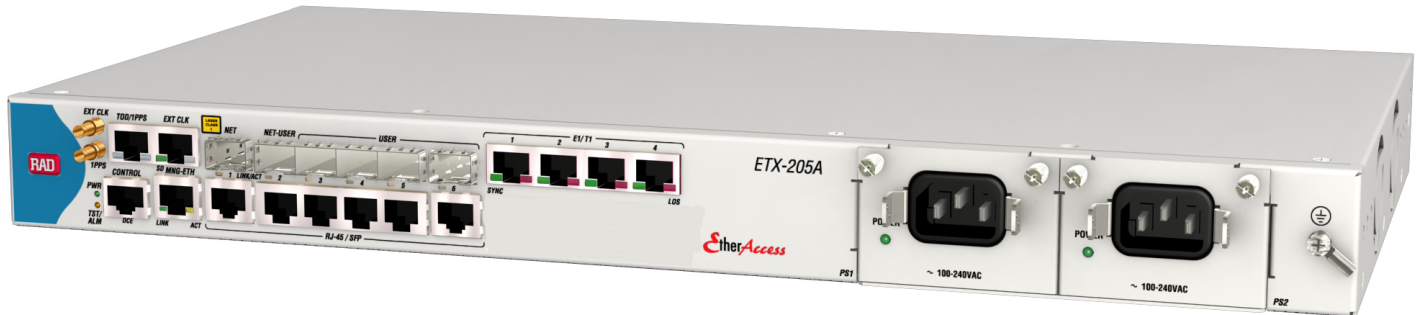


ETX-205A

Carrier Ethernet Demarcation Device



Demarcation point for
SLA-based Ethernet
business services and
mobile backhaul



- Multirate FE/GbE combo ports and E1/T1 ports allow flexible service offering in one unit for capex and opex savings
- Flow-based traffic management with H-QOS per EVC for SLA enforcement at customer premises, enabling MEF-certified EPL and EVPL services
- Ethernet OAM and performance monitoring at wire speed, for reliable and accurate SLA monitoring, enabling efficient diagnostics and troubleshooting
- Enhanced RFC-2544 analyzer for SLA verification, ensuring customer satisfaction immediately after turn-up
- Synchronous Ethernet and IEEE-1588v2 PTP, seamlessly bridging synchronization domains

The ETX-205A Carrier Ethernet demarcation device offers Ethernet demarcation functionality for business services as well as cell-site gateway functionality for 2G, 3G, and 4G/LTE mobile backhauling applications. It provides end-to-end service control and performance management across packet networks.

The device delivers SLA-based business services to the customer premises over native Ethernet interfaces, terminating over any type of packet network.

ETX-205A transports up to five Gbps of user traffic while ensuring SDH/SONET-like performance and Five Nines reliability.

ETX-205A delivers IP VPN, VoIP, and dedicated Internet access over the same physical link as a Layer-2 LAN-to-LAN service, all with differentiated quality of service and end-to-end monitoring. It can also deliver E1, T1, and NxDSO circuits.

Incorporating RAD's SyncToP™ synchronization and timing over packet feature set, ETX-205A utilizes standard technologies to ensure highly accurate phase and frequency recovery and distribution over both the physical and packet layers.



data communications
The Access Company

ETX-205A

Carrier Ethernet Demarcation Device

All ETX-205A units are equipped with SFP/copper combo Ethernet ports, enabling flexible mixture of fiber optic and copper interfaces in one device. The SFP ports accommodate a wide range of Fast Ethernet and Gigabit Ethernet SFP transceivers, allowing service providers to seamlessly connect customers located at different distances from the device.

MARKET SEGMENTS AND APPLICATIONS

ETX-205A is used in the following applications:

- Ethernet demarcation device – ETX-205A separates the service provider network, the access provider network, and the customer network, providing proactive service monitoring and easy fault localization for Ethernet and pseudowire services throughout the entire network (see *Figure 1*)

- Mobile demarcation device – ETX-205A is installed at the operator tower and controller sites equipped with Ethernet and PDH ports, connecting the 2G/3G/4G/LTE NodeB or eNodeB to the packet network, providing sophisticated synchronization and traffic management as well as service assurance capabilities, including proactive service monitoring and fault identification throughout the entire network (see *Figure 2*).

