,00000000,3503a8c0,00003dd5> target=all timeout=indefinite
action=notify log=log service=1,50-51,6/443,17/53 service-negated=true source=cc:QQ byte-
rate=0 req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k 'source' -t in -v 'cc:QQ'
operation=add uid=<5bab3acf,00000000,3503a8c0,00003ddc> target=all timeout=indefinite
action=drop service=any source-negated=true source=cc:QQ concurrent-conns-ratio=655
track=source req_type=quota
operation=add uid=<5bab3ac9,00000000,3503a8c0,00003dd5> target=all timeout=indefinite
action=notify log=log service=1,50-51,6/443,17/53 service-negated=true source=cc:QQ byte-
rate=0 req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k source -t in -v 'cc:QQ' -n
operation=add uid=<5bab3ac6,00000000,3503a8c0,00003dbf> target=all timeout=3291 action=drop
log=log service=any source=range:172.16.7.11-172.16.7.13 new-conn-rate=5 flush=true req_
type=quota
operation=add uid=<5bab3acc,00000000,3503a8c0,00003dd7> target=all timeout=indefinite
action=bypass source=range:172.16.8.17-172.16.9.121 service=6/80 req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k 'source-negated' -t in -v 'true'
operation=add uid=<5baa94e0,00000000,860318ac,00003016> target=all timeout=indefinite
action=drop service=any source-negated=true source=cc:QQ concurrent-conns-ratio=655
track=source req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k 'byte-rate' -t in -v '0'
operation=add uid=<5baa9431,00000000,860318ac,00002efd> target=all timeout=indefinite
action=notify log=log service=1,50-51,6/443,17/53 service-negated=true source=cc:QQ byte-
rate=0 req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k 'flush' -t in -v 'true'
operation=add uid=<5baa9422,00000000,860318ac,00002eea> target=all timeout=2841 action=drop
log=log service=any source=range:172.16.7.11-172.16.7.13 new-conn-rate=5 flush=true req_
type=quota
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw samp get -k 'concurrent-conns-ratio' -t in -v '655'
operation=add uid=<5baa94e0,00000000,860318ac,00003016> target=all timeout=indefinite
```

```
action=drop service=any source-negated=true source=cc:QQ concurrent-conns-ratio=655
track=source req_type=quota
[Expert@MyChassis-ch0x-0x:0]#
```

The /proc/ppk/ and /proc/ppk6/ entries

Description

SecureXL supports Linux **/proc** entries. The read-only entries in the **/proc/ppk/** and **/proc/ppk6/** contain various data about SecureXL.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/<Name of File>
```

```
g_cat /proc/ppk/<SecureXL Instance ID>/<Name of File>
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/<Name of File>
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/<Name of File>
```

Files

File	Instructions
`affinity`	Contains status and the thresholds for SecureXL New Affinity mechanism. See *"/proc/ppk/affinity" on page 223*.
`conf`	Contains the SecureXL configuration and basic statistics. See *"/proc/ppk/conf" on page 223*.
`conns`	Contains the list of the SecureXL connections. See *"/proc/ppk/conns" on page 225*.
`cpls`	Contains SecureXL configuration for ClusterXL Load Sharing (CPLS). See *"/proc/ppk/cpls" on page 225*.

File	Instructions
`cqstats`	Contains statistics for SecureXL connections queue. See *"/proc/ppk/cqstats" on page 226*.
`drop_statistics`	Contains SecureXL statistics for dropped packets. See *"/proc/ppk/drop_statistics" on page 227*.
`ifs`	Contains the list of interfaces that SecureXL uses. See *"/proc/ppk/ifs" on page 228*.
`mcast_statistics`	Contains SecureXL statistics for multicast traffic. See *"/proc/ppk/mcast_statistics" on page 232*.
`nac`	Contains SecureXL statistics for Identity Awareness Network Access Control (NAC) traffic. See *"/proc/ppk/nac" on page 233*.
`notify_statistics`	Contains SecureXL statistics for notifications SecureXL sent to Firewall about accelerated connections. See *"/proc/ppk/notify_statistics" on page 234*.
`profile_cpu_stat`	Contains IDs of the CPU cores and status of Traffic Profiling See *"/proc/ppk/profile_cpu_stat" on page 235*.
`rlc`	Contains SecureXL statistics for drops due to Rate Limiting for DoS Mitigation. See *"/proc/ppk/rlc" on page 236*.
`statistics`	Contains SecureXL overall statistics. See *"/proc/ppk/statistics" on page 237*.
`stats`	Contains the IRQ numbers and names of interfaces the SecureXL uses. See *"/proc/ppk/stats" on page 239*.
`viol_statistics`	Contains SecureXL statistics for violations - packets SecureXL forwarded (F2F) to the Firewall. See *"/proc/ppk/viol_statistics" on page 239*.

/proc/ppk/affinity

Description

Contains the number of accelerated packets per second and rate of encrypted bytes.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Notes:

- This feature is activated only if there is no massive VPN traffic, and the packets-per-second rate (cut-through) is large enough to benefit from the New Affinity mechanism.
- This feature is activated only if CPU strength is greater than 3 GHz.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/affinity
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/affinity
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/affinity
Current accelerated PPS          : 0
Current enc. bytes rate          : 0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/conf

Description

Contains the SecureXL configuration and basic statistics.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
g_cat /proc/ppk/conf
g_cat /proc/ppk/<SecureXL Instance ID>/conf
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
g_cat /proc/ppk6/conf
g_cat /proc/ppk6/<SecureXL Instance ID>/conf
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/conf
Flags                           : 0x00000592
Accounting Update Interval      : 3600
Conn Refresh Interval           : 512
SA Sync Notification Interval   : 200000
UDP Encapsulation Port          : 2746
Min TCP MSS                     : 0
TCP End Timeout                 : 5
Connection Limit                : 18446744073709551615

Total Number of conns           : 0
Number of Crypt conns           : 0
Number of TCP conns             : 0
Number of Non-TCP conns         : 0
Total Number of corrs           : 0

Debug flags :
 0     : 0x1
 1     : 0x1
 2     : 0x1
 3     : 0x1
 4     : 0x1
 5     : 0x1
 6     : 0x1
 7     : 0x1
 8     : 0x100
 9     : 0x8
 10     : 0x1
 11     : 0x10
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/conns

Description

Contains the list of the SecureXL connections.

Important - This file is for future use. Refer to the *"fwaccel conns" on page 48* command.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/conns
```

```
g_cat /proc/ppk/<SecureXL Instance ID>/conns
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/conns
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/conns
```

/proc/ppk/cpls

Description

Contains SecureXL configuration for ClusterXL Load Sharing (CPLS).

Important - This file is for future use. Refer to the "`fwaccel cfg -h`" command (see *"fwaccel cfg" on page 45*).

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/cpls
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
g_cat /proc/ppk6/cpls
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/cpls
fwha_conf_flags: 638
fwha_df_type: 0
fwha_member_id: 0
fwha_port: 8116
FWHAP MAC magic: 0
Forwarding MAC magic: 0
My state: ACTIVE
udp_enc_port: 0
selection table size: 0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/cqstats

Description

Contains statistics for SecureXL connections queue.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
g_cat /proc/ppk/cqstats
g_cat /proc/ppk/<SecureXL Instance ID>/cqstats
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
g_cat /proc/ppk6/cqstats
g_cat /proc/ppk6/<SecureXL Instance ID>/cqstats
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/cqstats
Name                      Value                Name                      Value
--------------------  ---------------     --------------------  ---------------
Queued pkts                         0     Queue fail                          0
Dequeue & f2f                       0     Dequeue & drop                      0
Dequeue & resume                    0     Async index req                     0
Err Async index req                 0     Async index cb                      0
Err Async index cb                  0     Queue alloc fail                    0
Queue empty err                     0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/drop_statistics

Description

Contains SecureXL statistics for dropped packets.

Note - This is the same information that the "`fwaccel stats -d`" command shows (see *"fwaccel stats" on page 102*).

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/drop_statistics
```

```
g_cat /proc/ppk/<SecureXL Instance ID>/drop_statistics
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/drop_statistics
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/drop_statistics
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/drop_statistics
Reason                  Packets             Reason                  Packets
--------------------  ---------------    --------------------  ---------------
general reason                    0    CPASXL decision                   0
PSLXL decision                    0    clr pkt on vpn                    0
encrypt failed                    0    drop template                     0
decrypt failed                    0    interface down                    0
cluster error                     0    XMT error                         0
anti spoofing                     0    local spoofing                    0
sanity error                      0    monitored spoofed                 0
QOS decision                      0    C2S violation                     0
S2C violation                     0    Loop prevention                   0
DOS Fragments                     0    DOS IP Options                    0
DOS Blacklists                    0    DOS Penalty Box                   0
DOS Rate Limiting                 0    Syn Attack                        0
Reorder                           0    Defrag timeout                    0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/ifs

Description

Contains the list of interfaces that SecureXL uses.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/ifs
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/ifs
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/ifs
 No | Interface | Address         | IRQ | F   | SIM F | Dev                | Output Func
| Features
---------------------------------------------------------------------------------------------
-------------
  2 | eth0      |    192.168.3.52 |  67 |   1 |   480 | 0xffff81023e5df000 | 0x000013a0
  3 | eth1      |     10.20.30.52 |  83 |   1 |   488 | 0xffff81023dd0c000 | 0x000013a0
  4 | eth2      |     40.50.60.52 |  59 |   1 |   480 | 0xffff810237f88000 | 0x000013a0
  5 | eth3      |         0.0.0.0 |  67 |   1 |    80 | 0xffff810239b3d000 | 0x000013a0
  6 | eth4      |         0.0.0.0 |  91 |   1 |    80 | 0xffff81023841f000 | 0x000013a0
  7 | eth5      |         0.0.0.0 |  83 |   1 |   480 | 0xffff8102396fe000 | 0x000013a0
  8 | eth6      |         0.0.0.0 |  59 |   1 |   480 | 0xffff810239a4d000 | 0x000013a0
 10 | bond0     |     70.80.90.52 |   0 |   1 |   280 | 0xffff8101f1a0e000 | 0x000013a0
[Expert@MyChassis-ch0x-0x:0]#
```

Example for IPv6

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk6/ifs
  No | Interface | Address         | IRQ | F   | SIM F | Dev                | Output Func
| Features
---------------------------------------------------------------------------------------------
-------------
  2 | eth0      |           fe80:0:0:0:250:56ff:fea3:1807 |  67 |   1 |   480 |
0xffff81023e5df000 | 0x000013a0
  3 | eth1      |           fe80:0:0:0:250:56ff:fea3:15a4 |  83 |   1 |   480 |
0xffff81023dd0c000 | 0x000013a0
  4 | eth2      |           fe80:0:0:0:250:56ff:fea3:2f50 |  59 |   1 |   480 |
0xffff810237f88000 | 0x000013a0
  5 | eth3      |                         0:0:0:0:0:0:0:0 |  67 |   1 |    80 |
0xffff810239b3d000 | 0x000013a0
  6 | eth4      |                         0:0:0:0:0:0:0:0 |  91 |   1 |    80 |
0xffff81023841f000 | 0x000013a0
  7 | eth5      |           fe80:0:0:0:250:56ff:fea3:75a9 |  83 |   1 |   480 |
0xffff8102396fe000 | 0x000013a0
  8 | eth6      |           fe80:0:0:0:250:56ff:fea3:5d4c |  59 |   1 |   480 |
0xffff810239a4d000 | 0x000013a0
 10 | bond0     |           fe80:0:0:0:250:56ff:fea3:287b |   0 |   1 |   280 |
0xffff8101f1a0e000 | 0x000013a0
[Expert@MyChassis-ch0x-0x:0]#
```

Explanation about the configuration flags in the "F" and "SIM F" columns

The "**F**" column shows the internal configuration flags that Firewall set on these interfaces.

The "**SIM F**" column shows the internal configuration flags that SecureXL set on these interfaces.

Flag	Instructions
0x001	If this flag is set, the SecureXL drops the packet at the end of the inbound inspection, if the packet is a "cut-through" packet. In outbound, SecureXL forwards all the packets to the network.

Flag	Instructions
0x002	If this flag is set, the SecureXL sends an applicable notification when a TCP state change occurs (connection is established or torn down).
0x004	If this flag is set, the SecureXL it sets the UDP header's checksum field correctly when the SecureXL encapsulates an encrypted packet (UDP encapsulation). If this flag is not set, SecureXL sets the UDP header's checksum field to zero. It is safe to ignore this flag, if it is set to 0 (SecureXL continues to calculate the UDP packet's checksum).
0x008	If this flag is set, the SecureXL does not create new connections that match a template, and SecureXL drops the packet that matches the template, when the number of entries in the Connections Table reaches the specified limit. If this flag is not set, the SecureXL forwards the packet to the Firewall.
0x010	If this flag is set, the SecureXL forwards fragments to the Firewall.
0x020	If this flag is set, the SecureXL does not create connections from TCP templates anymore. The Firewall offloads connections to SecureXL when necessary. This flag only disables the creation of TCP templates.
0x040	If this flag is set, the SecureXL notifies the Firewall at intervals, so it refreshes the accelerated connections in the Firewall kernel tables.
0x080	If this flag is set, the SecureXL does not create connections from non-TCP templates anymore. The Firewall offloads connections to SecureXL when necessary. This flag only disables the creation of non-TCP templates.
0x100	If this flag is set, the SecureXL allows sequence verification violations for connections that did not complete the TCP 3-way handshake process. If this flag is not set, SecureXL must forward the violating packets to the Firewall.
0x200	If this flag is set, the SecureXL allows sequence verification violations for connections that completed the TCP 3-way handshake process. If this flag is not set, SecureXL must forward the violating packets to the Firewall.
0x400	If this flag is set, the SecureXL forwards TCP [RST] packets to the Firewall.
0x0001	If this flag is set, the SecureXL notifies the Firewall about HitCount data.

Flag	Instructions
0x0002	If this flag is set, the VSX Virtual System works as a junction, rather than a regular Virtual System (only the local Virtual System flag is applicable).
0x0004	If this flag is set, the SecureXL disables the reply counter of inbound encrypted traffic. At a result, SecureXL kernel module works in the same way as the VPN kernel module.
0x0008	If this flag is set, the SecureXL enables the MSS Clamping. Refer to the kernel parameters "`fw_clamp_tcp_mss`" and "`fw_clamp_vpn_mss`" in sk101219.
0x0010	If this flag is set, the SecureXL disables the "No Match Ranges" (NMR) Templates (see sk117755).
0x0020	If this flag is set, the SecureXL disables the "No Match Time" (NMT) Templates (see sk117755).
0x0040	If this flag is set, the SecureXL does not send Drop Templates notifications about dropped packets to the Firewall (to update the drop counters). For example, if you set the value of the kernel parameter "`activate_optimize_drops_support_now`" to 1, it disables the Drop Templates notifications.
0x0080	If this flag is set, the SecureXL enables the MultiCore support for IPsec VPN (see sk118097).
0x0100	If this flag is set, the SecureXL enables the support for CoreXL Dynamic Dispatcher (see sk105261).
0x0800	If this flag is set, the SecureXL does not enforce the Path MTU Discovery for IP multicast packets.
0x1000	If this flag is set, the SecureXL disables the SIM "drop_templates" feature.
0x2000	If this flag is set, it indicates that an administrator enabled the Link Selection Load Sharing feature.
0x4000	If this flag is set, the SecureXL disables the asynchronous notification feature.
0x8000	If this flag is set, it indicates that the capacity of the Firewall Connections Table is unlimited.

Examples:

Value	Instructions
0x039	Means the sum of these flags: ■ 0x001 ■ 0x008 ■ 0x010 ■ 0x020
0x00008a16	Means the sum of these flags: ■ 0x0002 ■ 0x0004 ■ 0x0010 ■ 0x0200 ■ 0x0800 ■ 0x8000
0x00009a16	Means the sum of these flags: ■ 0x0002 ■ 0x0004 ■ 0x0010 ■ 0x0200 ■ 0x0800 ■ 0x1000 ■ 0x8000

/proc/ppk/mcast_statistics

Description

Contains SecureXL statistics for multicast traffic.

Note - This is the same information that the "`fwaccel stats -m`" command shows (see *"fwaccel stats" on page 102*).

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/mcast_statistics
```

```
g_cat /proc/ppk/<SecureXL Instance ID>/mcast_statistics
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/mcast_statistics
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/mcast_statistics
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/mcast_statistics
Name                  Value              Name                  Value
--------------------  ---------------    --------------------  ---------------
in packets                      10100    out packets                         0
if restricted                       0    conns with down if                  0
f2f packets                         0    f2f bytes                           0
dropped packets                     0    dropped bytes                       0
accel packets                       0    accel bytes                         0
mcast conns                         0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/nac

Description

Contains SecureXL statistics for Identity Awareness Network Access Control (NAC) traffic.

Note - This is the same information that the "`fwaccel stats -n`" command shows (see *"fwaccel stats" on page 102*).

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/nac
```

```
g_cat /proc/ppk/<SecureXL Instance ID>/nac
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/nac
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/nac
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/nac
Name                   Value              Name                   Value
--------------------   ---------------    --------------------   ---------------
NAC packets                          0    NAC bytes                            0
NAC connections                      0    complience failure                   0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/notify_statistics

Description

Contains SecureXL statistics for notifications SecureXL sent to Firewall about accelerated connections.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/notify_statistics
```

```
g_cat /proc/ppk/<SecureXL Instance ID>/notify_statistics
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/notify_statistics
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/notify_statistics
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/notify_statistics
Notification           Packets           Notification           Packets
---------------------  --------------    ---------------------  --------------
ntSAAboutToExpire                   0    ntSAExpired                         0
ntMSPIError                         0    ntNoInboundSA                       0
ntNoOutboundSA                      0    ntDataIntegrityFailed               0
ntPossibleReplay                    0    ntReplay                            0
ntNextProtocolError                 0    ntCPIError                          0
ntClearTextPacket                   0    ntFragmentation                     0
ntUpdateUdpEncTable                 0    ntSASync                            0
ntReplayOutOfWindow                 0    ntVPNTrafficReport                  0
ntConnDeleted                       0    ntConnUpdate                        0
ntPacketDropped                     0    ntSendLog                           0
ntRefreshGTPTunnel                  0    ntMcastDrop                         0
ntAccounting                        0    ntAsyncIndex                        0
ntACkReordering                     0    ntAccelAckInfo                      0
ntMonitorPacket                     0    ntPacketCapture                     0
ntCpasPacketCapture                 0    ntPSLGlueUpdateReject               0
ntSeqVerifyDrop                     0    ntPacketForwardBefore               0
ntICMPMessage                       0    ntQoSReclassifyPacket               0
ntQoSResumePacket                   0    ntVPNEncHaLinkFailure               0
ntVPNEncLsLinkFailure               0    ntVPNEncRouteChange                 0
ntVPNDecVerRouteChang               0    ntVPNDecRouteChange                 0
ntMuxSimToFw                        0    ntPSLEventLog                       0
ntSendCPHWDStats                39375    ntPacketTaggingViolat               0
ntDosNotify                         0    ntSynatkNotify                      0
ntSynatkStats                       0    ntQoSEventLog                       0
ntPrintGetParam                     0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/profile_cpu_stat

Description

This file is for Check Point use only.

Contains IDs of the CPU cores and status of Traffic Profiling:

- The first column shows the IDs of the CPU cores.
- The second column shows the status of Traffic Profiling for the applicable CPU core.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

g_ls -lR /proc/ppk/
g_cat /proc/ppk/profile_cpu_stat
g_cat /proc/ppk/<*SecureXL Instance ID*>/profile_cpu_stat

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/profile_cpu_stat
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/profile_cpu_stat
```

Example for IPv4 from a Security Gateway with 4 CPU cores

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/profile_cpu_stat
0 0
1 0
2 0
3 0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/rlc

Description

Contains SecureXL statistics for drops due to Rate Limiting for DoS Mitigation.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/rlc
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/rlc
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/rlc
Total drop packets : 0
Total drop bytes : 0
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/statistics

Description

Contains SecureXL overall statistics.

To see these statistics in a better way, run the *"fwaccel stats" on page 102* command.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/statistics
```

```
g_cat /proc/ppk/<SecureXL Instance ID>/statistics
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/statistics
```

```
g_cat /proc/ppk6/<SecureXL Instance ID>/statistics
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/statistics
Name                  Value             Name                  Value
--------------------  ---------------   --------------------  ---------------
accel packets                       0   accel bytes                         0
outbound packets                    0   outbound bytes                      0
conns created                       0   conns deleted                       0
current total conns                 0   TCP conns                           0
non TCP conns                       0   nat conns                           0
dropped packets                   728   dropped bytes                  107978
fragments received                  0   fragments transmit                  0
fragments dropped                   0   fragments expired                   0
IP options stripped                 0   IP options restored                 0
IP options dropped                  0   corrs created                       0
corrs deleted                       0   C corrections                       0
corrected packets                   0   corrected bytes                     0
crypt conns                         0   enc bytes                           0
dec bytes                           0   ESP enc pkts                        0
ESP enc err                         0   ESP dec pkts                        0
ESP dec err                         0   ESP other err                       0
espudp enc pkts                     0   espudp enc err                      0
espudp dec pkts                     0   espudp dec err                      0
espudp other err                    0   acct update interval             3600
CPASXL packets                      0   PSLXL packets                       0
CPASXL async packets                0   PSLXL async packets                 0
CPASXL bytes                        0   PSLXL bytes                         0
CPASXL conns                        0   PSLXL conns                         0
CPASXL conns created                0   PSLXL conns created                 0
PXL FF conns                        0   PXL FF packets                      0
PXL FF bytes                        0   PXL FF acks                         0
PXL no conn drops                   0   PSL Inline packets                  0
PSL Inline bytes                    0   CPAS Inline packets                 0
CPAS Inline bytes                   0   Total QoS conns                     0
CLASSIFY                            0   CLASSIFY_FLOW                       0
RECLASSIFY_POLICY                   0   Enq-IN FW pkts                      0
Enq-OUT FW pkts                     0   Deq-IN FW pkts                      0
Deq-OUT FW pkts                     0   Enq-IN FW bytes                     0
Enq-OUT FW bytes                    0   Deq-IN FW bytes                     0
Deq-OUT FW bytes                    0   Enq-IN AXL pkts                     0
Enq-OUT AXL pkts                    0   Deq-IN AXL pkts                     0
Deq-OUT AXL pkts                    0   Enq-IN AXL bytes                    0
Enq-OUT AXL bytes                   0   Deq-IN AXL bytes                    0
Deq-OUT AXL bytes                   0   F2F packets                         0
F2F bytes                           0   TCP violations                      0
F2V conn match pkts                 0   F2V packets                         0
F2V bytes                           0   gtp tunnels created                 0
gtp tunnels                         0   gtp accel pkts                      0
gtp f2f pkts                        0   gtp spoofed pkts                    0
gtp in gtp pkts                     0   gtp signaling pkts                  0
gtp tcpopt pkts                     0   gtp apn err pkts                    0
memory used                  38799384   C tcp handshake conn                0
C tcp estab. conns                  0   C tcp closed conns                  0
C tcp pxl hnshk conn                0   C tcp pxl est. conn                 0
C tcp pxl closed                    0   ob cpasxl packets                   0
ob pslxl packets                    0   ob cpasxl bytes                     0
ob pslxl bytes                      0   DNS DoR stats                       0
trimmed pkts
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/stats

Description

Contains the IRQ numbers and names of interfaces the SecureXL uses.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/stats
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/stats
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/stats
IRQ | Interface
---------------------------
 18   eth0
 16   eth1
 17   eth2
 18   eth3
 19   eth4
[Expert@MyChassis-ch0x-0x:0]#
```

/proc/ppk/viol_statistics

Description

Contains SecureXL statistics for violations - packets SecureXL forwarded (F2F) to the Firewall.

Note - This is the same information that the "`fwaccel stats -p`" command shows (see *"fwaccel stats" on page 102*).

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Syntax for IPv4

```
g_ls -lR /proc/ppk/
```

```
g_cat /proc/ppk/viol_statistics
```

Syntax for IPv6

```
g_ls -lR /proc/ppk6/
```

```
g_cat /proc/ppk6/viol_statistics
```

Example for IPv4

```
[Expert@MyChassis-ch0x-0x:0]# g_cat /proc/ppk/viol_statistics
Violation             Packets             Violation             Packets
--------------------  ---------------     --------------------  ---------------
pkt has IP options                  0     ICMP miss conn                      4
TCP-SYN miss conn                 356     TCP-other miss conn           1386954
UDP miss conn                  943355     other miss conn                     0
VPN returned F2F                    0     uni-directional viol                0
possible spoof viol                 0     TCP state viol                      0
out if not def/accl                 0     bridge, src=dst                     0
routing decision err                0     sanity checks failed                0
fwd to non-pivot                    0     broadcast/multicast                 0
cluster message             250859051     cluster forward                     0
chain forwarding                    0     F2V conn match pkts                 0
general reason                      0     route changes                       0

[Expert@MyChassis-ch0x-0x:0]#
```

SecureXL Debug

To understand how SecureXL processes the traffic, enable the SecureXL debug while the traffic passes through the Security Gateway.

Warning - Debug increases the load on Security Gateway's CPU. We recommend you schedule a maintenance window to debug the SecureXL.

In addition, see *"Kernel Debug on Security Group" on page 370*.

fwaccel dbg

Description

The "*fwaccel dbg*" command controls the SecureXL debug. See *"SecureXL Debug" on the previous page*..

Important:
The same SecureXL command must run on all Security Group Members.
Therefore, you must run the SecureXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fwaccel ...`" and "`fwaccel6 ...`" commands.
- In the Expert mode, run the "`g_fwaccel ...`" and "`g_fwaccel6 ...`" commands.

Syntax

```
fwaccel dbg
      -h
      -m <Name of SecureXL Debug Module>
      all
      + <Debug Flags>
      - <Debug Flags>
      reset
      -f {"<5-Tuple Debug Filter>" | reset}
      list
      resetall
```

Parameters

Parameter	Description
`-h`	Shows the applicable built-in help.
`-m <Name of SecureXL Debug Module>`	Specifies the name of the SecureXL debug module. To see the list of available debug modules, run: `fwaccel dbg`
`all`	Enables all debug flags for the specified debug module.

Parameter	Description
`+ <Debug Flags>`	Enables the specified debug flags for the specified debug module: Syntax: `+ Flag1 [Flag2 Flag3 ... FlagN]` **Note** - You must press the space bar key after the plus (+) character.
`- <Debug Flags>`	Disables all debug flags for the specified debug module. Syntax: `- Flag1 [Flag2 Flag3 ... FlagN]` **Note** - You must press the space bar key after the minus (-) character.
`reset`	Resets all debug flags for the specified debug module to their default state.
`-f "<5-Tuple Debug Filter>"`	Configures the debug filter to show only debug messages that contain the specified connection. The filter is a string of five numbers separated with commas: `"<Source IP Address>,<Source Port>,<Destination IP Address>,<Destination Port>,<Protocol Number>"` **Notes:** ■ You can configure only one debug filter at one time. ■ You can use the asterisk "*" as a wildcard for an IP Address, Port number, or Protocol number. ■ For more information, see *IANA Service Name and Port Number Registry* and *IANA Protocol Numbers*.
`-f reset`	Resets the current debug filter.
`list`	Shows all enabled debug flags in all debug modules.
`resetall`	Reset all debug flags for all debug modules to their default state.

Example 1 - Default output

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg
Usage: fwaccel dbg [-m <...>] [resetall | reset | list | all | +/- <flags>]
   -m <module>             - module of debugging
   -h                      - this help message
   resetall                - reset all debug flags for all modules
   reset                   - reset all debug flags for module
   all                     - set all debug flags for module
   list                    - list all debug flags for all modules
   -f reset | "<5-tuple>"  - filter debug messages
   + <flags>               - set the given debug flags
   - <flags>               - unset the given debug flags

List of available modules and flags:

Module: default (default)
err init drv tag lock cpdrv routing kdrv gtp tcp_sv gtp_pkt svm iter conn htab del update acct
conf stat queue ioctl corr util rngs relations ant conn_app rngs_print infra_ids offload nat

Module: db
err get save del tmpl tmo init ant profile nmr nmt

Module: api
err init add update del acct conf stat vpn notif tmpl sv pxl qos gtp infra tmpl_info upd_conf
upd_if_inf add_sa del_sa del_all_sas misc get_features get_tab get_stat reset_stat tag long_ver
del_all_tmpl get_state upd_link_sel

Module: pkt
err f2f frag spoof acct notif tcp_state tcp_state_pkt sv cpls routing drop pxl qos user deliver
vlan pkt nat wrp corr caf

Module: infras
err reorder pm

Module: tmpl
err dtmpl_get dtmpl_notif tmpl

Module: vpn
err vpnpkt linksel routing vpn

Module: nac
err db db_get pkt pkt_ex signature offload idnt ioctl nac

Module: cpaq
init client server exp cbuf opreg transport transport_utils error

Module: synatk
init conf conn err log pkt proxy state msg

Module: adp
err rt nh eth heth wrp inf mbs bpl bplinf mbeinf if drop bond xmode ipsctl xnp

Module: dos
fw1-cfg fw1-pkt sim-cfg sim-pkt err detailed drop

[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Enabling and disabling of debug flags

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -m default + err conn
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg list

Module: default (2001)
err conn

Module: db (1)
err

Module: api (1)
err

Module: pkt (1)
err

Module: infras (1)
err

Module: tmpl (1)
err

Module: vpn (1)
err

Module: nac (1)
err

Module: cpaq (100)
error

Module: synatk (0)


Module: adp (1)
err

Module: dos (10)
err

Debug filter not set.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -m default - conn
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg list

Module: default (1)
err

Module: db (1)
err

Module: api (1)
err

Module: pkt (1)
err

Module: infras (1)
err

Module: tmpl (1)
err
```

```
Module: vpn (1)
err

Module: nac (1)
err

Module: cpaq (100)
error

Module: synatk (0)


Module: adp (1)
err

Module: dos (10)
err

Debug filter not set.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -m default reset
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Resetting all debug flags in all debug modules

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg resetall
Debug state was reset to default.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Configuring debug filter for an SSH connection from 192.168.20.30 to 172.16.40.50

```
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg -f 192.168.20.30,*,172.16.40.50,22,6
Debug filter was set.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fwaccel dbg list

... ...