ETHERNET

Classification

Traffic is mapped to the Ethernet flows using very flexible classification criteria based on incoming port (port-based all-to-one bundling), VLAN ID, VLAN priority, IP precedence, DSCP, Ethertype, and IP/MAC source/destination address. Classification is defined for both VLAN tagged as well as untagged traffic.

Layer-2 Control Processing

The device can be configured to pass through Layer-2 control frames (including other vendors' L2CP frames, and with

optional MAC change) across the network, to peer supported protocols (IEEE 802.3-2005 and LACP), or to discard the L2CP frames.

ETX-205A provides LACP transparency by translating LACP traffic to L2PT inside the network, thus enabling end-to-end link aggregation.

OAM

Featuring ultra fast, hardware-powered processing, ETX-205A performs OAM and PM measurements in line rate with maximum precision, offering the following powerful benefits:

- Immediate detection of loss of continuity (LOC), ensuring under 50 ms protection switching
- Highly accurate frame loss measurements of live traffic
- Flow-level (per CoS) monitoring, enabling simultaneous processing of multiple OAM sessions with E-LAN and E-Tree support
- Non-disruptive MAC and IP level loopback testing of network integrity.

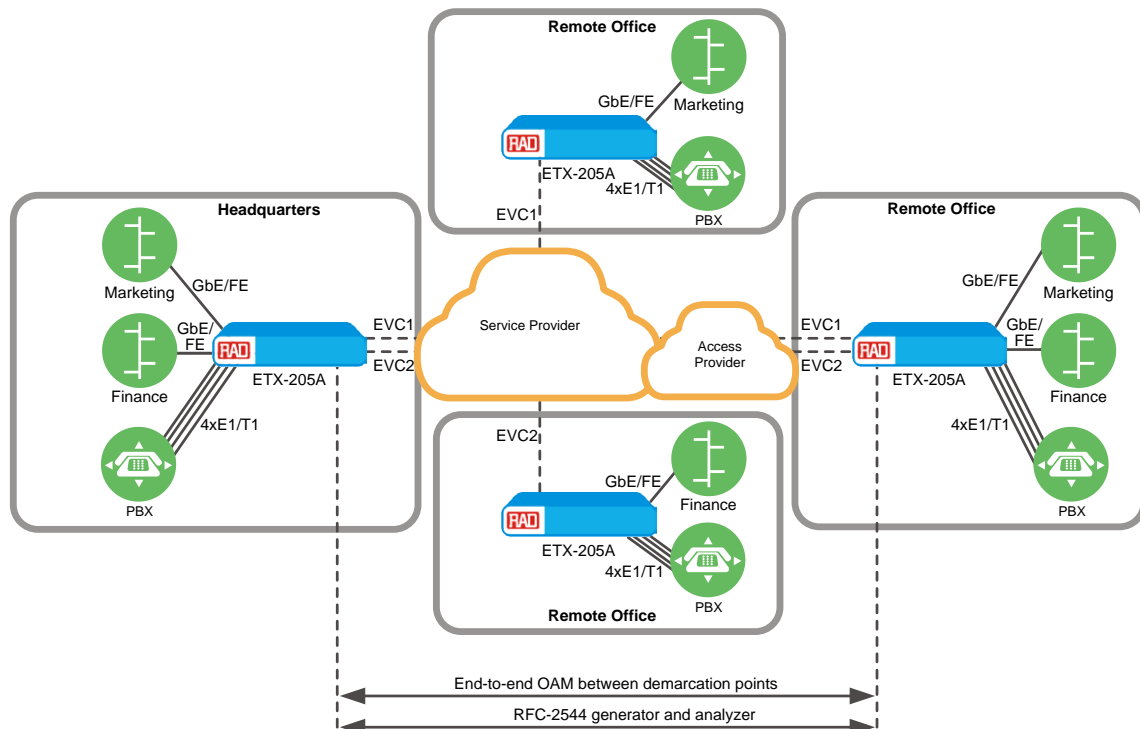


Figure 1. Ethernet Demarcation Device

ETX-205A provides these types of Ethernet OAM:

- Single-segment (link) OAM according to IEEE 802.3-2005 for remote management and fault indication, including remote loopback, dying gasp with SNMP trap, and MIB parameter retrieval. Active and passive mode are supported.
- End-to-end connectivity OAM based on IEEE 802.1ag that enables Ethernet service providers to monitor their services proactively and guarantee that customers receive the contracted SLA
- End-to-end service and performance monitoring based on ITU-T Y.1731. Fault monitoring and end-to-end performance measurement include delay, delay variation, frame loss and availability.

Traffic Management/QoS

Different service types require different levels of QoS to be provided end-to-end. QoS can be defined per subscriber as well as per service. QoS has three aspects: rate limitation, traffic shaping, and traffic prioritization.

Traffic policing is applied per flow or group of flows, and operates according to the dual token bucket mechanism based on user-configurable CIR + CBS and EIR + EBS. Traffic can be limited to the line rate or the data rate.

Forwarding

Every flow per EVC or EVC.cos has its own queues and scheduler supporting strict priority and weighted fair queues (WFQ). Queue blocks of eight queues per EVC are scheduled and shaped, forming an H-QoS model with shaped services and prioritized classes of service. The WRED mechanism is used for smart packet drop.

Smart SFPs

Integrated management of MiRiCi smart SFPs provides TDM (E1/T1/E3/T3/OC-3/STM-1) connectivity over PDH or SDH legacy networks. ETX-205A supports configuration and statistic collection for the smart SFP TDM port.

E1/T1 PSEUDOWIRE

Services

ETX-205A enables delivery of legacy TDM services over packet networks.

Encapsulation

TDM traffic can be encapsulated in the following modes:

- CESoPSN – CES (Circuit Emulation Services) over PSN, for framed E1/T1 traffic, per IETF RFC 5086
- SAToP – Structure-Agnostic TDM over Packet, for unframed E1/T1 traffic, per IETF RFC 4553.

The encapsulated pseudowire connections can be transmitted over the following types of PSN transport networks:

- UDP/IP (UDP over IP)
- MEF 8 (Ethernet).

OAM

The following TDM OAM is provided:

- Connectivity verification.
- PW parameter validation
- Delay measurements with 1µsec resolution

Forwarding

ETX-205A forwards MEF-8 PW bundles via Layer 2 (E-Line). The device forwards UDP/IP PW bundles via Layer 3.

Quality of Service (QoS)

The quality of service prioritization technique for E1/T1 pseudowire differs according to the transport network type:

- MEF 8 – Outgoing pseudowire packets can be assigned to a queue directly. Priority is also defined by means of Layer-2 p-bit marking
- UDP/IP – Outgoing pseudowire packets can be assigned a ToS value that defines the egress priority queue and the Layer-2 p-bit marking. The priority queue of the egress router interface can be assigned directly or via DSCP. Additionally, the Layer-2 p-bit marking can be done via DSCP value or assigned directly.

ETX-205A

Carrier Ethernet Demarcation Device

RESILIENCY

Dying Gasp

ETX-205A reports power failures to defined network management stations by sending an IEEE 802.3-2005 message or SNMP trap, thus enabling the unit to properly disconnect from the network with notification of the reason for the service problem.

Fault Propagation

The unit provides a user-configurable fault propagation mechanism in the network-to-user or user-to-network direction.

When a link failure is detected or OAM failure received, ETX-205A can shut down the affected port or forward the OAM failure message. The fault propagation mechanism enables routers and switches connected to both ends of the link to reroute the traffic to the redundancy path.

Link Protection

ETX-205A provides the following network interface protection modes:

- 802.3ad link aggregation (LAG), providing 1:1 link protection with Link Aggregation Control Protocol (LACP) support
- Dual homing (1:1), allowing ETX-205A units to be connected to two different upstream devices.