Debug filter: "<*,*,*,*,*>"
[Expert@MyChassis-ch0x-0x:0]#
```

SecureXL Debug Procedure

By default, SecureXL writes the output debug information to the `/var/log/messages` file.

To collect the applicable SecureXL debug and to make its analysis easier, follow the steps below.

Important:

- We strongly recommend to schedule a full maintenance window to minimize the impact on your production traffic.
- We strongly recommend to connect over serial console to your Security Group Members.
  This is to avoid a possible issue when you cannot work with the CLI because of a high load on the CPU.
- Debug the specific SecureXL instance only when you are sure that only that SecureXL instance processes the traffic.

Note - For more information, see *"Kernel Debug on Security Group" on page 370*.

Procedure

1. **Connect to the command line on your Security Group**

   Use an SSH or a console connection.

   Best Practice - Use a console connection.

2. **Log in to the Expert mode**

   If the default shell is Gaia Clish, then run:

   ```
   expert
   ```

3. **Reset all kernel debug flags in all kernel debug modules**

   Run:

   ```
   g_fw ctl debug 0
   ```

4. **Reset all the SecureXL debug flags in all SecureXL debug modules**

- For all SecureXL instances, run:

  ```
  g_fwaccel dbg resetall
  ```

- For a specific SecureXL instance, run:

  ```
  g_fwaccel -i <SecureXL ID> dbg resetall
  ```

5. **Allocate the kernel debug buffer**

   Run:

   ```
   g_fw ctl debug -buf 8200 [-v {"<List of VSIDs>" | all}]
   ```

   Note - The optional part "`-v {"<List of VSIDs>" | all}`" is to specify the applicable Virtual Systems in VSX mode.

6. **Make sure the Security Group allocated the kernel debug buffer**

   Run:

   ```
   g_fw ctl debug | grep buffer
   ```

7. **Configure the applicable kernel debug modules and kernel debug flags**

   Run:

   ```
   g_fw ctl debug -m <Name of Kernel Debug Module> {all | +
   <Kernel Debug Flags>}
   ```

8. **Configure the applicable SecureXL debug modules and SecureXL debug flags**

   - For all SecureXL instances, run:

     ```
     g_fwaccel dbg -m <Name of SecureXL Debug Module> {all |
     + <SecureXL Debug Flags>}
     ```

   - For a specific SecureXL instance, run:

     ```
     g_fwaccel -i <SecureXL ID> dbg -m <Name of SecureXL
     Debug Module> {all | + <SecureXL Debug Flags>}
     ```

   See *"SecureXL Debug Modules and Debug Flags" on page 251*.

9. **Examine the kernel debug configuration for kernel debug modules**

   Run:

```
g_fw ctl debug
```

10. **Examine the SecureXL debug configuration for SecureXL debug modules**

    - For all SecureXL instances, run:

      ```
      g_fwaccel dbg list
      ```

    - For a specific SecureXL instance, run:

      ```
      g_fwaccel -i <SecureXL ID> dbg list
      ```

11. **Remove all entries from both the Firewall Connections table and SecureXL Connections table**

    Run:

    ```
    g_fw tab -t connections -x -y
    ```

    Important:

    - This step makes sure that you collect the debug of the real issue that is not affected by the existing connections.
    - **This command deletes all existing connections. This interrupts all connections, including the SSH.**
      Run this command only if you are connected over a serial console to your Security Group Members.

12. **Remove all entries from the Firewall Templates table**

    Run:

    ```
    g_fw tab -t cphwd_tmpl -x -y
    ```

    Note - This command does **not** interrupt the existing connections. This step makes sure that you collect the debug of the real issue that is not affected by the existing connection templates.

13. **Start the kernel debug**

    Run:

    ```
    g_fw ctl kdebug -T -f > /var/log/kernel_debug.txt
    ```

14. **Replicate the issue, or wait for the issue to occur**

    Perform the steps that cause the issue to occur, or wait for it to occur.

15. **Stop the kernel debug**

    Press **CTRL+C**.

16. **Reset all kernel debug flags in all kernel debug modules**

    Run:

    ```
    g_fw ctl debug 0
    ```

17. **Reset all the SecureXL debug flags in all SecureXL debug modules**

    - For all SecureXL instances, run:

      ```
      g_fwaccel dbg resetall
      ```

    - For a specific SecureXL instance, run:

      ```
      g_fwaccel -i <SecureXL ID> dbg resetall
      ```

18. **Examine the kernel debug configuration to make sure it returned to the default**

    Run:

    ```
    g_fw ctl debug
    ```

19. **Examine the SecureXL debug configuration to make sure it returned to the default**

    - For all SecureXL instances, run:

      ```
      g_fwaccel dbg list
      ```

    - For a specific SecureXL instance, run:

      ```
      g_fwaccel -i <SecureXL ID> dbg list
      ```

20. **Collect and analyze the debug output file from all Security Group Members**

    Path to the debug output file:

    ```
    /var/log/kernel_debug.txt
    ```

    Best Practice - Compress this file with the "`tar -zxvf`" command and transfer it from all Security Group Members to your computer. If you transfer to an FTP server, do so in the binary mode.

SecureXL Debug Modules and Debug Flags

To see the available SecureXL debug modules and their debug flags, run the *"fwaccel dbg" on page 241* command.

Module "default"

Flag	Instructions
`acct`	Connection accounting information
`ant`	Anticipated connections
`conf`	Configuration of the SecureXL (for example, interfaces)
`conn`	Processing of connections
`conn_app`	Processing of connections
`corr`	Correction layer
`cpdrv`	*Currently not in use*
`del`	Deletion of connections
`drv`	Driver information
`err`	General errors
`gtp`	Processing of GTP tunnel connections
`gtp_pkt`	Processing of GTP tunnel packets
`htab`	Hash table
`infra_ids`	Allocating IDs for a given range in Identity Awareness
`init`	Initialization
`ioctl`	Changes in the configuration, which were initiated from the user space
`iter`	Connection table iterator
`kdrv`	Driver information
`lock`	Lock initializing and finalizing
`nat`	Processing of NAT connections
`offload`	Offloading of connections from the Firewall to the SecureXL

Flag	Instructions
queue	Connections queue
relations	Related connections (such as FTP data connections)
rngs	Handling of SecureXL ranges
rngs_print	Printing of SecureXL ranges
routing	Handling of SecureXL routing
stat	Handling of SecureXL statistics
svm	Registering templates or connections for System Counters in Security Gateway object in SmartConsole
tag	Tags that were added to the packets by the SecureXL before forwarding them to the Firewall
tcp_sv	Verification of sequence in TCP packets
update	Updates of connections
util	Utilization

Module "pkt" (Packet)

Flag	Instructions
acct	Connection accounting information
caf	Mirror and Decrypt feature - Mirror only of all traffic
corr	Correction layer
cpls	ClusterXL Load Sharing
deliver	Packet delivery
drop	Packets dropped by SecureXL
err	General errors
f2f	Reason for forwarding a packet to the Firewall
frag	Processing of fragments

Flag	Instructions
`nat`	Processing of NAT connections
`notif`	Notifications sent to the Firewall
`pkt`	Processing of packets
`pxl`	PXL (PacketXL) handling - API between the SecureXL and PSL (Packet Streaming Layer), which is a TCP Streaming engine that parses TCP streams
`qos`	QoS acceleration
`routing`	Handling of SecureXL routing
`spoof`	Handling of SecureXL Anti-Spoofing
`sv`	Validation of sequence in TCP packets
`tcp_state`	Validation of TCP state in TCP packets
`tcp_state_pkt`	Validation of TCP packets
`<Username>`	*Currently not in use*
`vlan`	Handling of VLAN tags
`wrp`	Handling of WRP interfaces in VSX

Module "db" (Database)

Flag	Instructions
`ant`	Anticipated connections
`del`	Deleting of data from the SecureXL database
`err`	General errors
`get`	Retrieving of data from the SecureXL database
`init`	Initializing and finalizing of SecureXL database
`nmr`	"No Match Ranges" templates, which allow SecureXL Accept Templates for rules that contain Dynamic objects or Domain objects (or for rules located below such rules)

Flag	Instructions
nmt	"No Match Time" templates, which allow SecureXL Accept Templates for rules that contain Time objects (or for rules located below such rules)
<Profile>	Operations on profile table
save	Saving of data to the SecureXL database
tmo	Handling of timeouts for SecureXL database entries
tmpl	Handling of SecureXL templates database

Module "api" (Application Programmable Interface)

Flag	Instructions
acct	Connection accounting information
add	Adding of connections
add_sa	Offloading of VPN SA to SecureXL
conf	Configuration of the SecureXL (for example, interfaces)
del	Deletion of connections
del_all_sas	Deletion of all VPN SAs from SecureXL
del_all_tmpl	Deletion of the SecureXL Templates
del_sa	Deletion of VPN SA from SecureXL
err	General errors
get_features	Getting features buffer (in SecureXL initialization)
get_stat	Retrieving of SecureXL statistics
get_state	Getting the connection state from SecureXL
get_tab	Some extra printouts when processing SecureXL tables
gtp	Processing of GTP tunnel connections

Flag	Instructions
`infra`	SecureXL infrastructure
`init`	Enabling and disabling of SecureXL
`long_ver`	Prints additional verbose information about connections
`misc`	Prints additional information about SecureXL internals
`notif`	Notifications sent to the Firewall
`pxl`	PXL (PacketXL) handling - API between the SecureXL and PSL (Packet Streaming Layer), which is a TCP Streaming engine that parses TCP streams
`qos`	QoS acceleration
`reset_stat`	Prints statistics IDs that are reset
`stat`	Handling of SecureXL statistics
`sv`	Validation of sequence in TCP packets
`tag`	Tags that were added to the packets by the SecureXL before forwarding them to the Firewall
`tmpl`	Handling of SecureXL Templates
`tmpl_info`	Information about SecureXL Templates
`upd_conf`	Update of SecureXL in ClusterXL Load Sharing
`upd_if_inf`	Prints some text that shows if SecureXL updated information about interfaces
`upd_link_sel`	Updates of VPN Link Selection
`update`	Updates of connections
`vpn`	Processing of VPN connection

Module "adp"

Reserved for future use.

Module "infras" (Identity Awareness - Identities Infrastructure)

Flag	Instructions
`err`	General errors
`pm`	Pattern Matcher
`reorder`	Reordering of packets in queue

Module "nac" (Identity Awareness - Network Access Control)

Flag	Instructions
`db`	Updating, adding, deleting of identities
`db_get`	Updating, fetching, searching of identities
`err`	General errors
`idnt`	Identity Tags
`ioctl`	Changes in the configuration, which were initiated from the user space
`nac`	Network Access Control
`offload`	Offloading of connections from the Firewall to the SecureXL
`pkt`	Forwarding of connections to Firewall (when identity is not found or revoked, or NAC packet tagging verification failed)
`pkt_ex`	NAC packet-tagging verification
`signature`	Signing of packets

Module "vpn" (VPN)

Flag	Instructions
`err`	General errors
`linksel`	VPN Link Selection
`routing`	VPN Encryption routing information
`vpn`	Processing of VPN connections
`vpnpkt`	Processing of VPN packets

Module "cpaq" (Internal Asynchronous Queue)

Flag	Instructions
`cbuf`	Information about queue buffers
`client`	Information about queue clients
`error`	General errors
`exp`	Information about expiration of queue items
`init`	Initializing of queue
`opreg`	*Currently not in use*
`<Mgmt Server>`	Information about queue servers
`transport`	Information about sending messages in queue
`transport_utils`	Additional information about sending messages in queue

Module "dos" (Denial of Service Defender)

Flag	Instructions
`detailed`	Detailed tracing of DoS Rate Limiting logic in the packet flow. **Important** - This debug flag is not suitable for large traffic volumes because it prints a large number of messages. This causes high load on the CPU.
`drop`	Dropped packets
`err`	General errors
`fw1-cfg`	Information about DoS Rate Limiting configuration in the Firewall kernel module
`fw1-pkt`	Information about DoS Rate Limiting packet flow in the Firewall kernel module
`sim-cfg`	Information about DoS Rate Limiting configuration in the SecureXL kernel module
`sim-pkt`	Information about DoS Rate Limiting packet flow in the SecureXL kernel module

Module "synatk" (Accelerated SYN Defender)

Flag	Instructions
`conf`	Receiving and updating of Accelerated SYN Defender module's configuration
`conn`	Handling of TCP connections
`err`	General errors
`init`	Initializing of the Accelerated SYN Defender module
`log`	Prints time of the last sent monitor log and interval between the monitor logs
`msg`	Information about internal messages in the Accelerated SYN Defender module
`pkt`	Handling of TCP packets
`proxy`	*Currently not in use*
`state`	Information about states of the Accelerated SYN Defender module

Module "tmpl" (Drop Templates)

Flag	Instructions
`err`	General errors
`dtmpl_get`	Getting of Drop Templates
`dtmpl_notif`	Notifications about Drop Templates
`tmpl`	Information about Drop Templates

CoreXL

CoreXL is a performance-enhancing technology for Security Gateways on multi-core platforms.

CoreXL makes it possible for the CPU cores to perform multiple tasks concurrently. This enhances the Security Gateway performance.

CoreXL provides almost linear scalability of performance, according to the number of processing cores on one machine. The increase in performance does not require changes to management or to network topology.

On a Security Gateway with CoreXL enabled, the Firewall kernel is replicated multiple times.

Each replicated copy of the Firewall kernel, or CoreXL Firewall instance, runs on one CPU core.

These CoreXL Firewall instances handle traffic concurrently, and each CoreXL Firewall instance is a complete and independent Firewall inspection kernel. When CoreXL is enabled, all the Firewall kernel instances in the Security Gateway process traffic through the same interfaces and apply the same security policy.

CoreXL Firewall instances work with SecureXL instances.

Enabling and Disabling CoreXL

To change the CoreXL configuration:

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.
4	Run: `cpconfig`
5	Enter the number of the **Check Point CoreXL** option.

Step	Instructions

6	Enter the number of the applicable option:
	`(1) Change the number of firewall instances`
	`(2) Change the number of IPv6 firewall instances`
	`(3) Disable Check Point CoreXL`

7	Follow the instructions on the screen.
8	Exit from the `cpconfig` menu.
9	Reboot all Security Group Members: `reboot -b all`

Default Configuration of CoreXL

When you enable CoreXL, the default number of CoreXL Firewall instances is based on the total number of CPU cores.

The default affinity setting for all interfaces is automatic when SecureXL is enabled. See *"Allocation of Processing CPU Cores" on page 274*.

Traffic from all interfaces is directed to the CPU cores that run the CoreXL Secure Network Distributor (SND).

Default number of IPv4 CoreXL Firewall instances:

Number of CPU cores	Default number of CoreXL IPv4 FW instances	Default number of Secure Network Distributors (SNDs)
1	1 (CoreXL is disabled)	0 (CoreXL is disabled)
2	2	2
4	3	1
6-20	Number of CPU cores, minus 2	2
More than 20	Number of CPU cores, minus 4. However, no more than 40.	4

The numbers of CoreXL Firewall instances start from zero.

The numbers of CPU cores start from the highest CPU ID allowed by the current Check Point license on your Security Group Member.

Refer to the **ID** and **CPU** columns in this example:

```
# g_fw ctl multik stat

ID | Active    | CPU     | Connections | Peak
----------------------------------------------
 0 | Yes       | 7       |           5 |       21
 1 | Yes       | 6       |           3 |       23
 2 | Yes       | 5       |           5 |       25
 3 | Yes       | 4       |           4 |       21
 4 | Yes       | 3       |           5 |       21
 5 | Yes       | 2       |           5 |       20
```

```
# g_fw6 ctl multik stat
ID | Active    | CPU     | Connections | Peak
----------------------------------------------
 0 | Yes       | 7       |           0 |        4
 1 | Yes       | 6       |           0 |        4
```

Maximal number of IPv4 CoreXL Firewall instances:

Gaia kernel edition	Check Point Appliance
64-bit	40

Notes:

- Starting in R80.20SP, the Gaia kernel edition is 64-bit only.
- The total number of IPv4 CoreXL Firewall instances and IPv6 CoreXL Firewall instances cannot exceed the numbers in the table above.

Configuring IPv4 and IPv6 CoreXL Firewall instances

In This Section:

IPv4 and IPv6 CoreXL Firewall Instances

After you enable Gaia IPv6 support on the Security Group (see the *R80.20SP Quantum Maestro Gaia Administration Guide*), configure the CPU cores to run different combinations of IPv4 and IPv6 CoreXL Firewall instances:

- The number of IPv4 CoreXL Firewall instances you can configure is from a minimum of two to a maximum equal to the total number of CPU cores on the Security Group Member:

  ```
  2 <= (Number of IPv4 CoreXL Firewall instances) <= (Total
  Number of CPU cores)
  ```

- By default, the number of IPv6 CoreXL Firewall instances is set to two.

  When the SMT (Hyper-Threading) is enabled, the default number of IPv6 CoreXL Firewall instances is four.

- The number of IPv6 CoreXL Firewall instances you can configure is from a minimum of two to a maximum equal to the total number of IPv4 CoreXL Firewall instances.

  The number of IPv6 CoreXL Firewall instances cannot be greater than the number of IPv4 CoreXL Firewall instances:

  ```
  2 <= (Number of IPv6 CoreXL Firewall instances) <= (Total
  Number of IPv4 CoreXL Firewall instances)
  ```

- The total number of IPv4 *and* IPv6 CoreXL Firewall instances cannot be greater than forty:

  ```
  (Number of IPv4 CoreXL Firewall instances) + (Number of IPv6
  CoreXL Firewall instances) <= 40
  ```

Configuring the Number of IPv4 CoreXL Firewall Instances

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.
4	Run: `cpconfig`
5	Enter the number of the **Check Point CoreXL** option.
6	Enter **1** to select the **(1) Change the number of firewall instances** option.
7	Enter the total number of IPv4 CoreXL Firewall instances you wish to run. **Note** - You can only select a number from the range shown. Follow the instructions on the screen.
8	Exit from the `cpconfig` menu.
9	Reboot all Security Group Members: `reboot -b all`

Configuring the Number of IPv6 CoreXL Firewall Instances

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.
4	Run: `cpconfig`
5	Enter the number of the **Check Point CoreXL** option.
6	Enter **2** to select the **(2) Change the number of IPv6 firewall instances** option.
7	Enter the total number of IPv6 CoreXL Firewall instances you wish to run. ⓘ **Note** - You can only select a number from the range shown. Follow the instructions on the screen.
8	Exit from the `cpconfig` menu.
9	Reboot all Security Group Members: `reboot -b all`

Example CoreXL Configuration

Security Group Members in the Security Group have four CPU cores.

By default, there are three IPv4 CoreXL Firewall instances and two IPv6 CoreXL Firewall instances:

CPU Core	IPv4 CoreXL Firewall instances	IPv6 CoreXL Firewall instances
CPU 0	N / A	N / A
CPU 1	`fw4_2`	N / A
CPU 2	`fw4_1`	`fw6_1`
CPU 3	`fw4_0`	`fw6_0`

- IPv4 CoreXL Firewall instances: The minimum allowed number is two and the maximum is four
- IPv6 CoreXL Firewall instances: The minimum allowed number is two and the maximum is three

To increase the number of IPv6 CoreXL Firewall instances to four, first you must increase the number of IPv4 CoreXL Firewall instances to the maximum of four and reboot:

```
CoreXL is currently enabled with 3 IPv4 firewall instances and 2 IPv6 firewall instances.

(1) Change the number of firewall instances
(2) Change the number of IPv6 firewall instances
(3) Disable Check Point CoreXL

(4) Exit
Enter your choice (1-4) : 1

How many IPv4 firewall instances would you like to enable (2 to 4) [3] ? 4

CoreXL was enabled successfully with 4 firewall instances.
Important: This change will take effect after reboot.
```

After the reboot, the CoreXL configuration on the Security Group looks like this:

CPU Core	IPv4 CoreXL Firewall instances	IPv6 CoreXL Firewall instances
CPU 0	`fw4_3`	N / A
CPU 1	`fw4_2`	N / A
CPU 2	`fw4_1`	`fw6_1`
CPU 3	`fw4_0`	`fw6_0`

Increase the number of IPv6 CoreXL Firewall instances to four and reboot:

```
CoreXL is currently enabled with 4 IPv4 firewall instances and 2 IPv6 firewall instances.

(1) Change the number of firewall instances
(2) Change the number of IPv6 firewall instances
(3) Disable Check Point CoreXL

(4) Exit
Enter your choice (1-4) : 2

How many IPv6 firewall instances would you like to enable (2 to 4)[2] ? 4

CoreXL was enabled successfully with 3 IPv6 firewall instances.
Important: This change will take effect after reboot.
```

After the reboot, the CoreXL configuration on the Security Group looks like this:

CPU Core	IPv4 CoreXL Firewall instances	IPv6 CoreXL Firewall instances
CPU 0	`fw4_3`	`fw6_3`
CPU 1	`fw4_2`	`fw6_2`
CPU 2	`fw4_1`	`fw6_1`
CPU 3	`fw4_0`	`fw6_0`

CoreXL Limitations

- R80.20SP CoreXL does not support:
  - Overlapping NAT
  - VPN Traditional Mode
- The global CoreXL Firewall instance #0 (`fw_worker_0`) always processes all the 6in4 traffic.

Configuring Affinity Settings

In This Section:

Important - For 16000 and 26000 Appliances, see *"Affinity Settings for 16000 and 26000 Appliances" on page 270*.

Introduction

The script `$FWDIR/scripts/fwaffinity_apply` on Security Group Members executes automatically during boot and controls the affinity settings. When you make a change to affinity settings, the changes do not take effect until you either reboot the Security Group Members, or manually execute the `$FWDIR/scripts/fwaffinity_apply` script.

The `$FWDIR/scripts/fwaffinity_apply` script configures the interfaces affinity according to the settings in the `$FWDIR/conf/fwaffinity.conf` configuration file. To change the interfaces affinity settings, edit that configuration file.

Note - When the SecureXL is enabled (this is the default), only the SecureXL SIM Affinity configuration defines the interfaces affinities (see *"sim affinity" on page 152*). Security Group Members ignore the interface affinity settings in the `$FWDIR/conf/fwaffinity.conf` file.

The $FWDIR/conf/fwaffinity.conf Configuration File

The configuration file `$FWDIR/conf/fwaffinity.conf` controls CoreXL affinity settings.

Each line in this plain-text file uses the same format:

```
<type> <id> <cpu_id>
```

Where:

Field	Allowed Value	Instructions
<type>	**i**	Configures the affinity of an interface.
	n	Configures the affinity of a Check Point daemon.
	k	Configures the affinity of a CoreXL Firewall instance.
<id>	Name of Interface	If **<type> = i**.
	Name of Daemon	If **<type> = n**.
	ID of CoreXL Firewall instance	If **<type> = k**.
	default	Configures affinities of interfaces that are not specified other lines.

Field	Allowed Value	Instructions
<cpu_ id>	Number (ID) of CPU core	Specifies the ID numbers of processing CPU cores, to which you affine an interface, a Check Point daemon, or a CoreXL Firewall instance.
	all	Specifies all processing CPU cores as available to configure the affinity of an interface, a Check Point daemon, or a CoreXL Firewall instance.
	auto	Configures Automatic mode. See *"Allocation of Processing CPU Cores" on page 274*.
	ignore	No specified affinity. This is useful to exclude an interface from the "**default**" configuration.

Notes:

- After you edit the `$FWDIR/conf/fwaffinity.conf` configuration file, you must copy it to all other Security Group Members.

  Run in the Expert mode:

  ```
  asg_cp2blades $FWDIR/conf/fwaffinity.conf
  ```

- The default configuration in this file is:

  ```
  i default auto
  ```

- Possible combinations:

  - To configure the affinity of an interface:

    ```
    i <Name of Interface> {<CPU ID Number> | all | ignore |
    auto}
    ```

    ```
    i default {<CPU ID Number> | all | ignore | auto}
    ```

  - To configure the affinity of a Check Point daemon:

    ```
    n <Name of Daemon> {<CPU ID Number> | all | ignore |
    auto}
    ```

  - To configure the affinity of a CoreXL Firewall instance:

    ```
    k <ID of CoreXL Firewall instance> {<CPU ID Number> | all
    | ignore | auto}
    ```

- To see the IRQs of all interfaces, run:

  - In Gaia gClish:

    ```
    fw ctl affinity -l -v -a
    ```

  - In the Expert mode:

    ```
    g_fw ctl affinity -l -v -a
    ```

  See *"fw ctl affinity" on page 308*.

- Interfaces that share an IRQ cannot have different CPU cores as their affinities.

  This also applies when one interface is included in the **default** affinity setting.

  You must either configure the same affinity for all interfaces, or use **ignore** for one of these interfaces.

The $FWDIR/scripts/fwaffinity_apply Script

To execute this shell script, run in the Expert mode:

```
g_all $FWDIR/scripts/fwaffinity_apply <Parameter>
```

Parameters

Parameter	Description
`-q`	Quiet mode - prints only error messages.
`-t {i | n | k}`	Applies affinity only for the specified type: ■ `-t i` - For an interface ■ `-t n` - For a Check Point daemon name ■ `-t k` - For a CoreXL Firewall instance
`-f`	Sets interface affinity even if SecureXL SIM Affinity is set to Automatic mode.

Affinity Settings for 16000 and 26000 Appliances

Background

With the default CoreXL affinity settings, all CoreXL SND instances are affined to the same CPU socket. As a result, the number of CoreXL Firewall instances affined to each CPU socket is not balanced.

To improve the memory behavior and possibly improve the Security Gateway's performance, you can evenly distribute the affinities of CoreXL SND instances and CoreXL Firewall instances between the CPU sockets.

The configuration provided below is a recommendation for Threat Prevention and NGFW.

Syntax

The applicable CLI commands:

```
mq_mng -s manual -c <IDs of CoreXL SND Instances>
```

```
fw ctl affinity -sa -c <IDs of CoreXL Firewall Instances>
```

Parameters

Parameter	Description
<IDs of CoreXL SND Instances>	IDs of CoreXL SND Instances separated with: ■ space (example: `0 1`) ■ comma (example: `0,1`) ■ hyphen (example: `0-1`)
<IDs of CoreXL Firewall Instances>	IDs of CoreXL Firewall Instances separated with: ■ space (example: `0 1`) ■ hyphen (example: `0-1`)

Notes:

- To see the list of CoreXL Firewall Instances, run:

  ```
  fw ctl multik stat
  ```

- To see the list of CPU cores, run:

  ```
  cat /proc/cpuinfo | grep
  processor
  ```

- For more information about these commands, see:
  - *"Multi-Queue Basic Configuration" on page 346*
  - *"fw ctl affinity" on page 308*

Procedure

Configuring the *alternative* CoreXL affinity settings on these models

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

Step	Instructions
4	Run: `cpconfig`
5	Enter the number of the **Check Point CoreXL** option.
6	Enter **1** to select the **(1) Change the number of firewall instances** option.
7	Configure the number of CoreXL Firewall instances: ■ On 16000 models - **39** ■ On 26000 models - **59**
8	Exit from the `cpconfig` menu.
9	Reboot all Security Group Members: `reboot -b all`
10	Connect to the command line on the Security Group.
11	Log in to the Expert mode.
12	Examine the current CoreXL affinity configuration: `fw ctl affinity -l [-a] [-v] [-r] [-q]`

13	Configure the Multi-Queue:
	■ On 16000 models, run:
	`mq_mng -s manual -c 0-1 12-13 24-25 36-37`
	■ On 26000 models, run:
	`mq_mng -s manual -c 0-2 18-20 36-38 54-56`

14	Configure the affinity of CoreXL Firewall instances to specific CPU cores:
	■ On 16000 models, run:
	`fw ctl affinity -sa -c 2-11 14-23 26-35 38-46`
	■ On 26000 models, run:
	`fw ctl affinity -sa -c 3-17 21-35 39-53 57-70`

15	Examine the new CoreXL configuration: `fw ctl affinity -l [-a] [-v] [-r] [-q]`

Configuring the *default* CoreXL affinity settings on these models

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to Gaia Clish, or the Expert mode.
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.
4	Run: `cpconfig`
4	Enter the number of the **Check Point CoreXL** option.
5	Enter **1** to select the **(1) Change the number of firewall instances** option.
7	Configure the number of CoreXL Firewall instances: ■ On 16000 models - **43** ■ On 26000 models - **61**
8	Exit from the `cpconfig` menu.
9	Reboot all Security Group Members: `reboot -b all`
10	Connect to the command line on the Security Group.
11	Log in to the Expert mode.
12	Examine the current CoreXL affinity configuration: `fw ctl affinity -l [-a] [-v] [-r] [-q]`

13	Configure the Multi-Queue:
	■ On 16000 models, run:
	`mq_mng -s manual -c 0-1 24-25`
	■ On 26000 models, run:
	`mq_mng -s manual -c 0-4 36-40`

Step	Instructions

14	Configure the affinity of CoreXL Firewall instances to specific CPU cores:
	■ On 16000 models, run:
	`fw ctl affinity -sa -c 2-23 26-46`
	■ On 26000 models, run:
	`fw ctl affinity -sa -c 5-35 41-70`

15	Examine the new CoreXL configuration: `fw ctl affinity -l [-a] [-v] [-r] [-q]`

Performance Tuning

This section describes how to fine tune the CoreXL performance.

Allocation of Processing CPU Cores

The CoreXL software architecture includes the Secure Network Distributor (SND).

The SND is responsible for these:

- Processing the incoming traffic from the network interfaces
- Securely accelerating authorized packets (if SecureXL is enabled)
- Distributing non-accelerated packets between the CoreXL Firewall instances.

The association of a particular interface with a specific processing CPU core is called the interface's *affinity* with that CPU core. This affinity causes the interface's traffic to be directed to that CPU core and the CoreXL SND to run on that CPU core.

The association of a particular CoreXL Firewall instance with a specific CPU core is called the CoreXL Firewall instance's *affinity* with that CPU core.

The association of a particular user space process with a specific CPU core is called the process's *affinity* with that CPU core.

The default affinity setting for all interfaces is Automatic. Automatic affinity means that if SecureXL is enabled, the affinity for each interface is reset periodically and balanced between the available CPU cores. If SecureXL is disabled, the default affinities of all interfaces are with one available CPU core. In both cases, all processing CPU cores that run a CoreXL Firewall instance, or defined as the affinity for another user space process, is considered unavailable, and the affinity for interfaces is not set to those CPU cores.

In some cases, which we discuss in the following sections, it may be advisable to change the distribution of CoreXL Firewall instances, the CoreXL SND, and other user space processes, between the processing CPU cores. To do so, you change the affinities of different NICs (interfaces) or user space processes. However, to ensure CoreXL efficiency, traffic from all interfaces must be directed to CPU cores that do not run CoreXL Firewall instances. Therefore, if you change affinities of interfaces or other user space processes, you must configure the number of CoreXL Firewall instances accordingly. You also must make sure that the CoreXL Firewall instances run on other processing CPU cores.

Under normal circumstances, we do not recommend for a CoreXL SND and a CoreXL Firewall instance to share the same CPU core. However, it is necessary for the CoreXL SND and a CoreXL Firewall instance to share a CPU core when Security Group runs on a computer with exactly two CPU cores.

Adding Processing CPU Cores to the Hardware

If you increase the number of processing CPU cores on the computer, it does **not** automatically increase the number of CoreXL Firewall instances.

You must manually configure the applicable number of CoreXL Firewall instances in the `cpconfig` menu (see *"Configuring IPv4 and IPv6 CoreXL Firewall instances" on page 261*).

Allocating Additional CPU Cores to the CoreXL SND

The default configuration of CoreXL Firewall instances and the CoreXL SNDs might not be optimal for your needs.

If the default number of CoreXL SNDs is not enough to process the incoming traffic, and your Security Group Members contain enough CPU cores, you can decrease the number of CoreXL Firewall instances. This automatically allocates additional CPU cores to run the CoreXL SNDs.

This scenario is likely to occur if much of the traffic is accelerated by SecureXL. In this case, the task load of the CoreXL SNDs may be disproportionate to that of the CoreXL Firewall instances.

To check if the SND is slowing down the traffic:

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to Gaia Clish, or the Expert mode
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

Step	Instructions

1	Identify the processing CPU core, to which the interfaces direct their traffic:
	■ In Gaia gClish:
	`fw ctl affinity -l -r`
	■ In the Expert mode:
	`g_fw ctl affinity -l -r`

2	Under heavy traffic conditions, run the `top` command.
	Examine the values for the different CPU cores in the '`idle`' column.
	■ In Gaia gClish:
	`top`
	■ In the Expert mode:
	`g_top`

Best Practice - We recommend to allocate an additional CPU core to the CoreXL SND only if *all* these conditions are met:

- Your platform has at least eight processing CPU cores.
- In the output of the `top` command, the '`idle`' values for the CPU cores that run the CoreXL SNDs are in the 0%-5% range.
- In the output of the `top` command, the sum of the '`idle`' values for the CPU cores that run the CoreXL Firewall instances is significantly higher than 100%.

If at least one of the above conditions is not met, the default CoreXL configuration is sufficient.

To allocate an additional processing CPU core to the CoreXL SND:

Item	Description
1	Decrease the number of CoreXL Firewall instances in the `cpconfig` menu. See *"Allocating Additional CPU Cores to the CoreXL SND" on the previous page*.
2	Configure interface affinities to the remaining CPU cores. See *"Configuring Affinities for Interfaces on a Security Group" on page 278*.
3	Reboot all Security Group Members to apply the new configuration: `reboot -b all`

Allocating a CPU Core for Heavy Logging

If Security Group Members generate very large number of logs, it may be advisable to allocate a processing CPU core to the **fwd** daemon, which generates the logs.

Note - This change decreases the number of CPU cores available for CoreXL Firewall instances.

To allocate a processing CPU core to the *fwd* daemon:

See *"Configuring Affinity Settings" on page 266*.

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to the Expert mode.
3	Run: `cpconfig`
4	Enter the number of the **Check Point CoreXL** option.
5	Decrease the number of CoreXL Firewall instances. See *"Configuring IPv4 and IPv6 CoreXL Firewall instances" on page 261*.
6	Exit from the `cpconfig` menu.
7	Examine which processing CPU cores run the CoreXL Firewall instances and which CPU cores handle the traffic from interfaces: `fw ctl affinity -l -r` See *"fw ctl affinity" on page 308*.
8	Back up the `$FWDIR/conf/fwaffinity.conf` file: `$FWDIR/conf/fwaffinity.conf{,_BKP}`
9	Edit the `$FWDIR/conf/fwaffinity.conf` file: `vi $FWDIR/conf/fwaffinity.conf`

Step	Instructions

10	Allocate one of the remaining CPU cores to the **fwd** daemon.
	To do so, configure the affinity of the **fwd** daemon to that CPU core.
	`n fwd <CPU ID>`
	For example, to affine the **fwd** daemon to CPU core **#2**, add this line:
	`n fwd 2`
	Note - It is important to avoid the CPU cores that run the CoreXL SND instances only if these CPU cores are explicitly defined for the affinities of interfaces. If affinity of interfaces is configured in the Automatic mode, the **fwd** daemon can use all CPU cores that do not run CoreXL Firewall instances. Traffic from interfaces is automatically diverted to other CPU cores.

11	Save the changes in the file and exit the editor.
12	Copy the `$FWDIR/conf/fwaffinity.conf` configuration file to all other Security Group Members: `asg_cp2blades $FWDIR/conf/fwaffinity.conf`

13	Apply the new configuration:
	- To apply immediately, run:
	`g_all $FWDIR/scripts/fwaffinity_apply`
	- To apply later, reboot all Security Group Members:
	`reboot -b all`

Configuring Affinities for Interfaces on a Security Group

Check which processing CPU cores run the CoreXL Firewall instances and which CPU cores handle the traffic from interfaces:

```
fw ctl affinity -l -r
```

See *"fw ctl affinity" on page 308*.

Allocate the remaining CPU cores to run the CoreXL SNDs. To do so, configure the affinity of interfaces to the applicable CPU cores.

For more information, see *"Allocation of Processing CPU Cores" on page 274*.

Note - To set the affinity of VLAN interfaces, use their physical interfaces.

Configuring affinities of interfaces when SecureXL is enabled

If SecureXL is enabled (this is the default), configure the affinities of interfaces with the SecureXL "`sim affinity`" command (see *"sim affinity" on page 152*).

The default SIM Affinity mode for interfaces is Automatic. In the Automatic mode, SecureXL automatically distributes affinities of interfaces between CPU cores, which do not run CoreXL Firewall instances and for which no affinities of user space processes are configured.

Configuring affinities of interfaces when SecureXL is disabled

Important - Starting from R80.20SP, you can disable the SecureXL only *temporarily*. See *"Configuring SecureXL" on page 30*..

If SecureXL is disabled, Security Group Members load affinities of interfaces during the boot from the CoreXL configuration file `$FWDIR/conf/fwaffinity.conf`. In this configuration file, lines that begin with the letter "`i`", define the affinities of interfaces. If SecureXL is enabled, Security Group Members ignore these lines.

If you allocate only one CPU core to the CoreXL SND, it is best to have that CPU core selected automatically. To do so, leave the default automatic interface affinity and do not configure explicit affinities of interfaces to CPU cores.

Make sure the `$FWDIR/conf/fwaffinity.conf` file contains this line:

```
i default auto
```

In addition, make sure that the `$FWDIR/conf/fwaffinity.conf` file does not contain other lines that begin with "`i`", so that no explicit affinities of interfaces are defined. This ensures that Security Group Members direct all traffic to the remaining CPU cores.

If you allocate more than one processing CPU core to the CoreXL SND, it is necessary to configure affinities of interfaces explicitly to the remaining CPU cores. If you have multiple interfaces, decide which interfaces to affine to which CPU cores. Try to achieve a balance of expected traffic between the CPU cores. Examine the traffic balance with the `top` command.

To configure affinities of interfaces explicitly, when SecureXL is disabled

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to the Expert mode.

Step	Instructions

3	Configure the affinity for each interface in the `$FWDIR/conf/fwaffinity.conf` file.
	See *"Configuring Affinity Settings" on page 266*.
	For each interface, there must be a separate line that begins with the letter "`i`".
	Each of these lines must have this syntax:
	`i <Name of Interface> <CPU ID>`
	For example, if it is necessary that the traffic from `eth1-05` and `eth1-07` goes to CPU core `#0`, and the traffic from `eth1-09` goes to CPU core `#1`, add these lines:
	`i eth1-05 0`
	`i eth1-07 0`
	`i eth1-09 1`
	Alternatively, define affinities of interface explicitly for only one processing CPU core, and define other CPU cores as the default affinity for the remaining interfaces.
	To do so, use this syntax:
	`i default <CPU ID>`
	For example, if it is necessary that the traffic from `eth1-05` goes to CPU core `#1`, and the traffic from all other interfaces goes to CPU core `#0`, add these lines:
	`i eth1-05 1`
	`i default 0`

4	Apply the new configuration: `$FWDIR/scripts/fwaffinity_apply`

CoreXL Commands

This section describes different CLI commands CoreXL.

Syntax Legend

Whenever possible, this guide lists commands, parameters and options in the alphabetical order.

This guide uses this convention in the Command Line Interface (CLI) syntax:

<table>
<tr><th>Character</th><th>Instructions</th></tr>
<tr><td>TAB</td><td>

Shows the available nested subcommands:

```
main command
→ nested subcommand 1
→ → nested subsubcommand 1-1
→ → nested subsubcommand 1-2
→ nested subcommand 2
```

Example:

```
cpwd_admin
    config
        -a <options>
        -d <options>
        -p
        -r
    del <options>
```

Meaning, you can run only **one** of these commands:

- This command:

  ```
  cpwd_admin config -a <options>
  ```

- Or this command:

  ```
  cpwd_admin config -d <options>
  ```

- Or this command:

  ```
  cpwd_admin config -p
  ```

- Or this command:

  ```
  cpwd_admin config -r
  ```

- Or this command:

  ```
  cpwd_admin del <options>
  ```

</td></tr>
<tr><td>Curly brackets or braces
{ }</td><td>Enclose a list of available commands or parameters, separated by the vertical bar **|**.
User can enter only one of the available commands or parameters.</td></tr>
<tr><td>Angle brackets
< ></td><td>Enclose a variable.
User must explicitly specify a supported value.</td></tr>
<tr><td>Square brackets or brackets
[ ]</td><td>Enclose an optional command or parameter, which user can also enter.</td></tr>
</table>

cp_conf corexl

Description

Enables or disables CoreXL.

Important:

- This command is for Check Point use only.
  To configure CoreXL, use the **Check Point CoreXL** option in the *"cpconfig" on the next page* menu.
- After all changes in CoreXL configuration on the Security Group, you must reboot it.

Syntax

- To enable CoreXL with 'n' IPv4 Firewall instances and optionally 'k' IPv6 Firewall instances:

```
cp_conf corexl [-v] enable [n] [-6 k]
```

- To disable CoreXL:

```
cp_conf corexl [-v] disable
```

The related command is: *"fwboot corexl" on page 328*.

Parameters

Parameter	Description
`-v`	Leaves the high memory (`vmalloc`) unchanged.
`n`	Denotes the number of IPv4 CoreXL Firewall instances.
`k`	Denotes the number of IPv6 CoreXL Firewall instances.

Example

Currently, the Security Group runs two IP4v CoreXL Firewall instances (`KERN_INSTANCE_NUM = 2`).

We change the number of IP4v CoreXL Firewall instances to three.

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 2      |           7 |       28
 1 | Yes     | 1      |           0 |       11
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_cat /etc/fw.boot/boot.conf
CTL_IPFORWARDING 1
DEFAULT_FILTER_PATH 0
KERN_INSTANCE_NUM 2
COREXL_INSTALLED 1
KERN6_INSTANCE_NUM 2
IPV6_INSTALLED 0
CORE_OVERRIDE 4
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# cp_conf corexl -v enable 3
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_cat /etc/fw.boot/boot.conf
CTL_IPFORWARDING 1
DEFAULT_FILTER_PATH 0
KERN_INSTANCE_NUM 3
COREXL_INSTALLED 1
KERN6_INSTANCE_NUM 2
IPV6_INSTALLED 0
CORE_OVERRIDE 4
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# reboot
.. ... ...
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 3      |           7 |       28
 1 | Yes     | 2      |           0 |       11
 2 | Yes     | 1      |           4 |       10
[Expert@MyChassis-ch0x-0x:0]#
```

cpconfig

Description

This command starts the Check Point Configuration Tool.

This tool lets you configure specific settings for the installed Check Point products.

Important - You must run this command on a Security Group - in Gaia gClish, or in the Expert mode.

Syntax

```
cpconfig
```

Menu Options

Note - The options shown depend on the configuration and installed products.

Menu Option	Description
Licenses and contracts	Manages Check Point licenses and contracts on this Security Group.
SNMP Extension	Obsolete. Do **not** use this option anymore. To configure SNMP, see the *R80.20SP Quantum Maestro Gaia Administration Guide* > Chapter *System Management* > Section *SNMP*.
PKCS#11 Token	Register a cryptographic token, for use by Gaia Operating System. See details of the token, and test its functionality.
Random Pool	Configures the RSA keys, to be used by Gaia Operating System.
Secure Internal Communication	Manages SIC on the Security Group. This change requires a restart of Check Point services on the Security Group. For more information, see: - The *Security Management Administration Guide* for your Management Server version. - sk65764: How to reset SIC.
Enable cluster membership for this gateway	Enables the cluster membership on the Security Group. This change requires a reboot of the Security Group.
Disable cluster membership for this gateway	Disables the cluster membership on the Security Group. This change requires a reboot of the Security Group.
Enable Check Point Per Virtual System State	Enables Virtual System Load Sharing on the Security Group in the VSX mode. For more information, see the *R80.20SP Quantum Maestro VSX Administration Guide*.

Menu Option	Description
Disable Check Point Per Virtual System State	Disables Virtual System Load Sharing on the Security Group in the VSX mode. For more information, see the *R80.20SP Quantum Maestro VSX Administration Guide*.
Enable Check Point ClusterXL for Bridge Active/Standby	Enables Check Point ClusterXL for Bridge mode. This change requires a reboot of the Security Group.
Disable Check Point ClusterXL for Bridge Active/Standby	Disables Check Point ClusterXL for Bridge mode. This change requires a reboot of the Security Group.
Check Point CoreXL	Manages CoreXL on the Security Group. After all changes in CoreXL configuration, you must reboot the Security Group. For more information, see *"CoreXL" on page 259*.
Automatic start of Check Point Products	Shows and controls which of the installed Check Point products start automatically during boot.
Exit	Exits from the Check Point Configuration Tool.

Example

```
[Expert@MyChassis-ch0x-0x:0]# cpconfig
This program will let you re-configure
your Check Point products configuration.


Configuration Options:
----------------------
(1)  Licenses and contracts
(2)  SNMP Extension
(3)  PKCS#11 Token
(4)  Random Pool
(5)  Secure Internal Communication
(6)  Disable cluster membership for this gateway
(7)  Enable Check Point Per Virtual System State
(8)  Enable Check Point ClusterXL for Bridge Active/Standby
(9)  Check Point CoreXL
(10) Automatic start of Check Point Products

(11) Exit

Enter your choice (1-11) :
```

'fw ctl multik' and 'fw6 ctl multik'

Description

The "*fw ctl multik*" and "*fw6 ctl multik*" commands control CoreXL for IPv4 and IPv6, respectively.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax for IPv4

```
fw ctl multik
      add_bypass_port <options>
      del_bypass_port <options>
      dynamic_dispatching <options>
      gconn <options>
      get_instance <options>
      print_heavy_conn
      prioq <options>
      show_bypass_ports
      stat
      start
      stop
      utilize
```

Syntax for IPv6

```
fw6 ctl multik
      add_bypass_port <options>
      del_bypass_port <options>
      dynamic_dispatching <options>
      gconn <options>
      get_instance <options>
      print_heavy_conn
      prioq <options>
      show_bypass_ports
      stat
      start
      stop
      utilize
```

Parameters

Parameter	Description
`add_bypass_port <options>`	Adds the specified TCP and UDP ports to the CoreXL Dynamic Dispatcher bypass list. See *"fw ctl multik add_bypass_port" on the next page*.
`del_bypass_port <options>`	Removes the specified TCP and UDP ports from the CoreXL Dynamic Dispatcher bypass list. See *"fw ctl multik del_bypass_port" on page 290*.
`dynamic_dispatching <options>`	Shows and controls CoreXL Dynamic Dispatcher (see sk105261). See *"fw ctl multik dynamic_dispatching" on page 291*.
`gconn <options>`	Shows statistics about CoreXL Global Connections. See *"fw ctl multik gconn" on page 293*.
`get_instance <options>`	Shows CoreXL Firewall instance that processes the specified IPv4 connection. See *"fw ctl multik get_instance" on page 298*.
`print_heavy_conn`	Shows the table with Heavy Connections (that consume the most CPU resources) in the CoreXL Dynamic Dispatcher. See *"fw ctl multik print_heavy_conn" on page 300*.
`prioq <options>`	Configures the CoreXL Firewall Priority Queues (see sk105762). See *"fw ctl multik prioq" on page 301*.

Parameter	Description
`show_bypass_ports`	Shows the TCP and UDP ports configured in the bypass port list of the CoreXL Dynamic Dispatcher. See *"fw ctl multik show_bypass_ports" on page 303*.
`stat`	Shows the CoreXL status. See *"fw ctl multik stat" on page 303*.
`start`	Starts all CoreXL Firewall instances on-the-fly. See *"fw ctl multik start" on page 305*.
`stop`	Stops all CoreXL Firewall instances temporarily. See *"fw ctl multik stop" on page 306*.
`utilize`	Shows the CoreXL queue utilization for each CoreXL Firewall instance. See *"fw ctl multik utilize" on page 307*.

fw ctl multik add_bypass_port

Description

Adds the specified TCP and UDP ports to the bypass port list of the CoreXL Dynamic Dispatcher.

For more information about the CoreXL Dynamic Dispatcher, see sk105261.

Important - This command saves the configuration in the `$FWDIR/conf/dispatcher_bypass.conf` file. You must **not** edit this file manually.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax

```
fw ctl multik add_bypass_port <Port Number 1>,<Port Number
2>,...,<Port Number N>
```

Parameters

Parameter	Description
<Port Number>	Specifies the numbers of TCP and UDP ports to add to the list. **Important** - You can add 10 ports maximum.

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_cat $FWDIR/conf/dispatcher_bypass.conf
dynamic_dispatcher_bypass_ports_number = 0
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik add_bypass_port 8888
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
(8888)
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_cat $FWDIR/conf/dispatcher_bypass.conf
dynamic_dispatcher_bypass_ports_number = 1
dynamic_dispatcher_bypass_port_table=8888
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik add_bypass_port 9999
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
(8888,9999)
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_cat $FWDIR/conf/dispatcher_bypass.conf
dynamic_dispatcher_bypass_ports_number = 2
dynamic_dispatcher_bypass_port_table=8888,9999
[Expert@MyChassis-ch0x-0x:0]
```

fw ctl multik del_bypass_port

Description

Removes the specified TCP and UDP ports from the bypass port list of the CoreXL Dynamic Dispatcher.

For more information about the CoreXL Dynamic Dispatcher, see sk105261.

Important - This command saves the configuration in the `$FWDIR/conf/dispatcher_bypass.conf` file. You must **not** edit this file manually.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax

```
fw ctl multik del_bypass_port <Port Number 1>,<Port Number
2>,...,<Port Number N>
```

Parameters

Parameter	Description
<Port Number>	Specifies the numbers of TCP and UDP ports to remove from the list.

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_cat $FWDIR/conf/dispatcher_bypass.conf
dynamic_dispatcher_bypass_ports_number = 0
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik add_bypass_port 8888
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
(8888)
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_cat $FWDIR/conf/dispatcher_bypass.conf
dynamic_dispatcher_bypass_ports_number = 1
dynamic_dispatcher_bypass_port_table=8888
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik add_bypass_port 9999
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
(8888,9999)
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_cat $FWDIR/conf/dispatcher_bypass.conf
dynamic_dispatcher_bypass_ports_number = 2
dynamic_dispatcher_bypass_port_table=8888,9999
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik add_bypass_port 9999
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
(8888)
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0]# g_cat $FWDIR/conf/dispatcher_bypass.conf
dynamic_dispatcher_bypass_ports_number = 1
dynamic_dispatcher_bypass_port_table=8888
[Expert@MyChassis-ch0x-0x:0]
```

fw ctl multik dynamic_dispatching

Description

Shows and controls the CoreXL Dynamic Dispatcher that dynamically assigns new connections to a CoreXL Firewall instances based on the utilization of CPU cores.

For more information, see sk105261.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax for IPv4

```
fw ctl multik dynamic_dispatching
      get_mode
      off
      on
```

Syntax for IPv6

```
fw6 ctl multik dynamic_dispatching
      get_mode
      off
      on
```

Parameters

Parameter	Description
`get_mode`	Shows the current state of the CoreXL Dynamic Dispatcher.
`off`	Disables the CoreXL Dynamic Dispatcher.
`on`	Enables the CoreXL Dynamic Dispatcher.

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik dynamic_dispatching get_mode
Current mode is Off
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik dynamic_dispatching on
New mode is: On
Please reboot the system
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik gconn

Description

Shows statistics about CoreXL Global Connections that Security Gateway stores in the kernel table `fw_multik_ld_gconn_table`.

The CoreXL Global Connections table contains information about which CoreXL Firewall instance owns which connections.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Notes:

- This command does not support VSX.
- This command does not support IPv6.

Syntax

```
fw [-d] ctl multik gconn
      -h
      -p
      -sec
      -seg <Number>
```

Parameters

Parameter	Description
`-d`	Runs the command in debug mode. Use only if you troubleshoot the command itself. **Best Practice** - If you use this parameter, then redirect the output to a file, or use the `script` command to save the entire CLI session.
none	Shows the interactive menu for the CoreXL Firewall Priority Queues.
`-h`	Shows the built-in help.

Parameter	Description
`-p`	Shows the additional information about each CoreXL Firewall instance, including the information about Firewall Priority Queues: ▪ `I/O` (In or Out) ▪ `Inst. ID` (CoreXL Firewall instance ID) ▪ `Flags` ▪ `Seq` (Sequence) ▪ `Hold_ref` (Hold reference) ▪ `Prio` (Firewall Priority Queues mode) ▪ `last_enq_jiff` (Jiffies since last enqueue) ▪ `queue_indx` (Queue index number) ▪ `conn_tokens` (Connection Tokens)
`-s`	Shows the total number of global connections.
`-sec`	Shows the additional information about each CoreXL Firewall instance: ▪ `I/O` (In or Out) ▪ `Inst. ID` (CoreXL Firewall instance ID) ▪ `Flags` ▪ `Seq` (Sequence) ▪ `Hold_ref` (Hold reference)
`-seg` *`<Number>`*	Shows the default information about the specified Global Connections Segment.

Example 1 - Default information

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik gconn
Default:

===============================================================================================
===========================
| Segm | Src IP | S.port | Dst IP | D.port | Proto | Flags | PP |Ref Cnt(I/O)|Inst|PPAK ID|clstr
mem ID|Rec. ref|Rec. Type|

===============================================================================================
===========================
|  0  | 192.168.3.52    | 18192 | 192.168.3.240   | 46082 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |
|  0  | 192.168.3.52    | 54216 | 192.168.3.240   | 257   | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |
|  0  | 192.168.3.240   | 53925 | 192.168.3.53    | 18192 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |
|  0  | 192.168.3.240   | 257   | 192.168.3.52    | 54216 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |
|  0  | 192.168.3.53    | 18192 | 192.168.3.240   | 64216 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 15   |   0   | UNDEF |
|  0  | 0.0.0.0         | 8116  | 192.168.3.53    | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |
|  0  | 0.0.0.0         | 8116  | 192.168.3.52    | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |
|  0  | 192.168.3.240   | 64216 | 192.168.3.53    | 18192 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 15   |   0   | UNDEF |
|  0  | 192.168.3.52    | 8116  | 0.0.0.0         | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |
|  0  | 172.20.168.16   | 63800 | 192.168.3.53    | 22    | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |
|  0  | 192.168.3.240   | 46082 | 192.168.3.52    | 18192 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |
|  0  | 192.168.3.53    | 8116  | 0.0.0.0         | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |
|  0  | 192.168.3.53    | 22    | 172.20.168.16   | 63800 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |
|  0  | 192.168.3.53    | 18192 | 192.168.3.240   | 53925 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |

===============================================================================================
===========================
FP - from pool.    T - temporary connection.    PP - pending pernament.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Summary information only

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik gconn -s
Summary:
        Total number of global connections: 12
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Additional information about each CoreXL Firewall instance, including the information about Firewall Priority Queues

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik gconn -p
Instance section prio info:

================================================================================================
================================================================================================
=======
| Segm | Src IP | S.port | Dst IP | D.port | Proto | Flags | PP |Ref Cnt(I/O)|Inst|PPAK ID|clstr
mem ID|Rec. ref|Rec. Type|Inst. Section: I/O|Inst. ID|Flags| Seq | Hold_ref |Prio:|last_enq_
jiff|queue_indx|conn_tokens

================================================================================================
================================================================================================
=======
|  0  | 192.168.3.52    | 18192 | 192.168.3.240   | 46082 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.240   | 53925 | 192.168.3.53    | 18192 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: In  |  0  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.240   | 257   | 192.168.3.52    | 35883 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.53    | 18192 | 192.168.3.240   | 64216 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 15   |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 0.0.0.0         | 8116  | 192.168.3.53    | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 0.0.0.0         | 8116  | 192.168.3.52    | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.240   | 64216 | 192.168.3.53    | 18192 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 15   |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.52    | 8116  | 0.0.0.0         | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 172.20.168.16   | 63800 | 192.168.3.53    | 22    | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: In  |  0  | Perm |  494  |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.240   | 46082 | 192.168.3.52    | 18192 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.52    | 35883 | 192.168.3.240   | 257   | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.53    | 8116  | 0.0.0.0         | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.53    | 22    | 172.20.168.16   | 63800 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: Out |  0  | Perm |  280  |  0  |Prio:|  0  |  -1  |  0  |
|  0  | 192.168.3.53    | 18192 | 192.168.3.240   | 53925 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: Out |  0  | Perm |  219  |  0  |Prio:|  0  |  -1  |  0  |

================================================================================================
================================================================================================
=======
FP - from pool.    T - temporary connection.    PP - pending pernament.    In - inbound.    Out
- outbound.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Additional information about each CoreXL Firewall instance

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik gconn -sec
Instance section:

===============================================================================================
=======================================================================
| Segm | Src IP | S.port | Dst IP | D.port | Proto | Flags | PP |Ref Cnt(I/O)|Inst|PPAK ID|clstr
mem ID|Rec. ref|Rec. Type|Inst. Section: I/O|Inst. ID|Flags| Seq | Hold_ref |

===============================================================================================
=======================================================================
|  0  | 192.168.3.52    | 18192 | 192.168.3.240   | 46082 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |
|  0  | 192.168.3.52    | 52864 | 192.168.3.240   | 257   | 6  |FP .. ..| No | 0/0 |  2  | 32 |
 0    |   0   | UNDEF |Inst. Section: Out |  2  | Perm |  0    |  0  |
|  0  | 192.168.3.240   | 53925 | 192.168.3.53    | 18192 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: In  |  0  | Perm |  0    |  0  |
|  0  | 192.168.3.53    | 18192 | 192.168.3.240   | 64216 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 15   |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |
|  0  | 192.168.3.53    | 60186 | 192.168.3.240   | 257   | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  76   |  0  |
|  0  | 0.0.0.0         | 8116  | 192.168.3.53    | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |
|  0  | 0.0.0.0         | 8116  | 192.168.3.52    | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |
|  0  | 192.168.3.240   | 64216 | 192.168.3.53    | 18192 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 15   |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |
|  0  | 192.168.3.52    | 8116  | 0.0.0.0         | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |
|  0  | 172.20.168.16   | 63800 | 192.168.3.53    | 22    | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: In  |  0  | Perm |  479  |  0  |
|  0  | 192.168.3.240   | 46082 | 192.168.3.52    | 18192 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 0    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |
|  0  | 192.168.3.53    | 8116  | 0.0.0.0         | 8116  | 17 |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |Inst. Section: Out |  1  | Perm |  0    |  0  |
|  0  | 192.168.3.240   | 257   | 192.168.3.52    | 52864 | 6  |FP .. ..| No | 0/0 |  2  | 32 |
 0    |   0   | UNDEF |Inst. Section: In  |  2  | Perm |  0    |  0  |
|  0  | 192.168.3.53    | 22    | 172.20.168.16   | 63800 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: Out |  0  | Perm |  257  |  0  |
|  0  | 192.168.3.53    | 18192 | 192.168.3.240   | 53925 | 6  |FP .. ..| No | 0/0 |  0  | 32 |
 1    |   0   | UNDEF |Inst. Section: Out |  0  | Perm |  219  |  0  |
|  0  | 192.168.3.240   | 257   | 192.168.3.53    | 60186 | 6  |FP .. ..| No | 0/0 |  1  | 32 |
 1    |   0   | UNDEF |Inst. Section: In  |  1  | Perm |  0    |  0  |

===============================================================================================
=======================================================================
FP - from pool.    T - temporary connection.    PP - pending pernament.    In - inbound.    Out
- outbound.
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik get_instance

Description

Shows CoreXL Firewall instance that processes the specified IPv4 connection.

Important - This command works only if the CoreXL Dynamic Dispatcher is disabled (see sk105261).