Ethernet Path Protection

ETX-205A applies standard ITU-T G.8031 Ethernet Linear Protection switching for fast protection of one or more EVCs from end to end. The standard implementation ensures interoperability with third-party devices. With standard APS functionality, Ethernet OAM messages provide bandwidth-efficient unidirectional or bidirectional 1:1 protection.

The EVC protection path can be configured on the same network port, enabling the transport network to provide an alternative path for the working and protecting paths. It can also be configured on separate network ports, adding protection at the access layer and enabling load balancing on network interfaces by splitting traffic between the two network ports.

The performance of the hardware-based Ethernet OAM together with protection switching for physical layer failure ensures fast protection in any scenario.

The flow level protection provides a full set of manual commands for maintenance purposes.

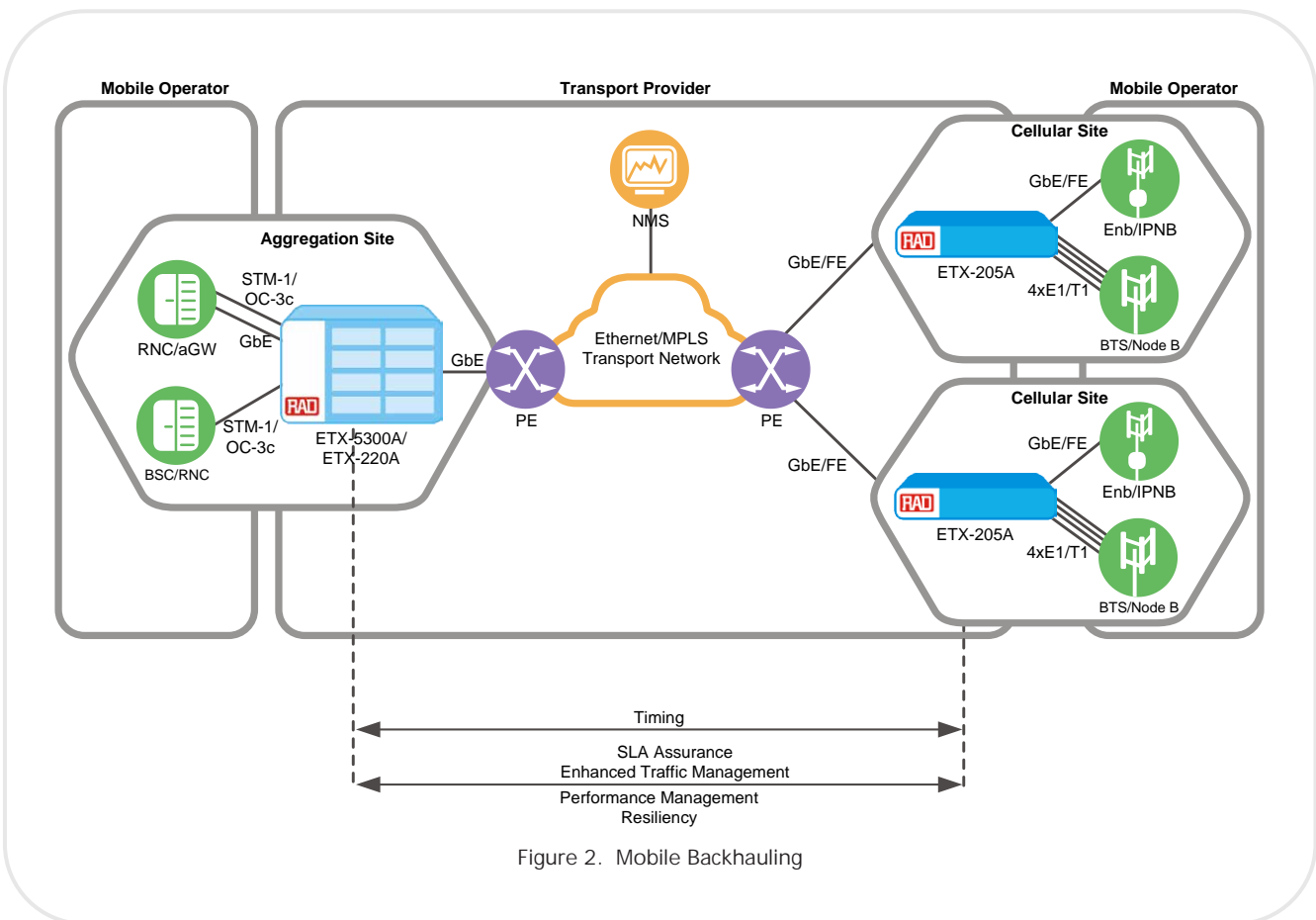


Figure 2. Mobile Backhauling

TIMING AND SYNCHRONIZATION

ETX-205A implements the RAD SyncTop™ synchronization suite (see *Figure 2*), allowing cellular backhaul providers to meet the necessary synchronization requirements without the need to invest in dedicated timing equipment at every base station. ETX-205A timing features include:

- Synchronous Ethernet (SyncE) per ITU-T G.8261-G.8264
- IEEE 1588v2 Precision Time Protocol, slave, working in the following modes:
 - Frequency –Slave reconstructs remote clock using sync and delay request/response from master to slave (no time-related status/alarms, or TOD)
 - Time –Slave uses regenerated frequency, A high-quality (PRC/PRS) CSM clock improves the time reconstruction. Time-related status/alarms and TOD are provided
 - Frequency and time – Slave provides time information in addition to frequency.
- IEEE 1588v2 Precision Time Protocol transparent clock with hardware-based time stamping as well as ToD (time of day) synchronization
- External clock in/out interfaces (T3/T4) supporting 2.048 MHz and E1 frequencies
- 1 PPS signal phase and 10 MHz frequency input/output
- Primary/secondary clock redundancy with stratum 3/3E holdover performance.

Transmit Clock Signal

The E1/T1 transmit clock source can be one of the following:

- **loopback** –Clock is retrieved from the port's incoming (Rx) data
- **internal** – Clock is provided by system internal oscillator

- **domain** – Clock is provided by clock domain (relevant only for SYE or PTP option)
- **pw** – Clock is provided by PW bundle (relevant only for SYE or PTP option). The PW source clock quality is limited to the following:
 - Stratum 1/2 (default)
 - Stratum 3E
 - Stratum 3
 - Stratum 4.

MANAGEMENT AND SECURITY

The following security protocols are provided by ETX-205A to ensure client server communication privacy and correct user authentication:

- SNMPv3
- RADIUS (client authentication)
- TACACS+ (client authentication, authorization, and accounting)
- SSH (secure shell communication session)
- SFTP (secure file transfer).

Command Line Interface (CLI)

Databases and scripts of commonly used commands can be easily created and applied to multiple units using command line interface.

Trap Synchronization

Traps are sent with sequence IDs to network manager groups, to enable the managers to detect when traps are lost and request the traps be sent again.

Zero Touch Provisioning

IP address and mask, default gateway, and software and configuration files can be automatically obtained using standard DHCP client functionality. This enables seamless node setup and configuration for quick and scalable network setup and deployment as well as configuration consistency when nodes must be replaced.

Ports

The unit can be managed using the following ports and applications:

- Local management via an ASCII terminal connected to the RS-232 port
- Out-of-band management via a dedicated management port.
- Remote inband management via user or network ports routed via separate VLANs, Telnet, or an SNMP-based management system.

MONITORING AND DIAGNOSTICS

RFC-2544

The device provides a built-in RFC-2544 wire-speed traffic generator and analyzer for unidirectional and bidirectional testing of throughput, latency, and frame loss. Based on standard OAM messages, the tests can be simultaneously performed over multiple flows, at the EVC.CoS level.

Enhanced RFC-2544 functionality provides service-oriented KPI analysis. SLA conformance is measured per service bandwidth and packet size, within a user-defined amount of time, for faster service introduction.

Loopback Tests

Layer-2 and/or layer-3 network integrity can be tested by a non-disruptive loopback performed per flow, with swapping of MAC address and optionally IP address. When the loopback is activated, ETX-205A exchanges the source and destination MAC/IP addresses of the incoming packets. This loopback passes through Ethernet bridges (MAC address) and routers (IP address), and can be configured to remain active after ETX-205A is reset.