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax

- **To show the CoreXL Firewall instance that processes the specified IPv4 connection:**

```
fw ctl multik get_instance sip=<Source IPv4 Address>
dip=<Destination IPv4 Address> proto=<Protocol Number>
```

- **To show the CoreXL Firewall instance that processes the specified range of IPv4 connections:**

```
fw ctl multik get_instance sip=<Source IPv4 Address Start> -
<Source IPv4 Address End> dip=<Destination IPv4 Address Start>
- <Destination IPv4 Address End> proto=<Protocol Number>
```

Parameters

Parameter	Description
<Source IPv4 Address>	Source IPv4 address of the specified connection
<Source IPv4 Address Start>	First source IPv4 address of the specified range of IPv4 addresses
<Source IPv4 Address End>	Last source IPv4 address of the specified range of IPv4 addresses
<Destination IPv4 Address>	Destination IPv4 address of the specified connection
<Destination IPv4 Address Start>	First destination IPv4 address of the specified range of IPv4 addresses
<Destination IPv4 Address End>	Last destination IPv4 address of the specified range of IPv4 addresses
<Protocol Number>	See *IANA Protocol Numbers*. For example: ▪ 1 = ICMP ▪ 6 = TCP ▪ 17 = UDP

Example for a specified IPv4 connection

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik get_instance sip=192.168.2.3 dip=172.30.241.66
proto=6
protocol: 6
192.168.2.3 -> 172.30.241.66 => 3
[Expert@MyChassis-ch0x-0x:0]#
```

Example for a specified range of IPv4 connections

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik get_instance sip=192.168.2.3-192.168.2.8
dip=172.30.241.66 proto=6
protocol: 6
192.168.2.3 -> 172.30.241.66 => 3
192.168.2.4 -> 172.30.241.66 => 0
192.168.2.5 -> 172.30.241.66 => 3
192.168.2.6 -> 172.30.241.66 => 5
192.168.2.7 -> 172.30.241.66 => 4
192.168.2.8 -> 172.30.241.66 => 5
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik print_heavy_conn

Description

Shows the table with Heavy Connections (that consume the most CPU resources) in the CoreXL Dynamic Dispatcher.

For more information about the CoreXL Dynamic Dispatcher, see sk105261.

CoreXL suspects that a connection is "heavy" if it meets these conditions:

- Security Gateway detected the suspected connection during the last 24 hours
- The suspected connection lasts more than 10 seconds
- CoreXL Firewall instance that processes this connection causes a CPU load of over 60%
- The suspected connection utilizes more than 50% of the total work the applicable CoreXL Firewall instance does

The output table shows this information about the Heavy Connections:

- Source IP address
- Source Port
- Destination IP address
- Destination Port
- Protocol Number
- CoreXL Firewall instance ID that processes this connection
- CoreXL Firewall instance load on the CPU
- Connection's relative load on the CoreXL Firewall instance

Notes:

- This command shows the suspected heavy connections even if they are already closed.
- In the *"CPView" on page 353* utility, go to **CPU > Top-Connections > InstancesX-Y > InstanceZ**. Refer to the **Top Connections** section.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax

```
fw [-d] ctl multik print_heavy_conn
```

Parameters

Parameter	Description
`-d`	Runs the command in debug mode. Use only if you troubleshoot the command itself. **Best Practice** - If you use this parameter, then redirect the output to a file, or use the `script` command to save the entire CLI session.

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik print_heavy_conn
Source: 192.168.20.31; SPort: 51006; Dest: 172.30.40.55; DPort: 80; IPP: 6; Instance 1; Instance
Load 61%; Connection instance load 100%
Source: 192.168.20.31; SPort: 50994; Dest: 172.30.40.55; DPort: 80; IPP: 6; Instance 1; Instance
Load 61%; Connection instance load 100%
Source: 192.168.20.31; SPort: 50992; Dest: 172.30.40.55; DPort: 80; IPP: 6; Instance 1; Instance
Load 61%; Connection instance load 100%
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik prioq

Description

Configures the CoreXL Firewall Priority Queues. For more information, see sk105762.

Important - This command saves the configuration in the `$FWDIR/conf/dispatcher_bypass.conf` file. You must **not** edit this file manually.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax for IPv4

```
fw ctl multik prioq [{0 | 1 | 2}]
```

Syntax for IPv6

```
fw6 ctl multik prioq [{0 | 1 | 2}]
```

Parameters

Parameter	Description
No Parameters	Shows the interactive menu for configuration of the CoreXL Firewall Priority Queues.
0	Disables the CoreXL Firewall Priority Queues.
1	Enables the CoreXL Firewall Priority Queues.
2	Enables the CoreXL Firewall Priority Queues in the Eviluator-only mode (evaluation of "evil" connections).

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik prioq
Current mode is Off

Available modes:
0.      Off
1.      Eviluator-only
2.      On

Choose the desired mode number: (or 3 to Quit)
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik show_bypass_ports

Description

Shows the TCP and UDP ports configured in the bypass port list of the CoreXL Dynamic Dispatcher with the *"fw ctl multik add_bypass_port" on page 288* command.

For more information about the CoreXL Dynamic Dispatcher, see sk105261.

Important - This command reads the configuration from the `$FWDIR/conf/dispatcher_bypass.conf` file. You must **not** edit this file manually.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax

```
fw ctl multik show_bypass_ports
```

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik show_bypass_ports
dynamic dispatcher bypass port list:
(9999,8888)
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik stat

Description

Shows information for each CoreXL Firewall instance.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax for IPv4

```
fw [-d] ctl multik stat
```

Syntax for IPv6

```
fw6 [-d] ctl multik stat
```

Information in the output

- The ID number of each CoreXL Firewall instance (numbers starts from zero).
- The state of each CoreXL Firewall instance.
- The ID number of CPU core, on which the CoreXL Firewall instance runs (numbers starts from the highest available CPU ID).
- The number of concurrent connections the CoreXL Firewall instance currently handles.
- The peak number of concurrent connections the CoreXL Firewall instance handled from the time it started.

Parameters

Parameter	Description
`-d`	Runs the command in debug mode. Use only if you troubleshoot the command itself. ★ **Best Practice** - If you use this parameter, then redirect the output to a file, or use the `script` command to save the entire CLI session.

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 7      |           5 |       21
 1 | Yes     | 6      |           3 |       23
 2 | Yes     | 5      |           5 |       25
 3 | Yes     | 4      |           4 |       21
 4 | Yes     | 3      |           5 |       21
 5 | Yes     | 2      |           5 |       20
[Expert@MyChassis-ch0x-0x:0]#

[Expert@MyChassis-ch0x-0x:0]# g_fw6 ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 7      |           0 |        4
 1 | Yes     | 6      |           0 |        4
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik start

Description

Starts all CoreXL Firewall instances on-the-fly, if they were stopped with the *"fw ctl multik stop" on the next page* command.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax for IPv4

```
fw ctl multik start
```

Syntax for IPv6

```
fw6 ctl multik start
```

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active   | CPU    | Connections | Peak
----------------------------------------------
 0 | No       | -      |           6 |        13
 1 | No       | -      |           3 |        11
 2 | No       | -      |           4 |        13
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik start
Instance 1 started (2 of 3 are active)
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik start
Instance 2 started (3 of 3 are active)
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active   | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes      | 3      |           5 |        13
 1 | Yes      | 2      |           4 |        11
 2 | Yes      | 1      |           4 |        13
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik start
All instances are already active
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik stop

Description

Stops all CoreXL Firewall instances on-the-fly.

Important - To start all CoreXL Firewall instances on-the-fly, run the *"fw ctl multik start" on the previous page* command.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax for IPv4

```
fw ctl multik stop
```

Syntax for IPv6

```
fw6 ctl multik stop
```

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 3      |           5 |       13
 1 | Yes     | 2      |           4 |       11
 2 | Yes     | 1      |           4 |       13
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stop
Instance 2 stopped (2 of 3 are active)
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stop
Instance 1 stopped (1 of 3 are active)
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 3      |           4 |       13
 1 | No      | -      |           3 |       11
 2 | No      | -      |           7 |       13
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stop
All instances are already inactive
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | No      | -      |           6 |       13
 1 | No      | -      |           3 |       11
 2 | No      | -      |           4 |       13
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl multik utilize

Description

Shows the CoreXL queue utilization for each CoreXL Firewall instance.

Note - This command does not support VSX.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" and "`fw6 ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" and "`g_fw6 ctl ...`" commands.

Syntax for IPv4

```
fw ctl multik utilize
```

Syntax for IPv6

```
fw6 ctl multik utilize
```

Example

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl multik utilize
ID | Utilize(%)   | Queue Elements
----------------------------------
 0 |            1 |             30
 1 |            0 |             10
 2 |            0 |             17
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw6 ctl multik utilize
ID | Utilize(%)   | Queue Elements
----------------------------------
 0 |            0 |              0
 1 |            0 |              0
[Expert@MyChassis-ch0x-0x:0]#
```

fw ctl affinity

The *fw ctl affinity* command shows and configures the CoreXL affinity settings for:

- Interfaces
- User-space processes
- CoreXL Firewall instances

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" commands.

Note - To set affinities on a specific Security Group Member, run these commands in Gaia Clish:

1. `member <Security Group Member ID>`
2. `fw ctl affinity ...`

Running the 'fw ctl affinity -l' command in Gateway Mode

Description

The "`fw ctl affinity -l`" command shows the current CoreXL affinity settings on a Security Gateway for:

- Interfaces
- User-space processes
- CoreXL Firewall instances

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" commands.

Syntax

- **To see the built-in help:**

```
fw ctl affinity
```

- **To show all the existing affinities:**

```
fw ctl affinity -l [-a] [-v] [-r] [-q]
```

- **To show the affinity for a specified interface:**

```
fw ctl affinity -l -i <Interface Name>
```

- **To show the affinity for a specified CoreXL Firewall instance:**

```
fw ctl affinity -l -k <CoreXL Firewall instance ID>
```

- **To show the affinity for a specified user-space process by its PID:**

```
fw ctl affinity -l -p <Process ID>
```

- **To show the affinity for a specified user-space process by its name:**

```
fw ctl affinity -l -n <Process Name>
```

- **To show the number of system CPU cores allowed by the installed CoreXL license:**

```
fw -d ctl affinity -corelicnum
```

Parameters

Parameter	Description
`-i <Interface Name>`	Shows the affinity for the specified interface.
`-k <CoreXL Firewall instance ID>`	Shows the affinity for the specified CoreXL Firewall instance.
`-p <Process ID>`	Shows the affinity for the Check Point user-space process (for example: *fwd*, *vpnd)* specified by its PID.
`-n <Process Name>`	Shows the affinity for the Check Point user-space process (for example: *fwd*, *vpnd)* specified by its name.
`all`	Shows the affinity for all CPU cores (numbers start from zero).
`<CPU ID0> ... <CPU IDn>`	Shows the affinity for the specified CPU cores (numbers start from zero).
`-a`	Shows all current CoreXL affinities.
`-v`	Shows verbose output with IRQ numbers of interfaces.
`-r`	Shows the CoreXL affinities in reverse order.
`-q`	Suppresses the errors in the output.

Examples

Example 1 - Show all current CoreXL affinities

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -l
eth0: CPU 0
eth1: CPU 0
eth2: CPU 0
eth3: CPU 0
fw_0: CPU 7
fw_1: CPU 6
fw_2: CPU 5
fw_3: CPU 4
fw_4: CPU 3
fw_5: CPU 2
fwd: CPU 2 3 4 5 6 7
fgd50: CPU 2 3 4 5 6 7
status_proxy: CPU 2 3 4 5 6 7
rad: CPU 2 3 4 5 6 7
cpstat_monitor: CPU 2 3 4 5 6 7
mpdaemon: CPU 2 3 4 5 6 7
cpsead: CPU 2 3 4 5 6 7
cserver: CPU 2 3 4 5 6 7
rtmd: CPU 2 3 4 5 6 7
fwm: CPU 2 3 4 5 6 7
cpsemd: CPU 2 3 4 5 6 7
cpca: CPU 2 3 4 5 6 7
cprid: CPU 2 3 4 5 6 7
cpd: CPU 2 3 4 5 6 7
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Show all current CoreXL affinities, verbose output

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -l -a -v
Interface eth0 (irq 67): CPU 0
Interface eth1 (irq 75): CPU 0
Interface eth2 (irq 83): CPU 0
Interface eth3 (irq 59): CPU 0
fw_0: CPU 7
fw_1: CPU 6
fw_2: CPU 5
fw_3: CPU 4
fw_4: CPU 3
fw_5: CPU 2
fwd: CPU 2 3 4 5 6 7
fgd50: CPU 2 3 4 5 6 7
status_proxy: CPU 2 3 4 5 6 7
rad: CPU 2 3 4 5 6 7
cpstat_monitor: CPU 2 3 4 5 6 7
mpdaemon: CPU 2 3 4 5 6 7
cpsead: CPU 2 3 4 5 6 7
cserver: CPU 2 3 4 5 6 7
rtmd: CPU 2 3 4 5 6 7
fwm: CPU 2 3 4 5 6 7
cpsemd: CPU 2 3 4 5 6 7
cpca: CPU 2 3 4 5 6 7
cprid: CPU 2 3 4 5 6 7
cpd: CPU 2 3 4 5 6 7
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Show all current CoreXL affinities, verbose output, in reverse order

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -l -a -v -r
CPU 0:  eth0 (irq 67) eth1 (irq 75) eth2 (irq 83) eth3 (irq 59)
CPU 1:
CPU 2:  fw_5
        fwd fgd50 status_proxy rad cpstat_monitor mpdaemon cpsead cserver rtmd fwm cpsemd
cpca cprid cpd
CPU 3:  fw_4
        fwd fgd50 status_proxy rad cpstat_monitor mpdaemon cpsead cserver rtmd fwm cpsemd
cpca cprid cpd
CPU 4:  fw_3
        fwd fgd50 status_proxy rad cpstat_monitor mpdaemon cpsead cserver rtmd fwm cpsemd
cpca cprid cpd
CPU 5:  fw_2
        fwd fgd50 status_proxy rad cpstat_monitor mpdaemon cpsead cserver rtmd fwm cpsemd
cpca cprid cpd
CPU 6:  fw_1
        fwd fgd50 status_proxy rad cpstat_monitor mpdaemon cpsead cserver rtmd fwm cpsemd
cpca cprid cpd
CPU 7:  fw_0
        fwd fgd50 status_proxy rad cpstat_monitor mpdaemon cpsead cserver rtmd fwm cpsemd
cpca cprid cpd
All:
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Show the affinity for the interface 'eth0'

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -l -i eth0
eth0: CPU 0
[Expert@MyChassis-ch0x-0x:0]#
```

Example 5 - Show the affinity for the Check Point user-space process 'fwd'

```
[Expert@MyChassis-ch0x-0x:0]# ps -ef | grep -v grep | egrep "PID|fwd"
UID        PID  PPID  C STIME TTY          TIME CMD
admin    26641 26452  0 Mar27 ?        00:06:56 fwd
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -l -p 26641
Process 26641: CPU 2 3 4 5 6 7
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -l -n fwd
fwd: CPU 2 3 4 5 6 7
[Expert@MyChassis-ch0x-0x:0]#
```

Example 6 - Show the affinity for the CoreXL Firewall instance #1

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -l -k 1
fw_1: CPU 6
[Expert@MyChassis-ch0x-0x:0]#
```

Example 7 - Show the number of system CPU cores allowed by the installed CoreXL license

```
[Expert@MyChassis-ch0x-0x:0]# g_fw -d ctl affinity -corelicnum
[5363 4134733584]@MyGW[4 Apr 18:11:03] Number of system CPUs 8
[5363 4134733584]@MyGW[4 Apr 18:11:03] cplic_get_navailable_cpus: fw_get_allowed_cpus_num
returned invalid value (100000) - all cpus considered as allowed!!!
4
[5363 4134733584]@MyGW[4 Apr 18:11:03] cpKeyTaskManager::~cpKeyTaskManager: called.
[Expert@MyChassis-ch0x-0x:0]#
```

Running the 'fw ctl affinity -l' command in VSX Mode

Description

The "`fw ctl affinity -l`" command shows the CoreXL affinity settings on a VSX Gateway for:

- Interfaces
- User-space processes
- CoreXL Firewall instances

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" commands.

Note - Before you run the "`fw ctl affinity -l -x`" commands, you must go to the context of the applicable Virtual System with the Gaia Clish command "`set virtual-system <VSID>`".

Syntax

- **To show the affinities in VSX mode (you can combine the optional parameters):**

```
fw ctl affinity -l -x
      [-vsid <VSID ranges>]
      [-cpu <CPU ID ranges>]
      [-flags {e | k | t | n | h | o}]
```

- **To show the number of system CPU cores allowed by the installed CoreXL license:**

```
fw -d ctl affinity -corelicnum
```

Parameters

Parameter	Description
`-vsid <VSID ranges>`	Shows the affinity for: ■ The specified one Virtual System (for example, `-vsid 7`) ■ The specified several Virtual Systems (for example, `-vsid 0-2 4`) **Important** - If you omit the `-vsid` parameter, the command runs in the current virtual context.
`<CPU ID ranges>`	Shows the affinity for: ■ The specified one CPU core (for example, `-cpu 7`) ■ The specified several CPU cores (for example, `-cpu 0-2 4`)
`-flags {e | k | t | n | h | o}`	The "`-flags`" parameter requires at least one of these arguments: ■ `e` - Do not print the exception processes ■ `k` - Do not print the kernel threads ■ `t` - Print all process threads ■ `n` - Print the process name instead of the `/proc/`*<PID>* `/cmdline` ■ `h` - Print the CPU mask in Hex format ■ `o` - Print the output into the file called `/tmp/affinity_list_output` **Important** - You must specify multiple arguments together. For example: `-flags tn`

Examples

Example 1 - Show the affinity for the CPU core #0

```
[Expert@VSX_GW:0]# g_fw ctl affinity -l -x -cpu 0
----------------------------------------------------------------------
|PID     |VSID |               CPU                     |SRC|V|KT |EXC| NAME
----------------------------------------------------------------------
|      2 |   0 |                                     0 |   | | K |   |
|      3 |   0 |                                     0 |   | | K |   |
|      4 |   0 |                                     0 |   | | K |   |
|     14 |   0 |                                     0 |   | | K |   |
|     99 |   0 |                                     0 |   | | K |   |
|    278 |   0 |                                     0 |   | | K |   |
|    382 |   0 |                                     0 |   | | K |   |
|    674 |   0 |                                     0 |   | | K |   |
|   2195 |   0 |                                     0 |   | | K |   |
|   6348 |   0 |                                     0 |   | | K |   |
|   6378 |   0 |                                     0 |   | | K |   |
----------------------------------------------------------------------
PID   - represents the pid of the process
VSID  - represents the virtual device id
CPU   - represents the CPUs assigned to the specific process
SRC   - represents the source configuration file of the process - (V)SID / (I)nstance /
(P)rocess
V     - represents validity,star means that the actual affinity is different than the
configured affinity
KT    - represents whether the process is a kernel thread
EXC   - represents whether the process belongs to the process exception list (vsaffinity_
exception.conf)
[Expert@VSX_GW:0]#
```

Example 2 - Show the affinity for the Virtual System #1

```
[Expert@VSX_GW:0]# g_fw ctl affinity -l -x -vsid 1
----------------------------------------------------------------------
|PID     |VSID |               CPU                     |SRC|V|KT |EXC| NAME
----------------------------------------------------------------------
|   3593 |   1 |                                 1 2 3 |   | |   |   | httpd
|  10997 |   1 |                                 1 2 3 |   | |   |   | cvpn_rotatelogs
|  11005 |   1 |                                 1 2 3 |   | |   |   | httpd
|  22294 |   1 |                                 1 2 3 |   | |   |   | routed
|  22328 |   1 |                                 1 2 3 |   | |   |   | fwk_wd
|  22333 |   1 |                                 1 2 3 | P | |   |   | fwk
|  22488 |   1 |                                 1 2 3 |   | |   |   | cpd
|  22492 |   1 |                                 1 2 3 |   | |   |   | fwd
|  22504 |   1 |                                 1 2 3 |   | |   |   | cpviewd
|  22525 |   1 |                                 1 2 3 |   | |   |   | mpdaemon
|  22527 |   1 |                                 1 2 3 |   | |   |   | ci_http_server
|  30629 |   1 |                                 1 2 3 |   | |   |   | vpnd
|  30631 |   1 |                                 1 2 3 |   | |   |   | pdpd
|  30632 |   1 |                                 1 2 3 |   | |   |   | pepd
|  30635 |   1 |                                 1 2 3 |   | |   |   | fwpushd
|  30743 |   1 |                                 1 2 3 |   | |   |   | dbwriter
|  30748 |   1 |                                 1 2 3 |   | |   |   | cvpnproc
|  30752 |   1 |                                 1 2 3 |   | |   |   | MoveFileServer
|  30756 |   1 |                                 1 2 3 |   | |   |   | CvpnUMD
|  30760 |   1 |                                 1 2 3 |   | |   |   | Pinger
|  30764 |   1 |                                 1 2 3 |   | |   |   | IdlePinger
|  30770 |   1 |                                 1 2 3 |   | |   |   | cvpnd
----------------------------------------------------------------------
[Expert@VSX_GW:0]#
```

Running the 'fw ctl affinity -s' command in Gateway Mode

Description

The "`fw ctl affinity -s`" command configures the CoreXL affinity settings on a Security Gateway for:

- Interfaces
- User-space processes
- CoreXL Firewall instances

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" commands.

Note - Changes you make with this command do **not** survive the Security Gateway reboot.
If it is necessary for the settings to survive reboot, manually edit the `$FWDIR/conf/fwaffinity.conf` configuration file.

Syntax

- **To see the built-in help:**

```
fw ctl affinity
```

- **To configure the affinity for a specified interface by its name:**

```
fw ctl affinity -s -i <Interface Name>
      all
      <CPU ID0> [ <CPU ID1> ... <CPU IDn> ]
```

- **To configure the affinity for a specified CoreXL Firewall instance:**

```
fw ctl affinity -s -k <CoreXL Firewall instance ID>
      all
      <CPU ID0> [ <CPU ID1> ... <CPU IDn> ]
```

- **To configure the affinity for a specified user-space process by its PID:**

```
fw ctl affinity -s -p <Process ID>
      all
      <CPU ID0> [ <CPU ID1> ... <CPU IDn> ]
```

- **To configure the affinity for a specified user-space process by its name:**

```
fw ctl affinity -s -n <Process Name>
      all
      <CPU ID0> [ <CPU ID1> ... <CPU IDn> ]
```

Parameters

Parameter	Description
`-i <Interface Name>`	Configures the affinity for the specified interface.
`-k <CoreXL Firewall instance ID>`	Configures the affinity for the specified CoreXL Firewall instance.
`-p <Process ID>`	Configures the affinity for the Check Point user-space process (for example: *fwd*, *vpnd)* specified by its PID.
`-n <Process Name>`	Configures the affinity for the Check Point user-space process (for example: *fwd*, *vpnd)* specified by its name. ℹ **Important** - The process name is case-sensitive.
`all`	Configures the affinity for all CPU cores (numbers start from zero).
`<CPU ID0> ... <CPU IDn>`	Configures the affinity for the specified CPU cores (numbers start from zero).

Examples

Example 1 - Affine the interface eth1 to the CPU core #1

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -i eth1 1
eth1: CPU 1 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Affine the CoreXL Firewall instance #1 to the CPU core #2

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -k 1 2
fw_1: CPU 2 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Affine the process CPD by its PID to the CPU core #2

```
[Expert@MyChassis-ch0x-0x:0]# cpwd_admin list | egrep "PID|cpd"
APP        PID    STAT  #START  START_TIME             MON  COMMAND
CPD        6080   E     1       [13:46:27] 17/9/2018   Y    cpd
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -p 6080 2
Process 6080: CPU 2 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Affine the process CPD by its name to the CPU core #2

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -n cpd 2
cpd: CPU 2 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

Running the 'fw ctl affinity -s' command in VSX Mode

Description

The "`fw ctl affinity -s`" command configures the CoreXL affinity settings on a VSX Gateway for:

- Interfaces
- User-space processes
- CoreXL Firewall instances

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" commands.

Syntax

- **To see the built-in help:**

```
fw ctl affinity
```

- **To configure the affinities of Virtual Systems:**

```
fw ctl affinity -s -d [-vsid <VSID ranges> ] -cpu <CPU ID
ranges>
```

- **To configure the affinities of a specified user-space process:**

```
fw ctl affinity -s -d -pname <Process Name> [-vsid <VSID
ranges>]
      -cpu all
      -cpu <CPU ID ranges>
```

- **To configure the affinities of specified FWK daemon instances (user-space Firewall):**

```
fw ctl affinity -s -d -inst <Instances Ranges> -cpu <CPU ID
ranges>
```

- **To configure the affinities of all FWK instances (user-space Firewalls):**

```
fw ctl affinity -s -d -fwkall <Number of CPUs>
```

- **To reset the affinities to defaults:**

```
fw ctl affinity
      -vsx_factory_defaults
      -vsx_factory_defaults_no_prompt
```

Important

- These settings do **not** survive a reboot of the VSX Gateway.

  To make these settings permanent, manually edit the `$FWDIR/conf/fwaffinity.conf` configuration file.

- When you configure affinity of an interface, it automatically configures the affinities of all other interfaces that share the same IRQ to the same CPU core.

Parameters

Parameter	Description
`-vsid <VSID ranges>`	Configures the affinity for: ■ One specified Virtual System. For example: `-vsid 7` ■ Several specified Virtual Systems. For example: `-vsid 0-2 4` **Note** - If you omit the "`-vsid`" parameter, the command uses the current virtual context.
`<CPU ID ranges>`	Configures the affinity to: ■ One specified CPU core. For example: `-cpu 7` ■ Several specified CPU cores. For example: `-cpu 0-2 4` **Important** - Numbers of CPU cores start from zero.
`-pname <Process Name>`	Configures the affinity for the Check Point daemon specified by its name (for example: *fwd*, *vpnd).* **Important** - The process name is case-sensitive.
`-inst <Instances Ranges>`	Configures the affinity for: ■ One specified FWK daemon instance. For example: `-inst 7` ■ Several specified FWK daemon instances. For example: `-inst 0 2 4`
`-fwkall <Number of CPUs>`	Configures the affinity for all running FWK daemon instances to the specified number of CPU cores. If it is necessary to affine all running FWK daemon instances to all CPU cores, enter the number of all available CPU cores.
`-vsx_factory_defaults`	Deletes all existing affinity settings and creates the default affinity settings during the next reboot. **Important** - Before this operation, the command prompts the user whether to proceed. You must reboot to complete the operation.

Parameter	Description
`-vsx_factory_defaults_no_prompt`	Deletes all current affinity settings and creates the default affinity settings during the next reboot. ℹ **Important** - Before this operation, the command does **not** prompt the user whether to proceed. You must reboot to complete the operation.

Examples

Example 1 - Affine the Virtual Devices #0,1,2,4,7,8 to the CPU cores #0,1,2,4

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -d -vsid 0-2 4 6-8 -cpu 0-2 4
VDevice 0-2 4 6-8 : CPU 0 1 2 4 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 2 - Affine the process CPD by its name for Virtual Devices #0-12 to the CPU core #7

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -d -pname cpd -vsid 0-12 -cpu 7
VDevice 0-12 : CPU 7 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
Warning: some of the VSIDs did not exist
[Expert@MyChassis-ch0x-0x:0]#
```

Example 3 - Affine the FWK daemon instances #0,2,4 to the CPU core #5

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -d -inst 0 2 4 -cpu 5
VDevice 0 2 4: CPU 5 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 4 - Affine all FWK daemon instances to the last two CPU cores

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -d -fwkall 2
VDevice 0-2 : CPU 2 3 - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

Example 5 - Affine all FWK daemon instances to all CPU cores

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl affinity -s -d -fwkall 4
There are configured processes/FWK instances
(y) will override all currently configured affinity and erase the configuration files
(n) will set affinity only for unconfigured processes/threads
Do you want to override existing configurations (y/n) ? y
VDevice 0-2 : CPU all - set successfully
Multi-queue affinity was not changed.  For More info, see sk113834.
[Expert@MyChassis-ch0x-0x:0]#
```

fw -i

Description

By default, the `fw` commands apply to the entire Security Gateway.

The `fw` commands show aggregated information for all CoreXL Firewall instances.

The "`fw -i`" commands apply to the specified CoreXL Firewall instance.

Important:
The same CoreXL command must run on all Security Group Members.
Therefore, you must run the CoreXL commands in either Gaia gClish, or Expert mode.

- In Gaia gClish, run the "`fw ctl ...`" commands.
- In the Expert mode, run the "`g_fw ctl ...`" commands.

Syntax for IPv4

```
fw -i <ID of CoreXL Firewall instance> <Command>
```

Parameters

Parameter	Description
<ID of IPv4 CoreXL Firewall instance>	Specifies the ID of the IPv4 CoreXL Firewall instance. To see the available IDs, run the *"fw ctl multik stat" on page 303* command.
<Command>	Only these commands support the "`fw -i`" syntax: ▪ `fw -i <ID> conntab ...` ▪ `fw -i <ID> ctl get ...` ▪ `fw -i <ID> ctl leak ...` ▪ `fw -i <ID> ctl pstat ...` ▪ `fw -i <ID> ctl set ...` ▪ `fw -i <ID> monitor ...` ▪ `fw -i <ID> tab ...` For details and additional parameters for any of these commands, refer to the corresponding entry for each command.

Example 1 - Show the Connections table for the IPv4 CoreXL Firewall instance #1

```
fw -i 1 tab -t connections
```

Example 2 - Show various internal statistics for the IPv4 CoreXL Firewall instance #1

```
fw -i 1 ctl pstat
```

fwboot bootconf

Description

Configures boot security options.

Notes:

- You must run this command from the Expert mode.
- The settings are saved in the `$FWDIR/boot/boot.conf` file.

  Warning - To avoid issues, do not edit the `$FWDIR/boot/boot.conf` file manually. Edit the file only with this command.
- Refer to this related command:
  - *"fwboot corexl" on page 328*

Syntax to show the current boot security options:

```
[Expert@MyChassis-ch0x-0x:0]# g_all $FWDIR/boot/fwboot bootconf
      get_corexl
      get_core_override
      get_def
      get_ipf
      get_ipv6
      get_kernnum
      get_kern6num
```

Syntax to configure the boot security options:

```
[Expert@MyChassis-ch0x-0x:0]# g_all $FWDIR/boot/fwboot bootconf
      set_corexl {0 | 1}
      set_core_override <number>
      set_def [</path/filename>]
      set_ipf {0 | 1}
      set_ipv6 {0 | 1}
      set_kernnum <number>
      set_kern6num <number>
```

Parameters

Parameter	Description
No Parameters	Shows the built-in help with available parameters.
`get_corexl`	Shows if the CoreXL is enabled or disabled: - 0 - disabled - 1 - enabled **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `COREXL_INSTALLED`.
`get_core_override`	Shows the number of overriding CPU cores. The SMT (HyperThreading) feature (sk93000) uses this configuration to set the number of CPU cores after reboot. **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `CORE_OVERRIDE`.
`get_def`	Shows the configured path and the name of the Default Filter policy file (default is `$FWDIR/boot/default.bin`). **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `DEFAULT_FILTER_PATH`.
`get_ipf`	Shows if the IP Forwarding during boot is enabled or disabled: - 0 - disabled (Security Gateway does not forward traffic between its interfaces during boot) - 1 - enabled **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `CTL_IPFORWARDING`.
`get_ipv6`	Shows if the IPv6 support is enabled or disabled: - 0 - disabled - 1 - enabled **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `IPV6_INSTALLED`.
`get_kernnum`	Shows the configured number of IPv4 CoreXL Firewall instances. **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `KERN_INSTANCE_NUM`.

Parameter	Description
`get_kern6num`	Shows the configured number of IPv6 CoreXL Firewall instances. **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `KERN6_INSTANCE_NUM`.
`set_corexl {0 | 1}`	Enables or disables CoreXL: ■ 0 - disables ■ 1 - enables **Notes:** ■ In the `$FWDIR/boot/boot.conf` file, refer to the value of the `COREXL_INSTALLED`. ■ To configure CoreXL, use the *"cpconfig" on page 283* menu.
`set_core_override <`*`number`*`>`	Configures the number of overriding CPU cores. The SMT (HyperThreading) feature (sk93000) uses this configuration to set the number of CPU cores after reboot. **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `CORE_OVERRIDE`.
`set_def [<`*`/path/filename`*`>]`	Configures the path and the name of the Default Filter policy file (default is `$FWDIR/boot/default.bin`). **Notes:** ■ In the `$FWDIR/boot/boot.conf` file, refer to the value of the `DEFAULT_FILTER_PATH`. ■ If you do not specify the path and the name explicitly, then the value of the `DEFAULT_FILTER_PATH` is set to 0. As a result, Security Gateway does not load a Default Filter during boot. **Best Practice** - The best location for this file is the `$FWDIR/boot/` directory.
`set_ipf {0 | 1}`	Configures the IP forwarding during boot: ■ 0 - disables (forbids the Security Gateway to forward traffic between its interfaces during boot) ■ 1 - enables **Note** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `CTL_IPFORWARDING`.

Parameter	Description
`set_ipv6 {0 | 1}`	Enables or disables the IPv6 Support: - 0 - disables - 1 - enables **Notes:** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `IPV6_INSTALLED`. - Configure the IPv6 Support in Gaia Portal, or Gaia Clish. See the *R80.20SP Quantum Maestro Gaia Administration Guide*.
`set_kernnum <number>`	Configures the number of IPv4 CoreXL Firewall instances. **Notes:** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `KERN_INSTANCE_NUM`. - To configure CoreXL, use the *"cpconfig" on page 283* menu.
`set_kern6num <number>`	Configures the number of IPv6 CoreXL Firewall instances. **Notes:** - In the `$FWDIR/boot/boot.conf` file, refer to the value of the `KERN6_INSTANCE_NUM`. - To configure CoreXL, use the *"cpconfig" on page 283* menu.

fwboot corexl

Description

Configures and monitors the CoreXL.

Note - The settings are saved in the `$FWDIR/boot/boot.conf` file.

Warning - To avoid issues, do **not** edit the `$FWDIR/boot/boot.conf` file manually. Edit the file only with this command.

Syntax to show CoreXL configuration:

```
[Expert@MyChassis-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl
      core_count
      curr_instance4_count
      curr_instance6_count
      def_instance4_count
      def_instance6_count
      eligible
      installed
      max_instance4_count
      max_instances4_32bit
      max_instances4_64bit
      max_instance6_count
      max_instances_count
      max_instances_32bit
      max_instances_64bit
      min_instance_count
      unsupported_features
```

Syntax to configure CoreXL:

Important:

- The **configuration** commands are for Check Point use only.
  To configure CoreXL, use the **Check Point CoreXL** option in the *"cpconfig" on page 283* menu.
- After all changes in CoreXL configuration on the Security Gateway, you must reboot it.
- You must run this command from the Expert mode.

```
[Expert@MyChassis-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl
      def_by_allowed [n]
      default
      [-v] disable
      [-v] enable [n] [-6 k]
      vmalloc_recalculate
```

Parameters

Parameter	Description
No Parameters	Shows the built-in help with available parameters.

<table>
<thead>
<tr><th>Parameter</th><th>Description</th></tr>
</thead>
<tbody>
<tr><td>

`core_count`

</td><td>

Returns the number of CPU cores on this computer.

Example

```
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl core_count
[Expert@HostName-ch0x-0x:0]# g_all echo $?
4
[Expert@HostName-ch0x-0x:0]#
[Expert@HostName-ch0x-0x:0]# g_cat /proc/cpuinfo | grep processor
processor : 0
processor : 1
processor : 2
processor : 3
[Expert@HostName-ch0x-0x:0]#
```

</td></tr>
<tr><td>

`curr_instance4_count`

</td><td>

Returns the current configured number of IPv4 CoreXL Firewall instances.

Example

```
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl curr_instance4_count
[Expert@HostName-ch0x-0x:0]# g_all echo $?
3
[Expert@HostName-ch0x-0x:0]#
[Expert@HostName-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 3      |          11 |       18
 1 | Yes     | 2      |          12 |       18
 2 | Yes     | 1      |          13 |       18
[Expert@HostName-ch0x-0x:0]#
```

</td></tr>
<tr><td>

`curr_instance6_count`

</td><td>

Returns the current configured number of IPv6 CoreXL Firewall instances.

Example

```
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl curr_instance6_count
[Expert@HostName-ch0x-0x:0]# g_all echo $?
2
[Expert@HostName-ch0x-0x:0]#
[Expert@HostName-ch0x-0x:0]# g_fw6 ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 3      |          11 |       18
 1 | Yes     | 2      |          12 |       18
[Expert@HostName-ch0x-0x:0]#
```

</td></tr>
<tr><td>

`def_by_allowed [n]`

</td><td>

Sets the default configuration for CoreXL according to the specified allowed number of CPU cores.

</td></tr>
<tr><td>

`default`

</td><td>

Sets the default configuration for CoreXL.

</td></tr>
</tbody>
</table>

Parameter	Description

`def_instance4_count`	Returns the default number of IPv4 CoreXL Firewall instances for this Security Gateway.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl def_instance4_count`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`3`
	`[Expert@HostName-ch0x-0x:0]#`

`def_instance6_count`	Returns the default number of IPv4 CoreXL Firewall instances for this Security Gateway.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl def_instance6_count`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`2`
	`[Expert@HostName-ch0x-0x:0]#`

`[-v] disable`	Disables CoreXL. - `-v` - Leaves the high memory (`vmalloc`) unchanged. See the *"cp_conf corexl" on page 282* command.

`eligible`	Returns whether CoreXL can be enabled on this Security Gateway.
	- 0 - CoreXL cannot be enabled
	- 1 - CoreXL can be enabled
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl eligible`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`1`
	`[Expert@HostName-ch0x-0x:0]#`

`[-v] enable [n] [-6 k]`	Enables CoreXL with '`n`' IPv4 Firewall instances and optionally '`k`' IPv6 Firewall instances. - `-v` - Leaves the high memory (`vmalloc`) unchanged. - `n` - Denotes the number of IPv4 CoreXL Firewall instances. - `k` - Denotes the number of IPv6 CoreXL Firewall instances. See the *"cp_conf corexl" on page 282* command.

Parameter	Description

`installed`	Returns whether CoreXL is installed (enabled) on this Security Gateway.
	- 0 - CoreXL is not enabled
	- 1 - CoreXL is enabled
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl installed`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`1`
	`[Expert@HostName-ch0x-0x:0]#`

`max_instance4_count`	Returns the maximal allowed number of IPv4 CoreXL Firewall instances for this Security Gateway.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl max_instance4_count`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`4`
	`[Expert@HostName-ch0x-0x:0]#`

`max_instances4_32bit`	Returns the maximal allowed number of IPv4 CoreXL Firewall instances for a Security Gateway that runs Gaia with 32-bit kernel.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl max_instances4_32bit`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`14`
	`[Expert@HostName-ch0x-0x:0]#`

`max_instances4_64bit`	Returns the maximal allowed number of IPv4 CoreXL Firewall instances for a Security Gateway that runs Gaia with 64-bit kernel.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl max_instances4_64bit`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`38`
	`[Expert@HostName-ch0x-0x:0]#`

`max_instance6_count`	Returns the maximal allowed number of IPv6 CoreXL Firewall instances for this Security Gateway.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl max_instance6_count`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`3`
	`[Expert@HostName-ch0x-0x:0]#`

Parameter	Description

`max_instances_count`	Returns the total maximal allowed number of CoreXL Firewall instances (IPv4 and IPv6) for this Security Gateway.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl max_instances_count`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`40`
	`[Expert@HostName-ch0x-0x:0]#`

`max_instances_32bit`	Returns the total maximal allowed number of CoreXL Firewall instances for a Security Gateway that runs Gaia with 32-bit kernel.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl max_instances_32bit`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`16`
	`[Expert@HostName-ch0x-0x:0]#`

`max_instances_64bit`	Returns the total maximal allowed number of CoreXL Firewall instances for a Security Gateway that runs Gaia with 64-bit kernel.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl max_instances_64bit`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`40`
	`[Expert@HostName-ch0x-0x:0]#`

`min_instance_count`	Returns the minimal allowed number of IPv4 CoreXL Firewall instances.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl min_instance_count`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`2`
	`[Expert@HostName-ch0x-0x:0]#`

`vmalloc_recalculate`	Updates the value of the `vmalloc` parameter in the `/boot/grub/grub.conf` file.

Parameter	Description

`unsupported_features`	Returns 1 if at least one feature is configured, which CoreXL does not support.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot corexl unsupported_features`
	`corexl unsupported feature: QoS is configured.`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	`1`
	`[Expert@HostName-ch0x-0x:0]#`

fwboot cpuid

Description

Shows the number of available CPUs and CPU cores on this Security Gateway.

Note - You must run this command from the Expert mode.

Syntax

```
[Expert@MyChassis-ch0x-0x:0]# g_all $FWDIR/boot/fwboot cpuid
      {-h | -help | --help}
      -c
      --full
      ht_aware
      -n
      --possible
```

Parameters

Parameter	Description

No Parameters	Shows the IDs of the available CPU cores on this Security Gateway.
	Example
	`[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot cpuid`
	`3 2 1 0`
	`[Expert@HostName-ch0x-0x:0]#`

<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td><code>-c</code></td><td>Counts the number of available CPU cores on this Security Gateway.
The command stores the returned number as its exit code.
<b>Example</b><pre>
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot cpuid -c
[Expert@HostName-ch0x-0x:0]# g_all echo $?
4
[Expert@HostName-ch0x-0x:0]#
</pre></td></tr>
<tr><td><code>--full</code></td><td>Shows a full map of the available CPUs and CPU cores on this Security Gateway.
<b>Example</b><pre>
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot cpuid --full
cpuid phys_id core_id thread_id
 0 0 0 0
 1 2 0 0
 2 4 0 0
 3 6 0 0
[Expert@HostName-ch0x-0x:0]#
</pre></td></tr>
<tr><td><code>ht_aware</code></td><td>Shows the CPU cores in the order of their awareness of Hyper-Threading.
<b>Example</b><pre>
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot cpuid ht_aware
3 2 1 0
[Expert@HostName-ch0x-0x:0]#
</pre></td></tr>
<tr><td><code>-n</code></td><td>Counts the number of available CPUs on this Security Gateway.
The command stores the returned number as its exit code.
<b>Example</b><pre>
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot cpuid -n
[Expert@HostName-ch0x-0x:0]# g_all echo $?
4
[Expert@HostName-ch0x-0x:0]#
</pre></td></tr>
<tr><td><code>--possible</code></td><td>Counts the number of possible CPU cores.
The command stores the returned number as its exit code.
<b>Example</b><pre>
[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot cpuid --possible
[Expert@HostName-ch0x-0x:0]# g_all echo $?
4
[Expert@HostName-ch0x-0x:0]#
</pre></td></tr>
</table>

fwboot ht

Description

Shows and configures the boot options for the SMT (HyperThreading) feature (sk93000).

Important - This command is for Check Point use only. To configure SMT (HyperThreading) feature, follow sk93000.

Note - You must run this command from the Expert mode.

Syntax

```
[Expert@MyChassis-ch0x-0x:0]# g_all $FWDIR/boot/fwboot ht
      --core_override [<number>]
      --disable
      --eligible
      --enable
      --enabled
      --supported
```

Parameters

Parameter	Description
No Parameters	Shows the built-in help with available parameters.
`--core_override [<number>]`	Shows or configures the number of overriding CPU cores. The SMT feature uses this configuration to set the number of CPU cores after reboot.
`--disable`	Disables the SMT feature.

Parameter	Description

`--eligible`	Returns a number that shows if this system is eligible for the SMT feature. Run:
	`[Expert@HostName-ch0x-0x:0]# g_all`
	`$FWDIR/boot/fwboot ht --eligible`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	- If you get 1 - The system is eligible for the SMT.
	- If you get 0 - The system is **not** eligible for the SMT.
	The possible causes are:
	• The system is not a Check Point appliance.
	• The system does not support the SMT.
	• The system does not run Gaia OS.
	• The appliance runs Gaia OS with 32-bit kernel and has more than 4 CPU cores.

`--enable`	Enables the SMT feature.

`--enabled`	Returns a number that shows if SMT feature is enabled on this system. Run:
	`[Expert@HostName-ch0x-0x:0]# g_all`
	`$FWDIR/boot/fwboot ht --enabled`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	- If you get 1 - The SMT is enabled.
	- If you get 0 - The SMT is disabled.
	The possible causes are:
	• The system does not run Gaia OS.
	• The SMT is disabled in software.

`--supported`	Returns a number that shows if this system supports the SMT feature. Run:
	`[Expert@HostName-ch0x-0x:0]# g_all`
	`$FWDIR/boot/fwboot ht --supported`
	`[Expert@HostName-ch0x-0x:0]# g_all echo $?`
	- If you get 1 - System supports the SMT.
	- If you get 0 - System does **not** support the SMT.
	The possible causes are:
	• The system's CPU does not support the SMT.
	• The SMT is disabled in the system's BIOS.
	• The SMT is disabled in software.

fwboot multik_reg

Description

Shows the internal memory address of the registration function for the specified CoreXL Firewall instance.

Important - This command is for Check Point use only.

Note - You must run this command from the Expert mode.

Syntax

```
g_all $FWDIR/boot/fwboot multik_reg <Number of CoreXL Firewall
instance> {ipv4 | ipv6} [-d]
```

Parameters

Parameter	Description
No Parameters	Shows the built-in help with available parameters.
<Number of CoreXL Firewall instance>	Specifies the ID number of the CoreXL Firewall instance.
`ipv4`	Specifies to work with IPv4 CoreXL Firewall instances.
`ipv6`	Specifies to work with IPv6 CoreXL Firewall instances.
`-d`	Shows the decimal 64-bit address of the hook function.

Example

```
[Expert@HostName-ch0x-0x:0]# g_fw ctl multik stat
ID | Active  | CPU    | Connections | Peak
----------------------------------------------
 0 | Yes     | 3      |          11 |       18
 1 | Yes     | 2      |          12 |       18
 2 | Yes     | 1      |          13 |       18
[Expert@HostName-ch0x-0x:0]#


[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot multik_reg 0 ipv4
0
[Expert@HostName-ch0x-0x:0]#

[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot multik_reg 1 ipv4
0xffffffff8a2a5690
[Expert@HostName-ch0x-0x:0]#

[Expert@HostName-ch0x-0x:0]# g_all $FWDIR/boot/fwboot multik_reg 2 ipv4
0xffffffff8a2a5690
[Expert@HostName-ch0x-0x:0]#
```

fwboot post_drv

Description

Loads the Firewall driver for CoreXL during boot.

Important:

- This command is for Check Point use only.
- If you run this command, Security Gateway can block all traffic.
  In such case, you must connect to the Security Gateway over a console and restart Check Point services with the "`cpstop`" and "`cpstart`" commands.
  Alternatively, you can reboot the Security Gateway.

Note - You must run this command from the Expert mode.

Syntax

```
[Expert@MyChassis-ch0x-0x:0]# g_all $FWDIR/boot/fwboot post_drv
{ipv4 | ipv6}
```

Parameters

Parameter	Description
No Parameters	Shows the built-in help with available parameters.
`ipv4`	Loads the IPv4 Firewall driver for CoreXL.
`ipv6`	Loads the IPv6 Firewall driver for CoreXL.

Multi-Queue

By default, each network interface has one traffic queue handled by one CPU.

You cannot use more CPU cores for acceleration than the number of interfaces handling traffic.

Multi-Queue lets you configure more than one traffic queue for each network interface.

For each interface, more than one CPU core is used for acceleration.

Note - Multi-Queue is applicable only if SecureXL is enabled (this is the default).

Overview:

- Multi-Queue is enabled by default on all interfaces that use the supported drivers.
- The number of traffic queues on each supported interface is determined automatically, based on:
  - The number of available CPU cores that run CoreXL SND Instances.
  - The limitations of the interfaces and its driver.
- Traffic queues are automatically affined to the CPU cores that runs CoreXL SND Instances.
- Changes in Multi-Queue configuration do **not** require a reboot.
- You configure Multi-Queue on the command line in the Expert mode.

Multi-Queue Requirements and Limitations

- Multi-Queue only supports Security Gateways with two or more CPU cores.
- Multi-Queue only supports interfaces that use these drives:

Driver	Max Speed	Description
igb	1 Gbps	Intel® Network Adapter Driver for PCIe 1 Gigabit Ethernet Network
ixgbe	10 Gbps	Intel® Network Adapter Driver for PCIe 10 Gigabit Ethernet Network

Driver	Max Speed	Description
i40e	40 Gbps	Intel® Network Adapter Driver for PCIe 40 Gigabit Ethernet Network
mlx5_core	40 Gbps	Mellanox® ConnectX® mlx5 core driver

- Multi-Queue does not use network interfaces that are currently in the down state.
- The number of traffic queues is limited by the number of CPU cores and the type of interface driver:

Interface Driver	Maximal Number of RX Queues
igb	2-16 (depends on the interface)
ixgbe	16
i40e	64
mlx5_core	60

- You must reboot the Security Group after all changes in the Multi-Queue configuration.

Deciding Whether to Enable the Multi-Queue

This section helps you decide if you can benefit from the Multi-Queue.

Best Practice - We recommend that you perform the steps below *before* you change the default Multi-Queue settings.

1. **Make sure that network interfaces support the Multi-Queue**

   Only network cards that use these drivers can support the Multi-Queue.

   See *"Multi-Queue Requirements and Limitations" on the previous page*.

   Important - Before you upgrade these drivers, make sure that the latest version supports the Multi-Queue.

Notes:

- To view, which driver an interface uses, run this command in the Expert mode:

  ```
  g_ethtool -i <Name of Interface>
  ```

- When you install a new interface, you must run these commands in the Expert mode:

  a. Run the Multi-Queue configuration:

  ```
  g_cpmq reconfigure
  ```

  b. Reboot the Security Group:

  ```
  reboot -b all
  ```

2. **Make sure that SecureXL is enabled**

<table>
<tr><th>Step</th><th>Instructions</th></tr>
<tr><td>1</td><td>Connect to the command line on the Security Group.</td></tr>
<tr><td>2</td><td>Log in to the Gaia Clish, or the Expert mode.</td></tr>
<tr><td>3</td><td>If you logged in to Gaia Clish, then go to Gaia gClish:
enter <code>gclish</code> and press Enter.</td></tr>
<tr><td>4</td><td>Get the SecureXL state (see <i>"fwaccel stat" on page 97</i>):
■ In Gaia gClish, run:<pre>fwaccel stat -t</pre>■ In the Expert mode, run:<pre>g_fwaccel stat -t</pre></td></tr>
<tr><td>5</td><td>Examine the <b>Status</b> column.
<b>Example from a non-VSX Gateway</b><pre>[Expert@MyChassis-ch0x-0x:0] fwaccel stat -t
+---
---+
|Id|Name |Status |Interfaces |Features
  |
+---
---+
|0 |SND |enabled |eth0,eth1,eth2,eth3,eth4,|
  |
| | | |eth5,eth6,eth7 |Acceleration,Cryptography
  |
+---
---+
[Expert@MyChassis-ch0x-0x:0]</pre></td></tr>
</table>

Step	Instructions

6	If the SecureXL is disabled, enable it (see *"fwaccel on" on page 86*):
	- In Gaia gClish, run:
	`fwaccel on`
	- In the Expert mode, run:
	`g_fwaccel on`

3. **Examine the CPU roles allocation**

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to the Gaia Clish, or the Expert mode.
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

4	Get the list of CPU roles (see *"fw ctl affinity" on page 308*):
	- In Gaia gClish, run:
	`fw ctl affinity -l [-a] [-v] [-r]`
	- In the Expert mode, run:
	`g_fw ctl affinity -l [-a] [-v] [-r]`
	Example
	CPU0 and CPU1 run the CoreXL SND instances:
	`[Expert@MyChassis-ch0x-0x:0] fw ctl affinity -l`
	`Mgmt: CPU 0`
	`eth1-04: CPU 1`
	`eth1-05: CPU 0`
	`eth1-06: CPU 1`
	`eth1-07: CPU 0`
	`fw_0: CPU 5`
	`fw_1: CPU 4`
	`fw_2: CPU 3`
	`fw_3: CPU 2`
	`[Expert@MyChassis-ch0x-0x:0]`

4. **Examine the CPU cores utilization**

Step	Instructions
1	Connect to the command line on the Security Group.

Step	Instructions
2	Log in to the Gaia Clish, or the Expert mode.
3	If you logged in to Gaia Clish, then go to Gaia gClish: enter `gclish` and press Enter.

4	Get the CPU cores utilization:
	■ In Gaia gClish, run:
	`top`
	■ In the Expert mode, run:
	`g_top`

5	Press 1 to show all the CPU cores. **Example** ■ CPU cores that run CoreXL SND instances (CPU0 and CPU1) are approximately 30% idle. ■ CPU cores that run CoreXL Firewall instances are approximately 70% idle.

```
    top - 18:02:33 up 8 days, 1:18, 1 user, load average: 1.22, 1.38,
1.48
   Tasks:  137 total,  3 running,  134 sleeping,  0 stopped,  0 zombie

   Cpu0 : 2.0%us, 0.0%sy, 0.0%ni, 28.7%id, 5.9%wa, 0.0%hi, 63.4%si,
0.0%st
   Cpu1 : 0.0%us, 1.0%sy, 0.0%ni, 27.6%id, 0.0%wa, 0.0%hi, 71.4%si,
0.0%st
   Cpu2 : 2.0%us, 2.0%sy, 0.0%ni, 66.5%id, 0.0%wa, 4.0%hi, 25.5%si,
0.0%st
   Cpu3 : 1.0%us, 2.0%sy, 0.0%ni, 71.3%id, 0.0%wa, 0.0%hi, 25.7%si,
0.0%st
   Cpu4 : 5.0%us, 1.0%sy, 0.0%ni, 69.0%id, 0.0%wa, 0.0%hi, 25.0%si,
0.0%st

   Mem:  12224020k total, 70005820k used,   5218200k free, 273536k
buffers
   Swap: 14707496k total,        0k used,  14707496k free, 484340k
cached

    PID USER  PR  NI  VIRT  RES  SHR  S  %CPU  %MEM   TIME+  COMMAND
   3301 root  15   0     0    O    0  R    31   0.0  747:04  [fw_worker_
3]
   3326 root  15   0     0    O    0  R    29   0.0  593:35  [fw_worker_
0]
   ... ... ...
```

5. **Decide if you can allocate more CPU cores to run the CoreXL SND instances**

To decide if you can allocate more CPU cores to run the CoreXL SND instances

If you have more active network interfaces than the CPU cores that run CoreXL SND instances, you can allocate more CPU cores to run more CoreXL SND instances.

We recommend to configure the Multi-Queue when:

a. CoreXL SND instances cause high CPU load (idle is less than 20%).

b. CoreXL Firewall instances cause low CPU load (idle is greater than 50%).

Note - You cannot assign more CPU cores to run CoreXL SND instances if you change interface IRQ affinity.

Multi-Queue Basic Configuration

Description

The "`g_cpmq`" command shows and configures the Multi-Queue on supported interfaces.

Procedure

Step	Instructions
1	Connect to the command line on the Security Group.
2	Log in to the Expert mode.
3	Run the `g_cpmq` command with the applicable parameters. See the syntax below.
4	If you changed the Multi-Queue configuration, you must reboot the Security Group Members: `reboot -b all`

Syntax

- **To show the existing Multi-Queue configuration:**

```
g_cpmq get
      [-a]
      [-v]
      [-vv]
      [rx_num {igb | ixgbe | i40e | mlx5_core}]
```

- **To configure the IRQ affinity of the queues:**

```
g_cpmq set affinity
```

- **To configure the Multi-Queue for the specified driver:**

```
g_cpmq set rx_num
      igb {default | <Value>}
      ixgbe {default | <Value>}
      i40e {default | <Value>}
      mlx5_core {default | <Value>}
```

Parameters

Parameter	Description
`get`	Shows Multi-Queue status only for active supported interfaces. Output does not show network interfaces that are currently in the down state.

Parameter	Description

`get -a`	Shows Multi-Queue status of all supported interfaces.
	- `[On]`
	Multi-Queue is enabled on the interface.
	- `[Off]`
	Multi-Queue is disabled on the interface.
	- `[Pending On]`
	Multi-Queue is currently disabled on the interface. Multi-Queue is enabled on this interface only after you reboot the Security Group Members. This status can also indicate bad configuration or system errors.
	- `[Pending Off]`
	Multi-Queue is enabled on the interface. Multi-Queue is disabled on this interface only after you reboot the Security Group Members.
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_cpmq get -a`
	
	`Active igb interfaces:`
	`eth1-05 [On]`
	`eth1-06 [Off]`
	`eth1-01 [Off]`
	`eth1-03 [Off]`
	`eth1-04 [On]`
	
	`Non active igb interfaces:`
	`eth1-02 [Off]`
	`[Expert@MyChassis-ch0x-0x:0]#`

`get -v`	Shows Multi-Queue status of supported interfaces with IRQ affinity information and RX bytes counters.
`get -vv`	Shows Multi-Queue status of supported interfaces with IRQ affinity information and RX bytes and packets counters.
`set affinity`	Configures the IRQ affinity of the queues when: - Multi-Queue is enabled on an interface - The interface status is changed to "down" - The computer was rebooted Run this command after the interface status is changed back to "up". **Important** - Do not change the IRQ affinity of queues manually. Such manual change can affect performance.
`set rx_num igb {default | <`*`Value`*`>}`	Configures the number of active RX queues for interfaces that use the `igb` driver (1Gb).

Parameter	Description
`set rx_num ixgbe {default | <Value>}`	Configures the number of active RX queues for interfaces that use the `ixgbe` driver (10Gb).
`set rx_num i40e {default | <Value>}`	Configures the number of active RX queues for interfaces that use the `i40e` driver (40Gb).
`set rx_num mlx5_core {default | <Value>}`	Configures the number of active RX queues for interfaces that use the `mlx5_core` driver (40Gb).
`set rx_num <Driver> default`	Configures the number of active RX queues to the number of CPUs, which are not used by CoreXL Firewall instances (recommended).
`set rx_num <Driver> <Value>`	Configures the specified number of active RX queues. This number can be between two and the total number of CPU cores.

Multi-Queue Special Scenarios and Configurations

This section provides instructions for configuring the Multi-Queue in special scenarios.

Default Number of Active RX Queues

Gateway Mode

Changing the number of CoreXL Firewall instances when the Multi-Queue is enabled on some, or all interfaces

For best performance, the Multi-Queue calculates the default number of active RX queues based on this formula:

```
Number of active RX queues = (Number of CPU cores) - (Number of
CoreXL Firewall instances)
```

This configuration is set automatically when you configure the Multi-Queue.

When you change the number of CoreXL Firewall instances, the number of active RX queues changes automatically, if it is not set manually.

VSX Mode

Changing the number of CPU cores, to which the FWK processes are assigned

For best performance, the Multi-Queue calculates the default number of active RX queues based on this formula:

```
Number of active RX queues = The lowest CPU ID, to which an FWK
process is assigned
```

Example

- The number of active RX queues is set to 2.
- This configuration is set automatically when you configure the Multi-Queue.
- It does not automatically update when you change the affinity of Virtual Systems.

```
[Expert@MyChassis-ch0x-0x:0] fw ctl affinity -l
eth1-Mgmt: CPU 0
eth1-05: CPU 0
eth1-06: CPU 1
VS_0 fwk: CPU 2 3 4 5
VS_1 fwk: CPU 2 3 4 5
[Expert@MyChassis-ch0x-0x:0]#
```

Adding a Network Interface

When you add a network interface card to a Security Appliance, the Multi-Queue configuration can change due to the way the operating system indexes the interfaces.

If you added a network interface card to a Security Appliance, make sure to run the Multi-Queue configuration again, or run:

```
g_cpmq reconfigure
```

If a reconfiguration change is required, the Multi-Queue prompts you to reboot the Security Group Member.

Changing the Affinity of CoreXL Firewall instances

For best performance, we recommend that you do **not** assign both CoreXL SND instance and a CoreXL Firewall instance to the same CPU core.

When you change the affinity of CoreXL Firewall instances to CPU cores that are assigned with one of the Multi-Queue queues, we recommend that you configure the number of active RX queues again based on this formula:

```
Active RX queues = The lowest CPU number, to which a CoreXL
Firewall instance is assigned
```

To configure the number of active RX queues, use the `g_cpmq` command. See *"Multi-Queue Basic Configuration" on page 346*.

Multi-Queue Troubleshooting

Note - You must run the applicable commands in the Expert mode on the applicable Security Group.

Scenario	Explanation and next steps

After reboot, the wrong interfaces are configured for Multi-Queue.	This can happen after changing the physical interfaces on the Security Group Member.
	Follow one of these steps:
	1. Run in the Expert mode:
	`g_cpmq reconfigure`
	`reboot`
	2. Configure the Multi-Queue again

After you configure the Multi-Queue and reboot the Security Group Member, some of the configured interfaces show as `Down`. These interfaces were up before the Security Group Member reboot. The "`g_cpmq get -a`" command shows the interface status as `Pending on`.	This can happen when not enough IRQs are available on the Security Group Member. Follow one of these steps: - Remove unused expansion cards, if possible - Disable some of the interfaces configured for Multi-Queue - Manually reduce the number of active RX queues (`rx_num`) with the "`g_cpmq set rx_num`" command, and reboot the Security Group Member

Scenario	Explanation and next steps
When you change the status of interfaces, all the interface IRQs are assigned to CPU 0, or to all of the CPU cores.	This can happen when an interface status is changed to UP after the automatic affinity procedure runs (during each boot). Run in the Expert mode: `g_cpmq set affinity` This problem does not occur if SecureXL Affinity is set to Automatic mode.

In VSX mode, an **fwk** process runs on the same CPU core as some of the interface queues.	This can happen when the affinity of the Virtual System was manually changed but Multi-Queue was not reconfigured accordingly.
	Follow one of these steps:
	■ Run in the Expert mode:
	`g_cpmq reconfigure`
	`reboot`
	■ Configure the number of active RX queues manually

In Gateway mode, after you change the number of CoreXL Firewall instances, the Multi-Queue is disabled on all interfaces.	When you change the number of CoreXL Firewall instances, the number of active RX queues automatically changes based on this formula (if it is not configured manually):
	`Active RX queues = (Number of CPU cores) - (Number of CoreXL Firewall instances)`
	If the difference between the number of CPU cores and the number of CoreXL Firewall Instances is 1, Multi-Queue is disabled.
	Configure the number of active RX queues manually with this command in the Expert mode:
	`g_cpmq set rx_num {igb | ixgbe | i40e | mlx5_core} <Value>`

CPView

Overview of CPView

Description

CPView is a text based built-in utility on a Check Point computer.

CPView Utility shows statistical data that contain both general system information (CPU, Memory, Disk space) and information for different Software Blades (only on Security Group).

The CPView continuously updates the data in easy to access views.

On Security Group, you can use this statistical data to monitor the performance.

For more information, see sk101878.

Syntax

```
cpview --help
```

CPView User Interface

The CPView user interface has three sections:

Section	Description
Header	This view shows the time the statistics in the third view are collected. It updates when you refresh the statistics.
Navigation	This menu bar is interactive. Move between menus with the arrow keys and mouse. A menu can have sub-menus and they show under the menu bar.
View	This view shows the statistics collected in that view. These statistics update at the refresh rate.

Using CPView

Use these keys to navigate the CPView:

Key	Description
Arrow keys	Moves between menus and views. Scrolls in a view.
Home	Returns to the **Overview** view.
Enter	Changes to the **View Mode**. On a menu with sub-menus, the **Enter** key moves you to the lowest level sub-menu.
Esc	Returns to the **Menu Mode**.
Q	Quits CPView.

Use these keys to change CPView interface options:

Key	Description
R	Opens a window where you can change the refresh rate. The default refresh rate is 2 seconds.
W	Changes between wide and normal display modes. In wide mode, CPView fits the screen horizontally.
S	Manually sets the number of rows or columns.
M	Switches on/off the mouse.
P	Pauses and resumes the collection of statistics.

Use these keys to save statistics, show help, and refresh statistics:

Key	Description
C	Saves the current page to a file. The file name format is: `cpview_<ID of the cpview process>.cap<Number of the capture>`
H	Shows a tooltip with CPView options.
Space bar	Immediately refreshes the statistics.

Command Line Reference

See the *R80.20 CLI Reference Guide*.

Working with Kernel Parameters on a Security Gateway

This section describes what are kernel parameters, and how to view and configure their values.

Introduction to Kernel Parameters

Kernel parameters let you change the advanced behavior of a Security Group.

These are the supported types of kernel parameters:

Type	Instructions
Integer	Accepts only one integer value.
String	Accepts only a plain-text string.

Important - In VSX mode, the configured values of kernel parameters apply to all existing Virtual Systems.

Security Group gets the names and the default values of the kernel parameters from these kernel module files:

- `$FWDIR/boot/modules/fw_kern_64.o`
- `$FWDIR/boot/modules/fw_kern_64_v6.o`
- `$PPKDIR/boot/modules/sim_kern_64.o`
- `$PPKDIR/boot/modules/sim_kern_64_v6.o`

Firewall Kernel Parameters

To change the internal default behavior of Firewall or to configure special advanced settings for Firewall, you can use Firewall kernel parameters.

The names of applicable Firewall kernel parameters and their values appear in various SK articles in *Check Point Support Center*, and provided by *Check Point Support*.

Important:

- The names of Firewall kernel parameters are case-sensitive.
- You can configure most of the Firewall kernel parameters on-the-fly with the "`g_fw ctl set`" command.
  This change does **not** survive a reboot.
- You can configure some of the Firewall kernel parameters only permanently in the special configuration files - `$FWDIR/boot/modules/fwkern.conf` or `$FWDIR/boot/modules/vpnkern.conf`.
  This requires a maintenance window, because the new values of the kernel parameters take effect only after a reboot.

Examples of Firewall kernel parameters

Type	Name

Integer	`fw_allow_simultaneous_ping`
	`fw_kdprintf_limit`
	`fw_log_bufsize`
	`send_buf_limit`

String	`simple_debug_filter_addr_1`
	`simple_debug_filter_daddr_1`
	`simple_debug_filter_vpn_1`
	`ws_debug_ip_str`
	`fw_lsp_pair1`

Working with Integer Kernel Parameters

Viewing the list of the available Firewall *integer* kernel parameters and their values

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.
3	Get the list of the available integer kernel parameters and their values: `modinfo -p $FWDIR/boot/modules/fw_kern*.o | sort -u | grep _type | awk 'BEGIN {FS=":"} ; {print $1}' | xargs -n 1 fw ctl get int 1>> /var/log/fw_integer_kernel_parameters.txt 2>> /var/log/fw_integer_kernel_parameters.txt`
4	Analyze the output file: `/var/log/fw_integer_kernel_parameters.txt`

Viewing the current value of a Firewall *integer* kernel parameter

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.

3	Check the current value of an integer kernel parameter:
	`g_fw ctl get int <Name of Integer Kernel Parameter> [-a]`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl get int send_buf_limit`
	`send_buf_limit = 80`
	`[Expert@MyChassis-ch0x-0x:0]#`

Configuring a value for a Firewall *integer* kernel parameter *temporarily*

Important - This change does **not** survive reboot.

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.

3	Set the new value for an integer kernel parameter:
	`g_fw ctl set int <Name of Integer Kernel Parameter> <Integer Value>`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set int send_buf_limit 100`
	`Set operation succeeded`
	`[Expert@MyChassis-ch0x-0x:0]#`

4	Make sure the new value is set:
	`g_fw ctl get int <Name of Integer Kernel Parameter>`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl get int send_buf_limit`
	`send_buf_limit = 100`
	`[Expert@MyChassis-ch0x-0x:0]#`

Configuring a value for a Firewall *integer* kernel parameter *permanently*

To make a kernel parameter configuration permanent (to survive reboot), you must edit one of the applicable configuration files:

- For Firewall kernel parameters:

  ```
  $FWDIR/boot/modules/fwkern.conf
  ```

- For VPN kernel parameters:

  ```
  $FWDIR/boot/modules/vpnkern.conf
  ```

The exact instructions are provided in various SK articles in *Check Point Support Center*, and provided by *Check Point Support*.

For more information, see sk26202: Changing the kernel global parameters for Check Point Security Gateway.

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.

3	Add the required Firewall kernel parameter with the assigned value in the exact format specified below.
	Important - These configuration files do not support space characters, tabulation characters, and comments (lines that contain the # character).
	■ To add a Firewall integer kernel parameter:
	`g_update_conf_file $FWDIR/boot/modules/fwkern.conf <Name_of_Integer_Kernel_Parameter>=<Integer_Value>`
	■ To add a VPN integer kernel parameter:
	`g_update_conf_file $FWDIR/boot/modules/vpnkern.conf <Name_of_Integer_Kernel_Parameter>=<Integer_Value>`
	■ To add a Firewall string kernel parameter:
	Note - You must write the value in single quotes, or double quotes.
	`g_update_conf_file $FWDIR/boot/modules/fwkern.conf <Name_of_String_Kernel_Parameter>='<String_Text>'`
	or
	`g_update_conf_file $FWDIR/boot/modules/fwkern.conf <Name_of_String_Kernel_Parameter>="<String_Text>"`

Step	Instructions
4	Reboot the Security Group: `reboot -b all`
5	Connect to the command line on the applicable Security Group.
6	Log in to the Expert mode.

7	Make sure the new value of the kernel parameter is set:
	■ For an integer kernel parameter, run:
	`g_fw ctl get int <Name of Integer Kernel Parameter> [-a]`
	■ For a string kernel parameter, run:
	`g_fw ctl get str <Name of String Kernel Parameter> [-a]`

Working with String Kernel Parameters

Viewing the list of the available Firewall *string* kernel parameters and their values

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.
3	Get the list of the available integer kernel parameters and their values: `modinfo -p $FWDIR/boot/modules/fw_kern*.o | sort -u | grep 'string param' | awk 'BEGIN {FS=":"} ; {print $1}' | xargs -n 1 fw ctl get str 1>> /var/log/fw_string_kernel_parameters.txt 2>> /var/log/fw_string_kernel_parameters.txt`
4	Analyze the output file: `/var/log/fw_string_kernel_parameters.txt`

Viewing the current value of a Firewall *string* kernel parameter

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.

3	Check the current value of a string kernel parameter:
	`g_fw ctl get str <Name of String Kernel Parameter> [-a]`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl get str fileapp_default_encoding_charset`
	`fileapp_default_encoding_charset = 'UTF-8'`
	`[Expert@MyChassis-ch0x-0x:0]#`

Configuring a value for a Firewall *string* kernel parameter *temporarily*

Important - This change does **not** survive reboot.

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.

3	Set the new value for a string kernel parameter:
	Note - You must write the value in single quotes, or double quotes.
	`g_fw ctl set str <Name of String Kernel Parameter> '<String Text>'`
	or
	`g_fw ctl set str <Name of String Kernel Parameter> "<String Text>"`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set str debug_filter_saddr_ip '1.1.1.1'`
	`Set operation succeeded`
	`[Expert@MyChassis-ch0x-0x:0]#`

4	Make sure the new value is set:
	`g_fw ctl get str <Name of String Kernel Parameter>`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl get str debug_filter_saddr_ip`
	`debug_filter_saddr_ip = '1.1.1.1'`
	`[Expert@MyChassis-ch0x-0x:0]#`

Removing the current value from a Firewall *string* kernel parameter *temporarily*

Important - This change does **not** survive reboot.

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.

3	Clear the current value from a string kernel parameter:
	Note - You must set an empty value in single quotes, or double quotes.
	`g_fw ctl set str '<Name of String Kernel Parameter>'`
	or
	`g_fw ctl set str "<Name of String Kernel Parameter>"`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set str debug_filter_saddr_ip ''`
	`Set operation succeeded`
	`[Expert@MyChassis-ch0x-0x:0]#`

4	Make sure the value is cleared (the new value is empty):
	`g_fw ctl get str <Name of String Kernel Parameter>`
	Example:
	`[Expert@MyChassis-ch0x-0x:0]# g_fw ctl get str debug_filter_saddr_ip`
	`debug_filter_saddr_ip = ''`
	`[Expert@MyChassis-ch0x-0x:0]#`

SecureXL Kernel Parameters

To change the internal default behavior of SecureXL or to configure special advanced settings for SecureXL, you can use SecureXL kernel parameters.

The names of applicable SecureXL kernel parameters and their values appear in various SK articles in *Check Point Support Center*, and provided by *Check Point Support*.

Important:

- The names of SecureXL kernel parameters are case-sensitive.
- You *cannot* configure SecureXL kernel parameters on-the-fly with the "`g_fw ctl set`" command.
  You must configure them only permanently in the special configuration file - `$PPKDIR/conf/simkern.conf`
  Schedule a maintenance window, because this procedure requires a reboot.
- For some SecureXL kernel parameters, you *cannot* get their current value on-the-fly with the "`g_fw ctl get`" command (see sk43387).

Examples of SecureXL kernel parameters

Type	Name

Integer	`num_of_sxl_devices`
	`sim_ipsec_dont_fragment`
	`tcp_always_keepalive`
	`sim_log_all_frags`
	`simple_debug_filter_dport_1`
	`simple_debug_filter_proto_1`

String	`simple_debug_filter_addr_1`
	`simple_debug_filter_daddr_2`
	`simlinux_excluded_ifs_list`

Viewing the list of the available SecureXL *integer* kernel parameters and their values

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.
3	Get the list of the available integer kernel parameters and their values: `modinfo -p $PPKDIR/boot/modules/sim_kern*.o | sort -u | grep _type | awk 'BEGIN {FS=":"} ; {print $1}' | xargs -n 1 fw ctl get int 1>> /var/log/sxl_integer_kernel_parameters.txt 2>> /var/log/sxl_integer_kernel_parameters.txt`
4	Analyze the output file: `/var/log/sxl_integer_kernel_parameters.txt`

Viewing the list of the available SecureXL *string* kernel parameters and their values

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.
3	Get the list of the available integer kernel parameters and their values: `modinfo -p $PPKDIR/boot/modules/sim_kern*.o | sort -u | grep 'string param' | awk 'BEGIN {FS=":"} ; {print $1}' | xargs -n 1 fw ctl get str 1>> /var/log/sxl_string_kernel_parameters.txt 2>> /var/log/sxl_string_kernel_parameters.txt`
4	Analyze the output file: `/var/log/sxl_string_kernel_parameters.txt`

Configuring a value for a SecureXL kernel parameter *permanently*

For more information, see sk26202: Changing the kernel global parameters for Check Point Security Gateway.

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.

3	Add the required SecureXL kernel parameter with the assigned value in the exact format specified below.
	Important - This configuration file does not support space characters, tabulation characters, and comments (lines that contain the # character).
	- To add an *integer* kernel parameter:
	`g_update_conf_file $PPKDIR/conf/simkern.conf <Name_of_SecureXL_Integer_Kernel_Parameter>=<Integer_Value>`
	- To add a *string* kernel parameter:
	Note - You must write the value in single quotes, or double quotes.
	`g_update_conf_file $PPKDIR/conf/simkern.conf <Name_of_SecureXL_String_Kernel_Parameter>='<String_Text>'`
	or
	`g_update_conf_file $PPKDIR/conf/simkern.conf <Name_of_SecureXL_String_Kernel_Parameter>="<String_Text>"`

6	Reboot the Security Group: `reboot -b all`
7	Connect to the command line on the applicable Security Group.
8	Log in to the Expert mode.

Step	Instructions

9	Make sure the new value of the kernel parameter is set:
	■ For an integer kernel parameter, run:
	`g_fw ctl get int <Name of Integer Kernel Parameter> [-a]`
	■ For a string kernel parameter, run:
	`g_fw ctl get str <Name of String Kernel Parameter> [-a]`

Kernel Debug on Security Group

This section describes how to collect a kernel debug on a Security Group.

Kernel Debug Syntax

Description:

During a kernel debug session, Security Group prints special debug messages that help Check Point Support and R&D understand how the Security Group processes the applicable connections.

Important - You must run the applicable commands in the Expert mode on the applicable Security Group.

Action plan to collect a kernel debug:

Note - See the *"Kernel Debug Procedure" on page 384*, or the *"Kernel Debug Procedure with Connection Life Cycle" on page 387*.

Step	Action	Instructions
1	Configure the applicable debug settings: a. Restore the default settings. b. Allocate the debug buffer.	In this step, you prepare the kernel debug options: a. Restore the default debug settings, so that any other debug settings do not interfere with the kernel debug. b. Allocate the kernel debug buffer, in which Security Group holds the applicable debug messages.
2	Configure the applicable kernel debug modules and their debug flags.	In this step, you prepare the applicable kernel debug modules and their debug flags, so that Security Group collects only applicable debug messages.
3	Start the collection of the kernel debug into an output file.	In this step, you configure Security Group to write the debug messages from the kernel debug buffer into an output file.
4	Stop the kernel debug.	In this step, you configure Security Group to stop writing the debug messages into an output file.
5	Restore the default kernel debug settings.	In this step, you restore the default kernel debug options.

To see the built-in help for the kernel debug

```
g_fw ctl debug -h
```

To restore the default kernel debug settings

- To reset all debug flags and enable only the default debug flags in all kernel modules:

  ```
  g_fw ctl debug 0
  ```

- To disable all debug flags including the default flags in all kernel modules:

  Best Practice - Do **not** run this command, because it disables even the basic default debug messages.

  ```
  g_fw ctl debug -x
  ```

To allocate the kernel debug buffer

```
g_fw ctl debug -buf 8200 [-v {"<List of VSIDs>" | all}] [-k]
```

Notes:

- Security Group allocates the kernel debug buffer with the specified size for *every* CoreXL Firewall instance.
- The maximal supported buffer size is 8192 kilobytes.

To configure the debug modules and debug flags

- General syntax:

```
g_fw ctl debug [-d <Strings to Search>] [-v {"<List of
VSIDs>" | all}] -m <Name of Debug Module> {all | + <List of
Debug Flags> | - <List of Debug Flags>}
```

```
g_fw ctl debug [-s "<String to Stop Debug>"] [-v {"<List of
VSIDs>" | all}] -m <Name of Debug Module> {all | + <List of
Debug Flags> | - <List of Debug Flags>}
```

- To see a list of all debug modules and their flags:

  Note - The list of kernel modules depends on the Software Blades you enabled on the Security Group.

```
g_fw ctl debug -m
```

- To see a list of debug flags that are already enabled:

```
g_fw ctl debug
```

- To enable all debug flags in the specified kernel module:

```
g_fw ctl debug -m <Name of Debug Module> all
```

- To enable the specified debug flags in the specified kernel module:

```
g_fw ctl debug -m <Name of Debug Module> + <List of Debug
Flags>
```

- To disable the specified debug flags in the specified kernel module:

```
g_fw ctl debug -m <Name of Debug Module> - <List of Debug
Flags>
```

To collect the kernel debug output

- General syntax (only supported parameters are listed):

```
g_fw ctl kdebug [-p <List of Fields>] [-T] -f >
/<Path>/<Name of Output File>
```

```
g_fw ctl kdebug [-p <List of Fields>] [-T] -f -o
/<Path>/<Name of Output File> -m <Number of Cyclic Files> [-
s <Size of Each Cyclic File in KB>]
```

- To start the collection of the kernel debug into an output file:

```
g_fw ctl kdebug -T -f > /<Path>/<Name of Output File>
```

- To start collecting the kernel debug into cyclic output files:

```
g_fw ctl kdebug -T -f -o /<Path>/<Name of Output File> -m
<Number of Cyclic Files> [-s <Size of Each Cyclic File in
KB>]
```

Parameters

Note - Only supported parameters are listed.

Table: Parameters of the 'fw ctl debug' command

Parameter	Description
`0 | -x`	Controls how to disable the debug flags: ■ `0` Resets all debug flags and enables only the default debug flags in all kernel modules. ■ `-x` Disables all debug flags, including the default flags in all kernel modules. **Best Practice** - Do **not** use the "`-x`" parameter, because it disables even the basic default debug messages.
`-d <Strings to Search>`	When you specify this parameter, the Security Group: 1. Examines the applicable debug messages based on the enabled kernel debug modules and their debug flags. 2. Collects only debug messages that contain at least one of the specified strings into the kernel debug buffer. 3. Writes the entire kernel debug buffer into the output file. **Notes:** ■ These strings can be any plain text (not a regular expression) that you see in the debug messages. ■ Separate the applicable strings by commas without spaces: `-d String1,String2,...,StringN` ■ You can specify up to 10 strings, up to 250 characters in total.

Table: Parameters of the 'fw ctl debug' command (continued)

<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>-s "&lt;String to Stop Debug&gt;"</td><td>When you specify this parameter, the Security Group:
1. Collects the applicable debug messages into the kernel debug buffer based on the enabled kernel debug modules and their debug flags.
2. Does not write any of these debug messages from the kernel debug buffer into the output file.
3. Stops collecting all debug messages when it detects the first debug message that contains the specified string in the kernel debug buffer.
4. Writes the entire kernel debug buffer into the output file.
Notes:
■ This one string can be any plain text (not a regular expression) that you see in the debug messages.
■ Maximum string length is 50 characters.</td></tr>
<tr><td>-m &lt;Name of Debug Module&gt;</td><td>Specifies the name of the kernel debug module, for which you print or configure the debug flags.</td></tr>
<tr><td>{all | + <List of Debug Flags> | - <List of Debug Flags&gt;}</td><td>Specifies which debug flags to enable or disable in the specified kernel debug module:
■ all
Enables all debug flags in the specified kernel debug module.
■ + <List of Debug Flags>
Enables the specified debug flags in the specified kernel debug module.
You must press the space bar key after the plus (+) character:
+ <Flag1> [<Flag2> ... <FlagN>]
Example: + drop conn
■ - <List of Debug Flags>
Disables the specified debug flags in the specified kernel debug module.
You must press the space bar key after the minus (-) character:
- <Flag1> [<Flag2> ... <FlagN>]
Example: - conn</td></tr>
</table>

Table: Parameters of the 'fw ctl debug' command (continued)

Parameter	Description
`-v {"<List of VSIDs>" | all}`	Specifies the list of Virtual Systems. A VSX Gateway automatically filters the collected kernel debug information for debug messages only for these Virtual Systems. ■ `-v "<List of VSIDs>"` Monitors the messages only from the specified Virtual Systems. To specify the Virtual Systems, enter their VSID number separated with commas and without spaces: `"VSID1[,VSID2,VSID3,...,VSIDn]"` Example: `-v "1,3,7"` ■ `-v all` Monitors the messages from all configured Virtual Systems. **Notes:** ■ This parameter is supported only in VSX mode. ■ This parameter and the "`-k`" parameter are mutually exclusive.

Table: Parameters of the 'fw ctl debug' command (continued)

Parameter	Description

`-e <Expression>`
`-i <Name of Filter File>`
`-i -`
`-u`
	Specifies the INSPECT filter for the debug:
	■ `-e <Expression>`
	Specifies the INSPECT filter.
	See the "`fw monitor`" command in the *R80.20 CLI Reference Guide*.
	■ `-i <Name of Filter File>`
	Specifies the file that contains the INSPECT filter.
	■ `-i -`
	Specifies that the INSPECT filter arrives from the standard input.
	The Security Group prompts you to enter the INSPECT filter on the screen.
	■ `-u`
	Removes the INSPECT debug filter.
	ℹ **Notes:**
	■ These are *legacy* parameters ("`-e`" and "`-i`").
	■ When you use these parameters ("`-e`" and "`-i`"), the Security Group cannot apply the specified INSPECT filter to the accelerated traffic.
	■ For new debug filters, see *"Kernel Debug Filters" on page 379*.

`-z`	The Security Group processes some connections in both SecureXL code and in the Host appliance code (for example, Passive Streaming Library (PSL) - an IPS infrastructure, which transparently listens to TCP traffic as network packets, and rebuilds the TCP stream out of these packets.). The Security Group processes some connections in only in the Host appliance code. When you use this parameter, kernel debug output contains the debug messages only from the Host appliance code.

Table: Parameters of the 'fw ctl debug' command (continued)

Parameter	Description
`-k`	The Security Group processes some connections in both kernel space code and in the user space code (for example, Web Intelligence). The Security Group processes some connections only in the kernel space code. When you use this parameter, kernel debug output contains the debug messages only from the kernel space. **Notes:** - This parameter is not supported in the VSX mode, in which the Firewall works in the user space. - This parameter and the "`-v`" parameter are mutually exclusive.
`-p` *`<List of Fields>`*	By default, when the Security Group prints the debug messages, the messages start with the applicable CPU ID and CoreXL Firewall instance ID. You can print additional fields in the beginning of each debug message. **Notes:** - These fields are available: `all`, `proc`, `pid`, `date`, `mid`, `type`, `freq`, `topic`, `time`, `ticks`, `tid`, `text`, `errno`, `host`, `vsid`, `cpu`. - When you specify the applicable fields, separate them with commas and without spaces: `Field1,Field2,...,FieldN` - The more fields you specify, the higher the load on the CPU and on the hard disk.
`-T`	Prints the time stamp in microseconds in front of each debug message. **Best Practice** - Always use this parameter to make the debug analysis easier.
`-f`	Collects the debug data until you stop the kernel debug in one of these ways: - When you press the **CTRL+C** keys. - When you run the "`g_fw ctl debug 0`" command. - When you run the "`g_fw ctl debug -x`" command. - When you kill the "`g_fw ctl kdebug`" process.

Table: Parameters of the 'fw ctl debug' command (continued)

Parameter	Description
`/<Path>/<Name of Output File>`	Specifies the path and the name of the debug output file. ★ **Best Practice** - Always use the largest partition on the disk - `/var/log/`. Security Group can generate many debug messages within short time. As a result, the debug output file can grow to large size very fast.
`-o /<Path>/<Name of Output File> -m <Number of Cyclic Files> [-s <Size of Each Cyclic File in KB>]`	Saves the collected debug data into cyclic debug output files. When the size of the current `<Name of Output File>` reaches the specified `<Size of Each Cyclic File in KB>` (more or less), the Security Group renames the current `<Name of Output File>` to `<Name of Output File>.0` and creates a new `<Name of Output File>`. If the `<Name of Output File>.0` already exists, the Security Group renames the `<Name of Output File>.0` to `<Name of Output File>.1`, and so on - until the specified limit `<Number of Cyclic Files>`. When the Security Group reaches the `<Number of Cyclic Files>`, it deletes the oldest files. The valid values are: ▪ `<Number of Cyclic Files>` - from 1 to 999 ▪ `<Size of Each Cyclic File in KB>` - from 1 to 2097150

Kernel Debug Filters

By default, kernel debug output contains information about all processed connections.

You can configure filters for kernel debug to collect debug messages only for the applicable connections.

There are three types of debug filters:

- By connection tuple parameters
- By an IP address parameter
- By a VPN peer parameter

To configure these kernel debug filters, assign the applicable values to the applicable kernel parameters **before** you start the kernel debug.

You assign the values to the applicable kernel parameters temporarily with the "`g_fw ctl set`" command.

Notes:

- A Security Group supports:
  - up to **five** Connection Tuple filters in total (from all types)
  - up to **three** Host IP Address filters
  - up to **two** VPN Peer filters
- A Security Group applies these debug filters to both the non-accelerated and accelerated traffic.
- A Security Group applies these debug filters to *"Kernel Debug Procedure with Connection Life Cycle" on page 387*.

Best Practice - It is usually simpler to set the Connection Tuple and Host IP Address filters from within the "`g_fw ctl debug`" command (see the "`fw ctl debug`" command in the *R80.20 CLI Reference Guide*). To filter the kernel debug by a VPN Peer, use the procedure below.

Important - You must run these commands in the Expert mode on the applicable Security Group.

To configure debug filter of the type "By connection tuple parameters":

A Security Group processes connections based on the 5-tuple:

- Source IP address
- Source Port (see *IANA Service Name and Port Number Registry*)
- Destination IP address
- Destination Port (see *IANA Service Name and Port Number Registry*)
- Protocol Number (see *IANA Protocol Numbers*)

This debug filter lets you filter by these tuple parameters:

Tuple Parameter	Syntax for Kernel Parameters
Source IP address	`g_fw ctl set str simple_debug_filter_saddr_<N> "<IPv4 or IPv6 Address>"`
Source Ports	`g_fw ctl set int simple_debug_filter_sport_<N> <1-65535>`
Destination IP address	`g_fw ctl set str simple_debug_filter_daddr_<N> "<IPv4 or IPv6 Address>"`
Destination Ports	`g_fw ctl set int simple_debug_filter_dport_<N> <1-65535>`
Protocol Number	`g_fw ctl set int simple_debug_filter_proto_<N> <0-254>`

Notes:

1. *<N>* is an integer between 1 and 5. This number is an index for the configured kernel parameters of this type.
2. When you specify IP addresses, you must enclose them in double quotes.
3. When you configure kernel parameters with the *same* index <N>, the debug filter is a logical "**AND**" of these kernel parameters.
   In this case, the final filter matches only *one* direction of the processed connection.
   - Example 1 - packets from the source IP address X to the destination IP address Y:
     ```
     simple_debug_filter_saddr_1 <Value X>
     AND
     simple_debug_filter_daddr_1 <Value Y>
     ```
   - Example 2 - packets from the source IP address X to the destination port Y:
     ```
     simple_debug_filter_saddr_1 <Value X>
     AND
     simple_debug_filter_dport_1 <Value Y>
     ```
4. When you configure kernel parameters with the *different* indices <N>, the debug filter is a logical "OR" of these kernel parameters.
   This means that if it is necessary for the final filter to match both directions of the connection, it is necessary to configure the applicable debug filters for both directions.
   - Example 1 - packets either from the source IP address X, or to the destination IP address Y:
     ```
     simple_debug_filter_saddr_1 <Value X>
     OR
     simple_debug_filter_daddr_2 <Value Y>
     ```
   - Example 2 - packets either from the source IP address X, or to the destination port Y:
     ```
     simple_debug_filter_saddr_1 <Value X>
     OR
     simple_debug_filter_dport_2 <Value Y>
     ```
5. For information about the Port Numbers, see *IANA Service Name and Port Number Registry*.
6. For information about the Protocol Numbers, see *IANA Protocol Numbers*.

To configure debug filter of the type "By an IP address parameter":

This debug filter lets you filter by one IP address, which is either the source or the destination IP address of the packet.

Syntax for Kernel Parameters:

```
g_fw ctl set str simple_debug_filter_addr_<N> "<IPv4 or IPv6
Address>"
```

Notes:

1. *<N>* is an integer between 1 and 3.
   This number is an index for the configured kernel parameters of this type.
2. You can configure one, two, or three of these kernel parameters at the same time.
   - Example 1:
     Configure one IP address (`simple_debug_filter_addr_1`).
   - Example 2:
     Configure two IP addresses (`simple_debug_filter_addr_1` and `simple_debug_filter_addr_2`).
     This would match packets, where any of these IP addresses appears, either as a source or a destination.
3. You must enclose the IP addresses in double quotes.

To configure debug filter of the type "By a VPN peer parameter":

This debug filter lets you filter by one IP address.

Syntax for Kernel Parameters:

```
g_fw ctl set str simple_debug_filter_vpn_<N> "<IPv4 or IPv6
Address>"
```

Notes:

1. *<N>* is an integer - 1 or 2.
   This number is an index for the configured kernel parameters of this type.
2. You can configure one or two of these kernel parameters at the same time.
   - Example 1:
     Configure one VPN peer (`simple_debug_filter_vpn_1`).
   - Example 2:
     Configure two VPN peers (`simple_debug_filter_vpn_1` and `simple_debug_filter_vpn_2`).
3. You must enclose the IP addresses in double quotes.

To disable all debug filters:

You can disable all the configured debug filters of all types.

Syntax for Kernel Parameter:

```
g_fw ctl set int simple_debug_filter_off 1
```

Usage Example

The kernel debug must show the information about the connection from Source IP address 192.168.20.30 from any Source Port to Destination IP address 172.16.40.50 to Destination Port 80 (192.168.20.30:<Any> --> 172.16.40.50:80).

Run these commands **before** you start the kernel debug:

```
g_fw ctl set int simple_debug_filter_off 1
g_fw ctl set str simple_debug_filter_saddr_1 "192.168.20.30"
g_fw ctl set str simple_debug_filter_daddr_1 "172.16.40.50"
g_fw ctl set str simple_debug_filter_saddr_2 "172.16.40.50"
g_fw ctl set str simple_debug_filter_daddr_2 "192.168.20.30"
g_fw ctl set int simple_debug_filter_dport_1 80
g_fw ctl set int simple_debug_filter_sport_2 80
```

Important - In the above example, two Connection Tuple filters are used ("`..._1`" and "`..._2`") - one for each direction, because we want the debug filter to match both directions of this connection.

Kernel Debug Procedure

Alternatively, use the *"Kernel Debug Procedure with Connection Life Cycle" on page 387*.

Important:

- Kernel debug increases the load on the CPU of Security Group Members. Schedule a maintenance window.
- You must run the applicable commands in the Expert mode on the applicable Security Group.

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.
3	Reset the kernel debug options: `g_fw ctl debug 0`
4	Reset the kernel debug filters: `g_fw ctl set int simple_debug_filter_off 1`
5	Configure the applicable kernel debug filters. See *"Kernel Debug Filters" on page 379*.
6	Allocate the kernel debug buffer for each CoreXL Firewall instance: `g_fw ctl debug -buf 8200`
7	Make sure the kernel debug buffer was allocated: `g_fw ctl debug | grep buffer`
8	Enable the applicable debug flags in the applicable kernel modules: `g_fw ctl debug -m <module> {all | + <flags>}` See *"Kernel Debug Modules and Debug Flags" on page 394*.
9	Examine the list of the debug flags that are enabled in the specified kernel modules: `g_fw ctl debug -m <module>`
10	Start the kernel debug: `g_fw ctl kdebug -T -f > /var/log/kernel_debug.txt`

Step	Instructions
11	Replicate the issue, or wait for the issue to occur.
12	Stop the kernel debug: Press the **CTRL+C** keys.
13	Reset the kernel debug options: `g_fw ctl debug 0`
14	Reset the kernel debug filters: `g_fw ctl set int simple_debug_filter_off 1`
15	Analyze the debug output file on each Security Group Member: `/var/log/kernel_debug.txt`

Example - Connection 192.168.20.30:<Any> --> 172.16.40.50:80

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug 0
Defaulting all kernel debugging options
Debug state was reset to default.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set int simple_debug_filter_off 1
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set str simple_debug_filter_saddr_1 "192.168.20.30"
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set str simple_debug_filter_daddr_2 "192.168.20.40"
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set int simple_debug_filter_dport_1 80
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug -buf 8200
Initialized kernel debugging buffer to size 8192K
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug | grep buffer
Kernel debugging buffer size: 8192KB
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug -m fw + conn drop
Updated kernel's debug variable for module fw
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug -m fw
Kernel debugging buffer size: 8192KB
Module: fw
Enabled Kernel debugging options: error warning conn drop
Messaging threshold set to type=Info freq=Common
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl kdebug -T -f > /var/log/kernel_debug.txt
... ... Replicate the issue, or wait for the issue to occur ... ...
... ... Press CTRL+C ... ...
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug 0
Defaulting all kernel debugging options
Debug state was reset to default.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl set int simple_debug_filter_off 1
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_all ls -l /var/log/kernel_debug.txt
-rw-rw---- 1 admin root 1630619 Apr 12 19:49 /var/log/kernel_debug.txt
[Expert@MyChassis-ch0x-0x:0]#
```

Kernel Debug Procedure with Connection Life Cycle

Introduction

R80.20 introduced a new debug tool called Connection Life Cycle.

This tool generates a formatted debug output file that presents the debug messages hierarchically by connections and packets:

- The first hierarchy level shows connections.
- After you expand the connection, you see all the packets of this connection.

Important - You must use this tool in the Expert mode together with the regular kernel debug flags.
See *"Kernel Debug Modules and Debug Flags" on page 394*.

Syntax

- To start the debug capture:

```
g_all conn_life_cycle.sh -a start -o /<Path>/<Name of Raw
Debug Output File> [{-t | -T}] [[-f "<Filter1>"] [-f
"<Filter2>"] [-f "<Filter3>] [-f "<Filter4>] [-f "<Filter5>"]]
```

- To stop the debug capture and prepare the formatted debug output:

```
g_all conn_life_cycle.sh -a stop -o /<Path>/<Name of Formatted
Debug Output File>
```

Parameters

Table: Parameters of the 'conn_life_cycle.sh' script

Parameter	Description

`-a start`
`-a stop`
	Mandatory.
	Specifies the action:
	- `start` - Starts the debug capture based on the debug flags you enabled and debug filters you specified.
	- `stop` - Stops the debug capture, resets the kernel debug options, resets the kernel debug filters.

Table: Parameters of the 'conn_life_cycle.sh' script (continued)

Parameter	Description
`-t | -T`	Optional. Specifies the resolution of a time stamp in front of each debug message: ▪ `-t` - Prints the time stamp in milliseconds. ▪ `-T` - Prints the time stamp in microseconds. **Best Practice** - Always use the "`-T`" option to make the debug analysis easier.

`-f "<Filter>"`	Optional.
	Specifies which connections and packets to capture.
	For additional information, see *"Kernel Debug Filters" on page 379*.
	Important - If you do not specify filters, then the tool prints debug messages for *all* traffic. This causes high load on the CPU and increases the time to format the debug output file.
	Each filter must contain these five numbers (5-tuple) separated with commas:
	`"<Source IP Address>,<Source Port>,<Destination IP Address>,<Destination Port>,<Protocol Number>"`
	Example of capturing traffic from IP 192.168.20.30 from any port to IP 172.16.40.50 to port 22 over the TCP protocol:
	`-f "192.168.20.30,0,172.16.40.50,22,6"`

Table: Parameters of the 'conn_life_cycle.sh' script (continued)

Parameter	Description
	Notes: - The tool supports up to **five** of such filters. - The tool treats the value 0 (zero) as "any". - If you specify two or more filters, the tool performs a logical "OR" of all the filters on each packet. If the packet matches at least one filter, the tool prints the debug messages for this packet. - "*<Source IP Address>*" and "*<Destination IP Address>*" - IPv4 or IPv6 address - "*<Source Port>*" and "*<Destination Port>*" - integers from 1 to 65535 (see *IANA Service Name and Port Number Registry*) - *<Protocol Number>* - integer from 0 to 254 (see *IANA Protocol Numbers*)
`-o /<Path>/<Name of Raw Debug Output File>`	Mandatory. Specifies the absolute path and the name of the raw debug output file. Example: `-o /var/log/kernel_debug.txt`
`-o /<Path>/<Name of Formatted Debug Output File>`	Mandatory. Specifies the absolute path and the name of the formatted debug output file (to analyze by an administrator). Example: `-o /var/log/kernel_debug_formatted.txt`

Procedure

Step	Instructions
1	Connect to the command line on the applicable Security Group.
2	Log in to the Expert mode.
3	Enable the applicable debug flags in the applicable kernel modules: `g_fw ctl debug -m <module> {all | + <flags>}` See *"Kernel Debug Modules and Debug Flags" on page 394*.
4	Examine the list of the debug flags that are enabled in the specified kernel modules: `g_fw ctl debug -m <module>`
5	Start the debug capture: `g_all conn_life_cycle.sh -a start -o /var/log/kernel_debug.txt -T -f "<Filter1>" [... [-f "<FilterN>"]]`
6	Replicate the issue, or wait for the issue to occur.
7	Stop the debug capture and prepare the formatted debug output: `g_all conn_life_cycle.sh -a stop -o /var/log/kernel_debug_formatted.txt`
8	Transfer the formatted debug output file from every Security Group Member to your desktop or laptop computer: `/var/log/kernel_debug_formatted.txt`
9	Examine the formatted debug output file in an advanced text editor like Notepad++ (click **Language > R > Ruby**), or any other Ruby language viewer.

Example

Collecting the kernel debug for TCP connection from IP 172.20.168.15 (any port) to IP 192.168.3.53 and port 22

```
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug -m fw + conn drop
Updated kernel's debug variable for module fw
Debug flags updated.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug -m fw
Kernel debugging buffer size: 50KB
HOST:
Module: fw
Enabled Kernel debugging options: error warning conn drop
Messaging threshold set to type=Info freq=Common
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_all conn_life_cycle.sh -a start -o /var/log/kernel_debug.txt
-T -f "172.20.168.15,0,192.168.3.53,22,6"
Set operation succeeded
Set operation succeeded
Set operation succeeded
Set operation succeeded
Set operation succeeded
Set operation succeeded
Set operation succeeded
Initialized kernel debugging buffer to size 8192K
Set operation succeeded
Capturing started...
[Expert@MyChassis-ch0x-0x:0]#

... ... Replicate the issue, or wait for the issue to occur ... ...

[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_all conn_life_cycle.sh -a stop -o /var/log/kernel_debug_
formatted.txt
Set operation succeeded
Defaulting all kernel debugging options
Debug state was reset to default.
Set operation succeeded
doing unification...
Openning host debug file /tmp/tmp.KiWmF18217... OK
New unified debug file: /tmp/tmp.imzMZ18220... OK
prepare unification
performing unification
Done :-)
doing grouping...
wrapping connections and packets...
Some of packets lack description, probably because they were already handled when the feature
was enabled.
[Expert@MyChassis-ch0x-0x:0]#
[Expert@MyChassis-ch0x-0x:0]# g_fw ctl debug -m fw
Kernel debugging buffer size: 50KB
HOST:
Module: fw
Enabled Kernel debugging options: error warning
Messaging threshold set to type=Info freq=Common
[Expert@MyChassis-ch0x-0x:0]
[Expert@MyChassis-ch0x-0x:0] ls -l /var/log/kernel_debug.*
-rw-rw---- 1 admin root 40960 Nov 26 13:02 /var/log/kernel_debug.txt
-rw-rw---- 1 admin root 24406 Nov 26 13:02 /var/log/kernel_debug_formatted.txt
[Expert@MyChassis-ch0x-0x:0]
```

Opening the kernel debug in Notepad++

Everything is collapsed:

```
   Connection with 1st packet already in handling so no conn details
[+]
{++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++
```

Opened the first hierarchy level to see the connection:

```
   Connection with 1st packet already in handling so no conn details
[-]
{++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++
;26Nov2018 13:02:06.736016;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is  INBOUND;
[+]{---------------------------------------------------------- packet begins ----------------
--------------------------------------
```

Opened the second hierarchy level to see the packets of this connection:

```
   Connection with 1st packet already in handling so no conn details
[-]
{++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++
;26Nov2018 13:02:06.736016;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is  INBOUND;
[-]{---------------------------------------------------------- packet begins -----------------
--------------------------------------
;26Nov2018 13:02:06.736021;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is entering  CHAIN_
MODULES_ENTER;
;26Nov2018 13:02:06.736035;[cpu_2];[fw4_1];#fwconn_lookup_cache: conn <dir 0,
172.20.168.15:57821 -> 192.168.3.53:22 IPP 6>;
;26Nov2018 13:02:06.736046;[cpu_2];[fw4_1];#<1c001,44000,2,1e2,0,UUID: 5bfbc2a2-0000-0000-c0-
a8-3-35-1-0-0-c0, 1,1,ffffffff,ffffffff,40800,0,80,OPQS:
[0,ffffc20033d220f0,0,0,0,0,ffffc20033958648,0,0,0,ffffc200325d57b0,0,0,0,0,0],0,0,0,0,0,0,0,
0,0,0,0,0,0,0>
;26Nov2018 13:02:06.736048;[cpu_2];[fw4_1];CONN LIFE CYCLE: lookup: found;
;26Nov2018 13:02:06.736053;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is entering  VM_ENTER;
;26Nov2018 13:02:06.736055;[cpu_2];[fw4_1];#
;26Nov2018 13:02:06.736060;[cpu_2];[fw4_1];#Before VM: <dir 0, 172.20.168.15:57821 ->
192.168.3.53:22 IPP 6> (len=40) TCP flags=0x10 (ACK), seq=686659054, ack=4181122096, data
end=686659054 (ifn=1) (first seen) (looked up) ;
;26Nov2018 13:02:06.736068;[cpu_2];[fw4_1];#After  VM: <dir 0, 172.20.168.15:57821 ->
192.168.3.53:22 IPP 6> (len=40) TCP flags=0x10 (ACK), seq=686659054, ack=4181122096, data
end=686659054 ;
;26Nov2018 13:02:06.736071;[cpu_2];[fw4_1];#VM Final action=ACCEPT;
;26Nov2018 13:02:06.736072;[cpu_2];[fw4_1];# -----  Stateful VM inbound Completed -----
;26Nov2018 13:02:06.736075;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is exiting  VM_EXIT;
;26Nov2018 13:02:06.736081;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is entering  POST VM_
ENTER;
;26Nov2018 13:02:06.736083;[cpu_2];[fw4_1];#
;26Nov2018 13:02:06.736085;[cpu_2];[fw4_1];#fw_post_vm_chain_handler: (first_seen 32, new_
conn 0, is_my_ip 0, is_first_packet 0);
;26Nov2018 13:02:06.736089;[cpu_2];[fw4_1];#Before POST VM: <dir 0, 172.20.168.15:57821 ->
192.168.3.53:22 IPP 6> (len=40) TCP flags=0x10 (ACK), seq=686659054, ack=4181122096, data
end=686659054 (ifn=1) (first seen) (looked up) ;
;26Nov2018 13:02:06.736095;[cpu_2];[fw4_1];#After  POST VM: <dir 0, 172.20.168.15:57821 ->
192.168.3.53:22 IPP 6> (len=40) TCP flags=0x10 (ACK), seq=686659054, ack=4181122096, data
end=686659054 ;
;26Nov2018 13:02:06.736097;[cpu_2];[fw4_1];#POST VM Final action=ACCEPT;
;26Nov2018 13:02:06.736098;[cpu_2];[fw4_1];# -----  Stateful POST VM inbound Completed -----
;26Nov2018 13:02:06.736101;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is exiting  POST VM_
EXIT;
;26Nov2018 13:02:06.736104;[cpu_2];[fw4_1];#fwconnoxid_msg_get_cliconn: warning - failed to
get connoxid message.;
;26Nov2018 13:02:06.736107;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is entering  CPAS_ENTER;
;26Nov2018 13:02:06.736110;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is exiting  CPAS_EXIT;
;26Nov2018 13:02:06.736113;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is exiting  CHAIN_
MODULES_EXIT;
;26Nov2018 13:02:06.736116;[cpu_2];[fw4_1];Packet 0xffff8101ea45e680 is  ACCEPTED;
}
;26Nov2018 13:02:06.770652;[cpu_2];[fw4_1];Packet 0xffff8101ea128580 is  INBOUND;
```

Kernel Debug Modules and Debug Flags

This section describes the Kernel Debug Modules and their Debug Flags.

To see the available kernel debug modules and their debug flags, run this command in the Expert mode on the applicable Security Group:

```
g_fw ctl debug -m
```

List of kernel debug modules (in alphabetical order):

- *"Module 'accel_apps' (Accelerated Applications)" on page 396*
- *"Module 'accel_pm_mgr' (Accelerated Pattern Match Manager)" on page 397*
- *"Module 'APPI' (Application Control Inspection)" on page 398*
- *"Module 'BOA' (Boolean Analyzer for Web Intelligence)" on page 399*
- *"Module 'CI' (Content Inspection)" on page 400*
- *"Module 'cluster' (ClusterXL)" on page 402*
- *"Module 'cmi_loader' (Context Management Interface / Infrastructure Loader)" on page 404*
- *"Module 'CPAS' (Check Point Active Streaming)" on page 406*
- *"Module 'cpcode' (Data Loss Prevention - CPcode)" on page 407*
- *"Module 'dlpda' (Data Loss Prevention - Download Agent for Content Awareness)" on page 408*
- *"Module 'dlpk' (Data Loss Prevention - Kernel Space)" on page 410*
- *"Module 'dlpuk' (Data Loss Prevention - User Space)" on page 411*
- *"Module 'fg' (FloodGate-1 - QoS)" on page 412*
- *"Module 'FILEAPP' (File Application)" on page 414*
- *"Module 'fw' (Firewall)" on page 415*
- *"Module 'gtp' (GPRS Tunneling Protocol)" on page 421*
- *"Module 'h323' (VoIP H.323)" on page 423*
- *"Module 'ICAP_CLIENT' (Internet Content Adaptation Protocol Client)" on page 424*
- *"Module 'IDAPI' (Identity Awareness API)" on page 426*
- *"Module 'kiss' (Kernel Infrastructure)" on page 428*
- *"Module 'kissflow' (Kernel Infrastructure Flow)" on page 431*

- *"Module 'MALWARE' (Threat Prevention)" on page 432*
- *"Module 'multik' (Multi-Kernel Inspection - CoreXL)" on page 433*
- *"Module 'MUX' (Multiplexer for Applications Traffic)" on page 435*
- *"Module 'NRB' (Next Rule Base)" on page 437*
- *"Module 'PSL' (Passive Streaming Library)" on page 439*
- *"Module 'RAD_KERNEL' (Resource Advisor - Kernel Space)" on page 440*
- *"Module 'RTM' (Real Time Monitoring)" on page 441*
- *"Module 'seqvalid' (TCP Sequence Validator and Translator)" on page 443*
- *"Module 'SFT' (Stream File Type)" on page 444*
- *"Module 'SGEN' (Struct Generator)" on page 445*
- *"Module 'synatk' (Accelerated SYN Defender)" on page 446*
- *"Module 'UC' (UserCheck)" on page 447*
- *"Module 'UP' (Unified Policy)" on page 448*
- *"Module 'upconv' (Unified Policy Conversion)" on page 450*
- *"Module 'UPIS' (Unified Policy Infrastructure)" on page 451*
- *"Module 'VPN' (Site-to-Site VPN and Remote Access VPN)" on page 453*
- *"Module 'WS' (Web Intelligence)" on page 456*
- *"Module 'WS_SIP' (Web Intelligence VoIP SIP Parser)" on page 459*
- *"Module 'WSIS' (Web Intelligence Infrastructure)" on page 461*

Module 'accel_apps' (Accelerated Applications)

Syntax:

```
g_fw ctl debug -m accel_apps + {all | <List of Debug Flags>}
```

Flag	Instructions
`av_lite`	Messages from the lite Content Inspection (Anti-Virus) module
`cmi_lite`	Messages from the lite Context Management Interface / Infrastructure module
`error`	General errors
`warning`	General warnings

Module 'accel_pm_mgr' (Accelerated Pattern Match Manager)

Syntax:

```
g_fw ctl debug -m accel_pm_mgr + {all | <List of Debug Flags>}
```

Flag	Instructions
`debug`	Operations in the Accelerated Pattern Match Manager module
`error`	General errors and failures
`flow`	Internal flow of functions
`submit_error`	General failures to submit the data for analysis
`warning`	General warnings and failures

Module 'APPI' (Application Control Inspection)

Syntax:

```
g_fw ctl debug -m APPI + {all | <List of Debug Flags>}
```

Flag	Instructions
`account`	Accounting information
`address`	Information about connection's IP address
`btime`	Browse time
`connection`	Application Control connections
`coverage`	Coverage times (entering, blocking, and time spent)
`error`	General errors
`global`	Global policy operations
`info`	General information
`limit`	Application Control limits
`memory`	Memory allocation operations
`module`	Operations in the Application Control module (initialization, module loading, calls to the module, policy loading, and so on)
`observer`	Classification Object (CLOB) observer (data classification)
`policy`	Application Control policy
`referrer`	Application Control referrer
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`urlf_ssl`	Application Control and URL Filtering for SSL
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'BOA' (Boolean Analyzer for Web Intelligence)

Syntax:

```
g_fw ctl debug -m BOA + {all | <List of Debug Flags>}
```

Flag	Instructions
`analyzer`	Operations in the BOA module
`disasm`	Disassembler information
`error`	General errors
`fatal`	Fatal errors
`flow`	Operations in the BOA module
`info`	General information
`lock`	Information about internal locks in the FireWall kernel
`memory`	Memory allocation operations
`spider`	Internal hash tables
`stat`	Statistics
`stream`	Memory allocation when processing streamed data
`warning`	General warnings

Module 'CI' (Content Inspection)

Syntax:

```
g_fw ctl debug -m CI + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Prints connection addresses (as `Source_IP:Source_Port -> Dest_IP:Dest_Port`)
`av`	Anti-Virus inspection
`coverage`	Coverage times (entering, blocking, and time spent)
`crypto`	Basic information about encryption and decryption
`error`	General errors
`fatal`	Fatal errors
`filter`	Basic information about URL filters
`info`	General information
`ioctl`	*Currently is not used*
`memory`	Memory allocation operations
`module`	Operations in the Content Inspection module (initialization, module loading, calls to the module, policy loading, and so on)
`policy`	Content Inspection policy
`profile`	Basic information about the Content Inspection module (initialization, destroying, freeing)
`regexp`	Regular Expression library
`session`	Session layer
`stat`	Content Inspection statistics
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')

Flag	Instructions
`track`	Use only for very limited important debug prints, so it can be used in a loaded environment - Content-Disposition, Content-Type, extension validation, extension matching
`uf`	URL filters and URL cache
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'cluster' (ClusterXL)

Syntax:

```
g_fw ctl debug -m cluster + {all | <List of Debug Flags>}
```

Notes:

- To print all synchronization operations in Check Point cluster in the debug output, enable these debug flags:
  - The debug flag "`sync`" in *"Module 'fw' (Firewall)" on page 415*
  - The debug flag "`sync`" in *"Module 'CPAS' (Check Point Active Streaming)" on page 406*
- To print the contents of the packets in HEX format in the debug output (as "`FW-1: fwha_print_packet: Buffer ...`"), before you start the kernel debug, set this kernel parameter on the applicable Security Group:

  ```
  g_fw ctl set int fwha_dprint_io 1
  ```
- To print all network checks in the debug output, before you start the kernel debug, set this kernel parameter on the applicable Security Group:

  ```
  g_fw ctl set int fwha_dprint_all_net_check 1
  ```

Flag	Instructions
`arp`	ARP Forwarding (see sk111956)
`autoccp`	Operations of CCP in Auto mode
`ccp`	Reception and transmission of Cluster Control Protocol (CCP) packets
`cloud`	Replies to the probe packets in CloudGuard IaaS
`conf`	Cluster configuration and policy installation
`correction`	Correction Layer
`cu`	Connectivity Upgrade (see sk107042)
`drop`	Connections dropped by the cluster Decision Function (DF) module (does not include CCP packets)
`forward`	Forwarding Layer messages (when Cluster Members send and receive a forwarded packet)
`if`	Interface tracking and validation (all the operations and checks on interfaces)

Flag	Instructions
`ifstate`	Interface state (all the operations and checks on interfaces)
`io`	Information about sending of packets through cluster interfaces
`log`	Creating and sending of logs by cluster **Note** - Also enable the debug flag "`log`" in *"Module 'fw' (Firewall)" on page 415*
`mac`	Current configuration of and detection of cluster interfaces **Note** - Also enable the debug flags "`conf`" and "`if`" in this debug module
`mmagic`	Operations on "MAC magic" (getting, setting, updating, initializing, dropping, and so on)
`msg`	Handling of internal messages between Cluster Members
`pivot`	Operation of ClusterXL in Load Sharing Unicast mode (Pivot mode)
`pnote`	Registration and monitoring of Critical Devices (pnotes)
`select`	Packet selection (includes the Decision Function)
`stat`	States of cluster members (state machine)
`subs`	Subscriber module (set of APIs, which enable user space processes to be aware of the current state of the ClusterXL state machine and other clustering configuration parameters)
`timer`	Reports of cluster internal timers
`trap`	Sending trap messages from the cluster kernel to the RouteD daemon about Master change

Module 'cmi_loader' (Context Management Interface / Infrastructure Loader)

Syntax:

```
g_fw ctl debug -m cmi_loader + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`connection`	Internal messages about connection
`coverage`	Coverage times (entering, blocking, and time spent)
`cpcode`	DLP CPcode **Note** - Also see *"Module 'cpcode' (Data Loss Prevention - CPcode)" on page 407*.
`error`	General errors
`global_states`	User Space global state structures
`info`	General information
`inspect`	INSPECT code
`memory`	Memory allocation operations
`module`	Operations in the Context Management Interface / Infrastructure Loader module (initialization, module loading, calls to the module, contexts, and so on)
`parsers_is`	Module parsers infrastructure
`policy`	Policy installation
`sigload`	Signatures, patterns, ranges
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)

Flag	Instructions
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'CPAS' (Check Point Active Streaming)

Syntax:

```
g_fw ctl debug -m CPAS + {all | <List of Debug Flags>}
```

Flag	Instructions
`api`	Interface layer messages
`conns`	Detailed description of connections, and connection's limit-related messages
`cpconntim`	Information about internal timers
`error`	General errors
`events`	Event-related messages
`ftp`	Messages of the FTP example server
`glue`	Glue layer messages
`http`	Messages of the HTTP example server
`icmp`	Messages of the ICMP example server
`notify`	E-mail Messaging Security application
`pkts`	Packets handling messages (allocation, splitting, resizing, and so on)
`skinny`	Processing of Skinny Client Control Protocol (SCCP) connections
`sync`	Synchronization operations in cluster **Note** - Also see the debug flag "`sync`" in *"Module 'fw' (Firewall)" on page 415*.
`tcp`	TCP processing messages
`tcpinfo`	TCP processing messages - more detailed description
`timer`	Reports of internal timer ticks **Warning** - Prints many messages, without real content.
`warning`	General warnings

Module 'cpcode' (Data Loss Prevention - CPcode)

Syntax:

```
g_fw ctl debug -m cpcode + {all | <List of Debug Flags>}
```

Note - Also see:

- *"Module 'dlpda' (Data Loss Prevention - Download Agent for Content Awareness)" on page 408*
- *"Module 'dlpk' (Data Loss Prevention - Kernel Space)" on page 410*
- *"Module 'dlpuk' (Data Loss Prevention - User Space)" on page 411*

Flag	Instructions
`cplog`	Resolving of names and IP addresses for Check Point logs
`csv`	Creation of CSV files
`echo`	Prints the function that called the CPcode module
`error`	General errors
`init`	Initializing of CPcode system
`io`	Input / Output functionality for CPcode module
`ioctl`	IOCTL control messages to kernel
`kisspm`	Kernel Infrastructure Pattern Matcher
`memory`	Memory allocation operations
`persist`	Operations on persistence domains
`policy`	Policy operations
`run`	Policy operations
`url`	Operations on URLs
`vm`	Virtual Machine execution
`warning`	General warnings

Module 'dlpda' (Data Loss Prevention - Download Agent for Content Awareness)

Syntax:

```
g_fw ctl debug -m dlpda + {all | <List of Debug Flags>}
```

Note - Also see:

- *"Module 'cpcode' (Data Loss Prevention - CPcode)" on page 407*
- *"Module 'dlpk' (Data Loss Prevention - Kernel Space)" on page 410*
- *"Module 'dlpuk' (Data Loss Prevention - User Space)" on page 411*

Flag	Instructions
`address`	Information about connection's IP address
`cmi`	Context Management Interface / Infrastructure operations
`coverage`	Coverage times (entering, blocking, and time spent)
`ctx`	Operations on DLP context
`engine`	Content Awareness engine module
`error`	General errors
`filecache`	Content Awareness file caching
`info`	General information
`memory`	Memory allocation operations
`mngr`	*Currently is not used*
`module`	Initiation / removal of the Content Awareness infrastructure
`observer`	Classification Object (CLOB) observer (data classification)
`policy`	Content Awareness policy
`slowpath`	*Currently is not used*
`subject`	Prints the debug subject of each debug message

Flag	Instructions
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'dlpk' (Data Loss Prevention - Kernel Space)

Syntax:

```
g_fw ctl debug -m dlpk + {all | <List of Debug Flags>}
```

Note - Also see:

- *"Module 'cpcode' (Data Loss Prevention - CPcode)" on page 407*
- *"Module 'dlpda' (Data Loss Prevention - Download Agent for Content Awareness)" on page 408*
- *"Module 'dlpuk' (Data Loss Prevention - User Space)" on page 411*

Flag	Instructions
`cmi`	HTTP Proxy, connection redirection, identity information, Async
`drv`	DLP inspection
`error`	General errors
`identity`	User identity, connection identity, Async
`rulebase`	DLP rulebase match
`stat`	Counter statistics

Module 'dlpuk' (Data Loss Prevention - User Space)

Syntax:

```
g_fw ctl debug -m dlpuk + {all | <List of Debug Flags>}
```

Note - Also see:

- *"Module 'cpcode' (Data Loss Prevention - CPcode)" on page 407*
- *"Module 'dlpda' (Data Loss Prevention - Download Agent for Content Awareness)" on page 408*
- *"Module 'dlpk' (Data Loss Prevention - Kernel Space)" on page 410*

Flag	Instructions
`address`	Information about connection's IP address
`buffer`	*Currently is not used*
`coverage`	Coverage times (entering, blocking, and time spent)
`error`	General errors
`info`	General information
`memory`	Memory allocation operations
`module`	Initiation / removal of the Data Loss Prevention User Space modules' infrastructure
`policy`	*Currently is not used*
`serialize`	Data buffers and data sizes
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'fg' (FloodGate-1 - QoS)

Syntax:

```
g_fw ctl debug -m fg + {all | <List of Debug Flags>}
```

Flag	Instructions
`chain`	Tracing each packet through FloodGate-1 stages in the cookie chain
`chainq`	Internal Chain Queue mechanism - holding and releasing of packets during critical actions (policy installation and uninstall)
`classify`	Classification of connections to QoS rules
`conn`	Processing and identification of connection
`dns`	DNS classification mechanism
`drops`	Dropped packets due to WFRED policy
`dropsv`	Dropped packets due to WFRED policy - with additional debug information (verbose)
`error`	General errors
`flow`	Internal flow of connections (direction, interfaces, buffers, and so on)
`fwrate`	Rate statistics for each interface and direction
`general`	*Currently is not used*
`install`	Policy installation
`llq`	Low latency queuing
`log`	Everything related to calls in the log
`ls`	Processing of connections in ClusterXL in Load Sharing Mode
`memory`	Memory allocation operations
`multik`	Processing of connections in CoreXL
`pkt`	Packet recording mechanism
`policy`	QoS policy rules matching

Flag	Instructions
`qosaccel`	Acceleration of QoS traffic
`rates`	Rule and connection rates (IQ Engine behavior and status)
`rtm`	Failures in information gathering in the Real Time Monitoring module **Note** - Also see *"Module 'RTM' (Real Time Monitoring)" on page 441*.
`sched`	Basic scheduling information
`tcp`	TCP streaming (re-transmission detection) mechanism
`time`	*Currently is not used*
`timers`	Reports of internal timer ticks **Warning** - Prints many messages, without real content.
`url`	URL and URI for QoS classification
`verbose`	Prints additional information (used with other debug flags)

Module 'FILEAPP' (File Application)

Syntax:

```
g_fw ctl debug -m FILEAPP + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`coverage`	Coverage times (entering, blocking, and time spent)
`error`	General errors
`filetype`	Information about processing a file type
`global`	Allocation and creation of global object
`info`	General information
`memory`	Memory allocation operations
`module`	Operations in the FILEAPP module (initialization, module loading, calls to the module, and so on)
`normalize`	File normalization operations (internal operations)
`parser`	File parsing
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`upload`	File upload operations
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'fw' (Firewall)

Syntax:

```
g_fw ctl debug -m fw + {all | <List of Debug Flags>}
```

Flag	Instructions
`acct`	Accounting data in logs for Application Control (also enable the debug of *"Module 'APPI' (Application Control Inspection)" on page 398*)
`advp`	Advanced Patterns (signatures over port ranges) - runs under ASPII and CMI
`aspii`	Accelerated Stateful Protocol Inspection Infrastructure (INPSECT streaming)
`balance`	ConnectControl - logical servers in kernel, load balancing
`bridge`	Bridge mode
`caf`	Mirror and Decrypt feature - only mirror operations on all traffic
`cgnat`	Carrier Grade NAT (CGN/CGNAT)
`chain`	Connection Chain modules, cookie chain
`chainfwd`	Chain forwarding - related to cluster kernel parameter `fwha_perform_chain_forwarding`
`cifs`	Processing of Microsoft Common Internet File System (CIFS) protocol
`citrix`	Processing of Citrix connections
`cmi`	Context Management Interface / Infrastructure - IPS signature manager
`conn`	Processing of all connections
`connstats`	Connections statistics for Evaluation of Heavy Connections in CPView (see sk105762)
`content`	Anti-Virus content inspection
`context`	Operations on Memory context and CPU context in *"Module 'kiss' (Kernel Infrastructure)" on page 428*
`cookie`	Virtual de-fragmentation , cookie issues (cookies in the data structure that holds the packets)

Flag	Instructions
`corr`	Correction layer
`cptls`	CRYPTO-PRO Transport Layer Security (HTTPS Inspection) - Russian VPN GOST
`crypt`	Encryption and decryption of packets (algorithms and keys are printed in clear text and cipher text)
`cvpnd`	Processing of connections handled by the Mobile Access daemon
`dfilter`	Operations in the debug filters (see *"Kernel Debug Filters" on page 379*)
`dlp`	Processing of Data Loss Prevention connections
`dnstun`	DNS tunnels
`domain`	DNS queries
`dos`	DDoS attack mitigation (part of IPS)
`driver`	Check Point kernel attachment (access to kernel is shown as log entries)
`drop`	Reason for (almost) every dropped packet
`drop_tmpl`	Operations in Drop Templates
`dynlog`	Dynamic log enhancement (INSPECT logs)
`epq`	End Point Quarantine (also AMD)
`error`	General errors
`event`	Event App features (DNS, HTTP, SMTP, FTP)
`ex`	Expiration issues (time-outs) in dynamic kernel tables
`filter`	Packet filtering performed by the Check Point kernel and all data loaded into kernel
`ftp`	Processing of FTP Data connections (used to call applications over FTP Data - i.e., Anti-Virus)
`handlers`	Operations related to the Context Management Interface / Infrastructure Loader **Note** - Also see *"Module 'cmi_loader' (Context Management Interface / Infrastructure Loader)" on page 404*.

Flag	Instructions
`highavail`	Cluster configuration - changes in the configuration and information about interfaces during traffic processing
`hold`	Holding mechanism and all packets being held / released
`icmptun`	ICMP tunnels
`if`	interface-related information (accessing the interfaces, installing a filter on an interfaces)
`install`	Driver installation - NIC attachment (actions performed by the "`g_fw ctl install`" and "`g_fw ctl uninstall`" commands)
`integrity`	Integrity Client (enforcement cooperation)
`ioctl`	IOCTL control messages (communication between kernel and daemons, loading and unloading of the FireWall)
`ipopt`	Enforcement of IP Options
`ips`	IPS logs and IPS IOCTL
`ipv6`	Processing of IPv6 traffic
`kbuf`	Kernel-buffer memory pool (for example, encryption keys use these memory allocations)
`ld`	Kernel dynamic tables infrastructure (reads from / writes to the tables) ❗ **Warning** - Security Gateway can freeze or hang due to very high CPU load!.
`leaks`	Memory leak detection mechanism
`link`	Creation of links in Connections kernel table (ID 8158)
`log`	Everything related to calls in the log
`machine`	INSPECT Virtual Machine (actual assembler commands being processed) ❗ **Warning** - Security Gateway can freeze or hang due to very high CPU load!.
`mail`	Issues with e-mails over POP3, IMAP

Flag	Instructions
`malware`	Matching of connections to Threat Prevention Layers (multiple rulebases) **Note** - Also see *"Module 'MALWARE' (Threat Prevention)" on page 432*.
`media`	*Does not apply anymore* Only on Security Gateway that runs on Windows OS: Transport Driver Interface information (interface-related information)
`memory`	Memory allocation operations
`mgcp`	Media Gateway Control Protocol (complementary to H.323 and SIP)
`misc`	Miscellaneous helpful information (not shown with other debug flags)
`misp`	ISP Redundancy
`monitor`	Prints output similar to the "`fw monitor`" command (see the *R80.20 CLI Reference Guide*.) **Note** - Also enable the debug flag "`misc`" in this module.
`monitorall`	Prints output similar to the "`fw monitor -p all`" command (see the *R80.20 CLI Reference Guide*.) **Note** - Also enable the debug flag "`misc`" in this module.
`mrtsync`	Synchronization between cluster members of Multicast Routes that are added when working with Dynamic Routing Multicast protocols
`msnms`	MSN over MSMS (MSN Messenger protocol) Also always enable the debug flag '`sip`' in this module
`multik`	CoreXL-related **Note** - This debug flag enables all the debug flags in the *"Module 'multik' (Multi-Kernel Inspection - CoreXL)" on page 433*, except for the debug flag "`packet`".
`nac`	Network Access Control (NAC) feature in Identity Awareness
`nat`	NAT issues - basic information
`nat64`	NAT issues - 6in4 tunnels (IPv6 over IPv4) and 4in6 tunnels (IPv4 over IPv6)

Flag	Instructions
`netquota`	IPS protection "Network Quota"
`ntup`	Non-TCP / Non-UDP traffic policy (traffic parser)
`packet`	Actions performed on packets (like Accept, Drop, Fragment)
`packval`	Stateless verifications (sequences, fragments, translations and other header verifications)
`portscan`	Prevention of port scanning
`prof`	Connection profiler for Firewall Priority Queues (see sk105762)
`q`	Driver queue (for example, cluster synchronization operations) This debug flag is crucial for the debug of Check Point cluster synchronization issues
`qos`	QoS (FloodGate-1) **Note** - Also see *"Module 'fg' (FloodGate-1 - QoS)" on page 412*.
`rad`	Resource Advisor policy (for Application Control, URL Filtering, and others)
`route`	Routing issues This debug flag is crucial for the debug of ISP Redundancy issues
`sam`	Suspicious Activity Monitoring
`sctp`	Processing of Stream Control Transmission Protocol (SCTP) connections
`scv`	SecureClient Verification
`shmem`	*Currently is not used*
`sip`	VoIP traffic - SIP and H.323 **Note** - Also see: ■ *"Module 'h323' (VoIP H.323)" on page 423* ■ *"Module 'WS_SIP' (Web Intelligence VoIP SIP Parser)" on page 459*
`smtp`	Issues with e-mails over SMTP
`sock`	Sockstress TCP DoS attack (CVE-2008-4609)

Flag	Instructions
`span`	Monitor mode (mirror / span port)
`spii`	Stateful Protocol Inspection Infrastructure and INSPECT Streaming Infrastructure
`synatk`	IPS protection 'SYN Attack' (SYNDefender) ⓘ **Note** - Also see *"Module 'synatk' (Accelerated SYN Defender)" on page 446*.
`sync`	Synchronization operations in Check Point cluster ⓘ **Note** - Also see the debug flag "`sync`" in *"Module 'CPAS' (Check Point Active Streaming)" on page 406*.
`tcpstr`	TCP streaming mechanism
`te`	Prints the name of an interface for incoming connection from Threat Emulation Machine
`tlsparser`	*Currently is not used*
`ua`	Processing of Universal Alcatel "UA" connections
`ucd`	Processing of UserCheck connections in Check Point cluster
`user`	User Space communication with Kernel Space (most useful for configuration and VSX debug)
`utest`	*Currently is not used*
`vm`	Virtual Machine chain decisions on traffic going through the `fw_filter_chain`
`wap`	Processing of Wireless Application Protocol (WAP) connections
`warning`	General warnings
`wire`	Wire-mode Virtual Machine chain module
`xlate`	NAT issues - basic information
`xltrc`	NAT issues - additional information - going through NAT rulebase
`zeco`	Memory allocations in the Zero-Copy kernel module

Module 'gtp' (GPRS Tunneling Protocol)

Syntax:

```
g_fw ctl debug -m gtp + {all | <List of Debug Flags>}
```

Flag	Instructions
`create`	GTPv0 / GTPv1 create PDP context
`create2`	GTPv2 create session
`dbg`	GTP debug mechanism
`delete`	GTPv0 / GTPv1 delete PDP context
`delete2`	GTPv2 delete session
`error`	General GTP errors
`ioctl`	GTP IOCTL commands
`ld`	Operations with GTP kernel tables (addition, removal, modification of entries)
`log`	GTPv0 / GTPv1 logging
`log2`	GTPv2 logging
`modify`	GTPv2 modify bearer
`other`	GTPv0 / GTPv1 other messages
`other2`	GTPv2 other messages
`packet`	GTP main packet flow
`parse`	GTPv0 / GTPv1 parsing
`parse2`	GTPv2 parsing
`policy`	Policy installation
`state`	GTPv0 / GTPv1 dispatching
`state2`	GTPv2 dispatching
`sxl`	Processing of GTP connections in SecureXL

Flag	Instructions
`tpdu`	GTP T-PDU
`update`	GTPv0 / GTPv1 update PDP context

Module 'h323' (VoIP H.323)

Syntax:

```
g_fw ctl debug -m h323 + {all | <List of Debug Flags>}
```

Flag	Instructions
`align`	General VoIP debug messages (for example, VoIP infrastructure)
`cpas`	Debug messages about the CPAS TCP ⓘ **Important** - This debug flag is **not** included when you use the syntax "`g_fw ctl debug -m h323 all`"
`decode`	H.323 decoder messages
`error`	General errors
`h225`	H225 call signaling messages (`SETUP`, `CONNECT`, `RELEASE COMPLETE`, and so on)
`h245`	H245 control signaling messages (`OPEN LOGICAL CHANNEL`, `END SESSION COMMAND`, and so on)
`init`	Internal errors
`ras`	H225 RAS messages (`REGISTRATION`, `ADMISSION`, and `STATUS REQUEST / RESPONSE`)

Module 'ICAP_CLIENT' (Internet Content Adaptation Protocol Client)

Syntax:

```
g_fw ctl debug -m ICAP_CLIENT + {all | <List of Debug Flags>}
```

Flag	Instructions
address	Information about connection's IP address
blade	Internal operations in the ICAP Client module
coverage	Coverage times (entering, blocking, and time spent)
cpas	Check Point Active Streaming (CPAS) **Note** - Also see *"Module 'CPAS' (Check Point Active Streaming)" on page 406*.
daf_cmi	Mirror and Decrypt of HTTPS traffic - operations related to the Context Management Interface / Infrastructure Loader **Note** - Also see *"Module 'cmi_loader' (Context Management Interface / Infrastructure Loader)" on page 404*.
daf_module	Mirror and Decrypt of HTTPS traffic - operations related to the ICAP Client module
daf_policy	Mirror and Decrypt of HTTPS traffic - operations related to policy installation
daf_rulebase	Mirror and Decrypt of HTTPS traffic - operations related to rulebase
daf_tcp	Mirror and Decrypt of HTTPS traffic - internal processing of TCP connections
error	General errors
global	Global operations in the ICAP Client module
icap	Processing of ICAP connections
info	General information
memory	Memory allocation operations

Flag	Instructions
`module`	Operations in the ICAP Client module (initialization, module loading, calls to the module, and so on)
`policy`	Policy installation
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`trick`	Data Trickling mode
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'IDAPI' (Identity Awareness API)

Syntax:

```
g_fw ctl debug -m IDAPI + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`async`	Checking for known networks
`classifier`	Data classification
`clob`	Classification Object (CLOB) observer (data classification)
`coverage`	Coverage times (entering, blocking, and time spent)
`data`	Portal, IP address matching for Terminal Servers Identity Agent, session handling
`error`	General errors
`htab`	Checking for network IP address, working with kernel tables
`info`	General information
`log`	Various logs for internal operations
`memory`	Memory allocation operations
`module`	Removal of the Identity Awareness API debug module's infrastructure, failure to convert to Base64, failure to append Source to Destination, and so on
`observer`	Data classification observer
`subject`	Prints the debug subject of each debug message
`test`	IP test, Identity Awareness API synchronization
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System

Flag	Instructions
`warning`	General warnings

Module 'kiss' (Kernel Infrastructure)

Syntax:

```
g_fw ctl debug -m kiss + {all | <List of Debug Flags>}
```

Note - Also see *"Module 'kissflow' (Kernel Infrastructure Flow)" on page 431*.

Flag	Instructions
accel_pm	Accelerated Pattern Matcher
bench	CPU benchmark
connstats	Statistics for connections
cookie	Virtual de-fragmentation , cookie issues (cookies in the data structure that holds the packets)
dfa	Pattern Matcher (Deterministic Finite Automaton) compilation and execution
driver	Loading / unloading of the FireWall driver
error	General errors
flofiler	FLow prOFILER
ghtab	Multi-threaded safe global hash tables
ghtab_bl	Internal operations on global hash tables
handles	Memory pool allocation for tables
htab	Multi-threaded safe hash tables
htab_bl	Internal operations on hash tables
htab_bl_err	Errors and failures during internal operations on hash tables
htab_bl_exp	Expiration in hash tables
htab_bl_infra	Errors and failures during internal operations on hash tables

Flag	Instructions
`ioctl`	IOCTL control messages (communication between the kernel and daemons)
`kqstats`	Kernel Worker thread statistics (resetting, initializing, turning off)
`kw`	Kernel Worker state and Pattern Matcher inspection
`leak`	Memory leak detection mechanism
`memory`	Memory allocation operations
`memprof`	Memory allocation operations in the Memory Profiler (when the kernel parameter `fw_conn_mem_prof_enabled=1`)
`misc`	CPU counters, Memory counters, getting/setting of global kernel parameters
`mtctx`	Multi-threaded context - memory allocation, reference count
`packet`	Internal parsing operations on packets
`pcre`	Perl Compatible Regular Expressions (execution, memory allocation)
`pm`	Pattern Matcher compilation and execution
`pmdump`	Pattern Matcher DFA (dumping XMLs of DFAs)
`pmint`	Pattern Matcher compilation
`pools`	Memory pool allocation operations
`queue`	Kernel Worker thread queues
`rem`	Regular Expression Matcher - Pattern Matcher 2nd tier (slow path)
`salloc`	System Memory allocation
`shmem`	Shared Memory allocation
`sm`	String Matcher - Pattern Matcher 1st tier (fast path)
`stat`	Statistics for categories and maps
`swblade`	Registration of Software Blades
`thinnfa`	*Currently is not used*

Flag	Instructions
thread	Kernel thread that supplies low level APIs to the kernel thread
timers	Internal timers
usrmem	User Space platform memory usage
vbuf	Virtual buffer
warning	General warnings
worker	Kernel Worker - queuing and dequeuing

Module 'kissflow' (Kernel Infrastructure Flow)

Syntax:

```
g_fw ctl debug -m kissflow + {all | <List of Debug Flags>}
```

Note - Also see *"Module 'kiss' (Kernel Infrastructure)" on page 428*.

Flag	Instructions
`compile`	Pattern Matcher (pattern compilation)
`dfa`	Pattern Matcher (Deterministic Finite Automaton) compilation and execution
`error`	General errors
`memory`	Memory allocation operations
`pm`	Pattern Matcher - general information
`warning`	General warnings

Module 'MALWARE' (Threat Prevention)

Syntax:

```
g_fw ctl debug -m MALWARE + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`av`	*Currently is not used*
`coverage`	Coverage times (entering, blocking, and time spent)
`error`	General errors
`global`	Prints parameters from the `$FWDIR/conf/mail_security_config` file
`info`	General information
`ioc`	Operations on Indicators of Compromise (IoC)
`memory`	*Currently is not used*
`module`	Removal of the MALWARE module's debug infrastructure
`policy`	Policy installation
`subject`	Prints the debug subject of each debug message
`te`	*Currently is not used*
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'multik' (Multi-Kernel Inspection - CoreXL)

Syntax:

```
g_fw ctl debug -m multik + {all | <List of Debug Flags>}
```

Note - When you enable the debug flag 'multik' in the *"Module 'fw' (Firewall)" on page 415*, it enables all the debug flags in this debug module, except for the debug flag 'packet'.

Flag	Instructions
api	Registration and unregistration of cross-instance function calls
cache_tab	Cache table infrastructure
conn	Creation and deletion of connections in the dispatcher table
counter	Cross-instance counter infrastructure
error	General errors
event	Cross-instance event aggregation infrastructure
fwstats	Firewall statistics
ioctl	Distribution of IOCTLs to different CoreXL Firewall instances
lock	Obtaining and releasing the fw_lock on multiple CoreXL Firewall instances
message	Cross-instance messages (used for local sync and port scanning)
packet	For each packet, shows the CoreXL SND dispatching decision (CoreXL Firewall instance and reason)
packet_err	Invalid packets, for CoreXL SND could not make a dispatching decision
prio	Firewall Priority Queues (refer to sk105762)
queue	Packet queue
quota	Cross-instance quota table (used by the Network Quota feature)
route	Routing of packets

Flag	Instructions
`state`	Starting and stopping of CoreXL Firewall instances, establishment of relationship between CoreXL Firewall instances
`temp_conns`	Temporary connections
`uid`	Cross-instance Unique IDs
`vpn_multik`	MultiCore VPN (see sk118097)

Module 'MUX' (Multiplexer for Applications Traffic)

R80.20 introduced a new layer between the Streaming layer and the Applications layer - MUX (Multiplexer).

Applications are registered to the Streaming layer through the MUX layer.

The MUX layer chooses to work over PSL (passive streaming) or CPAS (active streaming).

Syntax:

```
g_fw ctl debug -m MUX + {all | <List of Debug Flags>}
```

Flag	Instructions
`active`	CPAS (active streaming) ⓘ **Note** - Also see *"Module 'CPAS' (Check Point Active Streaming)" on page 406*.
`advp`	Advanced Patterns (signatures over port ranges)
`api`	API calls
`comm`	Information about opening and closing of connections
`error`	General errors
`http_disp`	HTTP Dispatcher
`misc`	Miscellaneous helpful information (not shown with other debug flags)
`passive`	PSL (passive streaming) ⓘ **Note** - Also see *"Module 'PSL' (Passive Streaming Library)" on page 439*.
`proxy_tp`	Proxy tunnel parser
`stream`	General information about the data stream
`test`	*Currently is not used*
`tier1`	Pattern Matcher 1st tier (fast path)
`tls`	General information about the TLS
`tlsp`	TLS parser

Flag	Instructions
`tol`	Test Object List algorithm (to determine whether an application is malicious or not)
`udp`	UDP parser
`warning`	General warnings
`ws`	Web Intelligence

Module 'NRB' (Next Rule Base)

Syntax:

```
g_fw ctl debug -m NRB + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`appi`	Rules and applications **Note** - Also see *"Module 'APPI' (Application Control Inspection)" on page 398*.
`coverage`	Coverage times (entering, blocking, and time spent)
`dlp`	Data Loss Prevention **Note** - Also see: ▪ *"Module 'dlpda' (Data Loss Prevention - Download Agent for Content Awareness)" on page 408* ▪ *"Module 'dlpk' (Data Loss Prevention - Kernel Space)" on page 410* ▪ *"Module 'dlpuk' (Data Loss Prevention - User Space)" on page 411*
`error`	General errors
`info`	General information
`match`	Rule matching
`memory`	Memory allocation operations
`module`	Operations in the NRB module (initialization, module loading, calls to the module, contexts, and so on)
`policy`	Policy installation
`sec_rb`	Security rulebase
`session`	Session layer
`ssl_insp`	HTTPS Inspection
`subject`	Prints the debug subject of each debug message

Flag	Instructions
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'PSL' (Passive Streaming Library)

Syntax:

```
g_fw ctl debug -m PSL + {all | <List of Debug Flags>}
```

Note - Also see *"Module 'MUX' (Multiplexer for Applications Traffic)" on page 435*.

Flag	Instructions
`error`	General errors
`pkt`	Processing of packets
`tcpstr`	Processing of TCP streams
`seq`	Processing of TCP sequence numbers
`warning`	General warnings

Module 'RAD_KERNEL' (Resource Advisor - Kernel Space)

Syntax:

```
g_fw ctl debug -m RAD_KERNEL + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`cache`	RAD kernel malware cache
`coverage`	Coverage times (entering, blocking, and time spent)
`error`	General errors
`global`	RAD global context
`info`	General information
`memory`	Memory allocation operations
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'RTM' (Real Time Monitoring)

Syntax:

```
g_fw ctl debug -m RTM + {all | <List of Debug Flags>}
```

Flag	Instructions
`accel`	Prints SecureXL information about the accelerated packets, connections, and so on
`chain`	Prints information about chain registration and about the E2E (Virtual Link) chain function actions **Note** - This important debug flag helps you know, whether the E2E identifies the Virtual Link packets
`con_conn`	Prints messages for each connection (when a new connection is handled by the RTM module) The same debug flags as '`per_conn`'
`driver`	Check Point kernel attachment (access to kernel is shown as log entries)
`err`	General errors
`import`	Importing of the data from other kernel modules (FireWall, QoS)
`init`	Initialization of the RTM module
`ioctl`	IOCTL control messages
`netmasks`	Information about how the RTM handles netmasks, if you are monitoring an object of type Network
`per_conn`	Prints messages for each connection (when a new connection is handled by the RTM module) The same debug flags as '`con_conn`'
`per_pckt`	Prints messages for each packet (when a new packet arrives) **Warning** - Prints many messages, which increases the load on the CPU
`performance`	*Currently is not used*
`policy`	Prints messages about loading and unloading on the FireWall module (indicates that the RTM module received the FireWall callback)

Flag	Instructions
`rtm`	Real time monitoring
`s_err`	General errors about kernel tables and other failures
`sort`	Sorting of "Top XXX" counters
`special`	Information about how the E2E modifies the E2ECP protocol packets
`tabs`	*Currently is not used*
`topo`	Calculation of network topography
`view_add`	Adding or deleting of a View
`view_update`	Updating of Views with new information
`view_update1`	Updating of Views with new information
`wd`	WebDefense views

Module 'seqvalid' (TCP Sequence Validator and Translator)

Syntax:

```
g_fw ctl debug -m seqvalid + {all | <List of Debug Flags>}
```

Flag	Instructions
`error`	General errors
`seqval`	TCP sequence validation and translation
`sock`	*Currently is not used*
`warning`	General warnings

Module 'SFT' (Stream File Type)

Syntax:

```
g_fw ctl debug -m SFT + {all | <List of Debug Flags>}
```

Flag	Instructions
`error`	General errors
`fatal`	Fatal errors
`info`	General information
`mgr`	Rule match, database, connection processing, classification
`warning`	General warnings

Module 'SGEN' (Struct Generator)

Syntax:

```
g_fw ctl debug -m SGEN + {all | <List of Debug Flags>}
```

Flag	Instructions
`engine`	Struct Generator engine operations on objects
`error`	General errors
`fatal`	Fatal errors
`field`	Operations on fields
`general`	General types macros
`info`	General information
`load`	Loading of macros
`serialize`	Serialization while loading the macros
`warning`	General warnings

Module 'synatk' (Accelerated SYN Defender)

For additional information, see *"Accelerated SYN Defender" on page 39*.

Syntax:

```
g_fw ctl debug -m synatk + {all | <List of Debug Flags>}
```

Flag	Instructions
`cookie`	TCP SYN Cookie
`error`	General errors
`radix_dump`	Dump of the radix tree
`radix_match`	Matched items in the radix tree
`radix_modify`	Operations in the radix tree
`warning`	General warnings

Module 'UC' (UserCheck)

Syntax:

```
g_fw ctl debug -m UC + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`coverage`	Coverage times (entering, blocking, and time spent)
`error`	General errors
`htab`	Hash table
`info`	General information
`memory`	Memory allocation operations
`module`	Operations in the UserCheck module (initialization, UserCheck table hits, finding User ID in cache, removal of UserCheck debug module's infrastructure)
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings
`webapi`	URL patterns, UserCheck incidents, connection redirection

Module 'UP' (Unified Policy)

Syntax:

```
g_fw ctl debug -m UP + {all | <List of Debug Flags>}
```

Note - Also see:

- *"Module 'upconv' (Unified Policy Conversion)" on page 450*
- *"Module 'UPIS' (Unified Policy Infrastructure)" on page 451*

Flag	Instructions
`account`	*Currently is not used*
`address`	Information about connection's IP address
`btime`	*Currently is not used*
`clob`	Classification Object (CLOB) observer (data classification)
`connection`	Information about connections, transactions
`coverage`	Coverage times (entering, blocking, and time spent)
`error`	General errors
`info`	General information
`limit`	Unified Policy download and upload limits
`log`	Some logging operations
`mab`	Mobile Access handler
`manager`	Unified Policy manager operations
`match`	Classification Object (CLOB) observer (data classification)
`memory`	Memory allocation operations
`module`	Operations in the Unified Policy module (initialization, module loading, calls to the module, and so on)
`policy`	Unified Policy internal operations
`prob`	*Currently is not used*

Flag	Instructions
`prob_impl`	Implied matched rules
`rulebase`	Unified Policy rulebase
`sec_rb`	Secondary NRB rulebase operations
`stats`	Statistics about connections, transactions
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`urlf_ssl`	*Currently is not used*
`verbose`	Prints additional information (used with other debug flags)
`vpn`	VPN classifier
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'upconv' (Unified Policy Conversion)

Syntax:

```
g_fw ctl debug -m upconv + {all | <List of Debug Flags>}
```

Note - Also see:

- *"Module 'UP' (Unified Policy)" on page 448*
- *"Module 'UPIS' (Unified Policy Infrastructure)" on page 451*

Flag	Instructions
`error`	General errors
`info`	General information
`map`	UTF-8 and UTF-16 characters conversion
`mem`	Prints how much memory is used for character sets
`tree`	Lookup of characters
`utf7`	Conversion of UTF-7 characters to a Unicode characters
`utf8`	Conversion of UTF-8 characters to a Unicode characters
`warning`	General warnings

Module 'UPIS' (Unified Policy Infrastructure)

Syntax:

```
g_fw ctl debug -m UPIS + {all | <List of Debug Flags>}
```

Note - Also see:

- *"Module 'UP' (Unified Policy)" on page 448*
- *"Module 'upconv' (Unified Policy Conversion)" on page 450*

Flag	Instructions
address	Information about connection's IP address
clob	Classification Object (CLOB) observer (data classification)
coverage	Coverage times (entering, blocking, and time spent)
cpdiag	CPDiag operations
crumbs	*Currently is not used*
db	SQLite Database operations
error	General errors
fwapp	Information about policy installation for the FireWall application
info	General information
memory	Memory allocation operations
mgr	Policy installation manager
module	Operations in the Unified Policy Infrastructure module (initialization, module loading, calls to the module, and so on)
mutex	Unified Policy internal mutex operations
policy	Unified Policy Infrastructure internal operations
report	Various reports about Unified Policy installations
sna	Operations on SnA objects ("Services and Application")
subject	Prints the debug subject of each debug message

Flag	Instructions
`tables`	Operations on kernel tables
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`topo`	Information about topology and Anti-Spoofing of interfaces; about Address Range objects
`upapp`	Information about policy installation for Unified Policy application
`update`	Information about policy installation for CMI Update application
`verbose`	Prints additional information (used with other debug flags)
`vpn`	VPN classifier
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'VPN' (Site-to-Site VPN and Remote Access VPN)

Syntax:

```
g_fw ctl debug -m VPN + {all | <List of Debug Flags>}
```

Flag	Instructions
`cluster`	Events related to cluster
`comp`	Compression for encrypted connections
`counters`	Various status counters (typically for real-time Monitoring)
`cphwd`	Traffic acceleration issues (in hardware)
`driver`	Check Point kernel attachment (access to kernel is shown as log entries)
`err`	Errors that should not happen, or errors that critical to the working of the VPN module
`gtp`	Processing of GPRS Tunneling Protocol (GTP) connections **Note** - Also see *"Module 'gtp' (GPRS Tunneling Protocol)" on page 421*.
`ifnotify`	Notifications about the changes in interface status - up or down (as received from OS)
`ike`	Enables all IKE kernel debug in respect to moving the IKE to the interface, where it will eventually leave and the modification of the source IP of the IKE packet, depending on the configuration
`init`	Initializes the VPN kernel and kernel data structures, when kernel is up, or when policy is installed (it will also print the values of the flags that are set using the `CPSET` upon policy reload)
`l2tp`	Processing of L2TP connections
`lsv`	Large Scale VPN (LSV)
`mem`	Allocation of VPN pools and VPN contexts
`mspi`	Information related to creation and destruction of MSA / MSPI
`multicast`	VPN multicast
`multik`	information related to interaction between VPN and CoreXL

Flag	Instructions
`nat`	NAT issues , cluster IP manipulation (Cluster Virtual IP address <=> Member IP address)
`om_alloc`	Allocation of Office Mode IP addresses
`osu`	Cluster Optimal Service Upgrade (see sk107042)
`packet`	Events that can happen for every packet, unless covered by more specific debug flags
`pcktdmp`	Prints the encrypted packets before the encryption Prints the decrypted packets after the decryption
`policy`	Events that can happen only for a special packet in a connection, usually related to policy decisions or logs / traps
`queue`	Handling of Security Association (SA) queues
`rdp`	Processing of Check Point RDP connections
`ref`	Reference counting for MSA / MSPI, when storing or deleting Security Associations (SAs)
`resolver`	VPN Link Selection table and Certificate Revocation List (CRL), which is also part of the peer resolving mechanism
`rsl`	Operations on Range Skip List
`sas`	Information about keys and Security Associations (SAs)
`sr`	SecureClient / SecureRemote related issues
`tagging`	Sets the VPN policy of a connection according to VPN communities, VPN Policy related information
`tcpt`	Information related to TCP Tunnel (Visitor mode - FireWall traversal on TCP port 443)
`tnlmon`	VPN tunnel monitoring
`topology`	VPN Link Selection
`vin`	*Does not apply anymore* Only on Security Gateway that runs on Windows OS: Information related to IPSec NIC interaction
`warn`	General warnings

Flag	Instructions
`xl`	*Does not apply anymore* Interaction with Accelerator Cards (AC II / III / IV)

Module 'WS' (Web Intelligence)

Syntax:

```
g_fw ctl debug -m WS + {all | <List of Debug Flags>}
```

Notes:

- Also see *"Module 'WSIS' (Web Intelligence Infrastructure)" on page 461*.
- To print information for all Virtual Systems in the debug output, before you start the kernel debug, set this kernel parameter on the VSX Gateway or each VSX Cluster Member (this is the default behavior):

  ```
  g_fw ctl set int ws_debug_vs 0
  ```
- To print information for a specific Virtual System in the debug output, before you start the kernel debug, set this kernel parameter on the VSX Gateway or each VSX Cluster Member:

  ```
  g_fw ctl set int ws_debug_vs <VSID>
  ```
- To print information for all IPv4 addresses in the debug output, before you start the kernel debug, set this kernel parameter on the VSX Gateway or each VSX Cluster Member (this is the default behavior):

  ```
  g_fw ctl set int ws_debug_ip 0
  ```
- To print information for a specific IPv4 address in the debug output, before you start the kernel debug, set this kernel parameter on the VSX Gateway or each VSX Cluster Member:

  ```
  g_fw ctl set int ws_debug_ip <XXX.XXX.XXX.XXX>
  ```

Flag	Instructions
`address`	Information about connection's IP address
`body`	HTTP body (content) layer
`connection`	Connection layer
`cookie`	HTTP cookie header
`coverage`	Coverage times (entering, blocking, and time spent)
`crumb`	*Currently is not used*
`error`	General errors (the connection is probably rejected)
`event`	Events
`fatal`	Fatal errors

Flag	Instructions
`flow`	*Currently is not used*
`global`	Handling of global structure (usually, related to policy)
`info`	General information
`ioctl`	IOCTL control messages (communication between the kernel and daemons, loading and unloading of the FireWall)
`mem_pool`	Memory pool allocation operations
`memory`	Memory allocation operations
`module`	Operations in the Web Intelligence module (initialization, module loading, calls to the module, policy loading, and so on)
`parser`	HTTP header parser layer
`parser_err`	HTTP header parsing errors
`pfinder`	Pattern finder
`pkt_dump`	Packet dump
`policy`	Policy (installation and enforcement)
`regexp`	Regular Expression library
`report_mgr`	Report manager (errors and logs)
`session`	Session layer
`spii`	Stateful Protocol Inspection Infrastructure (INSPECT streaming)
`ssl_insp`	HTTPS Inspection
`sslt`	SSL Tunneling (SSLT)
`stat`	Memory usage statistics
`stream`	Stream virtualization
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')

Flag	Instructions
`uuid`	Session UUID
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'WS_SIP' (Web Intelligence VoIP SIP Parser)

Syntax:

```
g_fw ctl debug -m WS_SIP + {all | <List of Debug Flags>}
```

Flag	Instructions
`address`	Information about connection's IP address
`body`	HTTP body (content) layer
`connection`	Connection layer
`cookie`	HTTP cookie header
`coverage`	Coverage times (entering, blocking, and time spent)
`crumb`	*Currently is not used*
`error`	General errors
`event`	Events
`fatal`	Fatal errors
`flow`	*Currently is not used*
`global`	Handling of global structure (usually, related to policy)
`info`	General information
`ioctl`	IOCTL control messages (communication between the kernel and daemons, loading and unloading of the FireWall)
`mem_pool`	Memory pool allocation operations
`memory`	Memory allocation operations
`module`	Operations in the Web Intelligence VoIP SIP Parser module (initialization, module loading, calls to the module, policy loading, and so on)
`parser`	HTTP header parser layer
`parser_err`	HTTP header parsing errors
`pfinder`	Pattern finder

Flag	Instructions
`pkt_dump`	Packet dump
`policy`	Policy (installation and enforcement)
`regexp`	Regular Expression library
`report_mgr`	Report manager (errors and logs)
`session`	Session layer
`spii`	Stateful Protocol Inspection Infrastructure (INSPECT streaming)
`ssl_insp`	HTTPS Inspection
`sslt`	SSL Tunneling (SSLT)
`stat`	Memory usage statistics
`stream`	Stream virtualization
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`uuid`	Session UUID
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings

Module 'WSIS' (Web Intelligence Infrastructure)

Syntax:

```
g_fw ctl debug -m WSIS + {all | <List of Debug Flags>}
```

Note - Also see *"Module 'WS' (Web Intelligence)" on page 456*.

Flag	Instructions
`address`	Information about connection's IP address
`cipher`	*Currently is not used*
`common`	Prints a message, when parameters are invalid
`coverage`	Coverage times (entering, blocking, and time spent)
`crumb`	*Currently is not used*
`datastruct`	Data structure tree
`decoder`	Decoder for the content transfer encoding (UUEncode, UTF-8, HTML encoding &#)
`dump`	Packet dump
`error`	General errors
`flow`	*Currently is not used*
`info`	General information
`memory`	Memory allocation operations
`parser`	HTTP header parser layer
`subject`	Prints the debug subject of each debug message
`timestamp`	Prints the timestamp for each debug message (changes when you enable the debug flag '`coverage`')
`verbose`	Prints additional information (used with other debug flags)
`vs`	Prints the VSID of the debugged Virtual System
`warning`	General warnings