ETX-205A

Carrier Ethernet Demarcation Device

Specifications

CAPACITY

Max. Frame Size

12,288 bytes

ETHERNET INTERFACES

Number of Ports

Up to 2 network ports (redundancy)
Up to 5 user ports (port 2 can function as network or user)

Type

SFP/copper combo port:

Fiber optic:

Fast Ethernet (100BaseFx, 100BaseLX10, 100BaseBx10, 100BaseT), SFP-based

Gigabit Ethernet (1000BaseSx, 1000BaseLX10, 1000BaseBx10, 1000BaseT), SFP-based

Packet over PDH and SDH: MiRiCi SFPs

Copper: 10/100/1000BaseT (built-in)

Connector

SFP slot or RJ-45

E1 INTERFACES

(E1/T1 ports configured to E1 mode; relevant only for 4E1T1 ordering option)

Number of Ports

4

Compliance

G.703, G.732n

Data Rate

2.048 Mbps

Line Coding

HDB3

Impedance

120W, balanced

75W, unbalanced (via adapter cable)

Connector

Electrical, RJ-45

T1 INTERFACES

(E1/T1 ports configured to T1 mode; relevant only for 4E1T1 ordering option)

Number of Ports

4

Compliance

ANSI T1.101, ANSI T1.403

Data Rate

1.544 Mbps

Line Coding

B8ZS

Framing

Unframed or ESF

Impedance

100W, balanced

Connector

Electrical, RJ-45

OAM

IEEE 802.1ag, MEP/MIP

ITU-T Y.1731, PM including one-way delay measurement

Loopback, link trace, RFC-2544

MANAGEMENT

Ethernet Management Port

Type: 10/100BaseT

Connector: RJ-45

Control Port

Interface: V.24/RS-232 DCE

Connector: RJ-45

Format: Asynchronous

Data rate: 9.6, 19.2, or 115.2 kbps

TIMING

IEEE 1588v2 Precision Time Protocol (PTP)

(PTP ordering option)

Slave clock for frequency and ToD

Synchronous Ethernet

(SYE or PTP ordering option)

ITU-T G.8261-G.8264

Station Clock

(relevant only for SYE and PTP options)

Type: Balanced E1, unbalanced E1 (via an adapter cable)

Connector: RJ-45

TOD/1PPS Port

(relevant only for PTP option)

Connector: RJ-45

External Clock

(relevant only for PTP option)

Connector: BNC

1PPS Port

(relevant only for PTP option)

Connector: BNC

GENERAL

Compliance

MEF 6 (E-Line – EPL and EVPL), MEF 10, MEF 9, MEF 14: EPL and EVPL, MEF 20, IEEE 802.3, 802.3u, 802.1q, 802.1p, 802.3ad, 802.3-2005, 802.1ag, ITU-T Y.1731, G.8031, G.8262, RFC-2544

Indicators

PWR (green): On – Device is powered up

TST/ALM (red): On – Active alarm

Blinking – Active loopback

LINK/ACT on Eth ports (green):

On – Ethernet link connected

Blinking – Data is being transmitted and received on the Ethernet link

LOC on E1/T1 ports (red):

On – Local synchronization loss

REM on E1/T1 ports (red):

On – Remove synchronization loss

SD on station clock (green):

On – Station clock port connected

Power

AC power supply:

100–240 VAC, 50/60 Hz

Wide-range DC power supply:

24/48 VDC nominal (20 to 72 VDC)

Power Consumption: 17W max

Physical

Height: 43.7 mm (1.7 in)

Width: 440 mm (17.4 in)

Depth: 240 mm (9.5 in)

Weight: 3.1 kg (6.8 lb)

Environment




Temperature:

ETX-205A: 0 to 50°C (32 to 122°F)

ETX-205A/H: -20 to 65°C (-4 to 149°F)

Humidity: Up to 90%, non-condensing

Table 1. ETX Family Comparison Table

Feature	ETX-203AM (Ver. 4.3) 	ETX-203AX (Ver. 4.3) 	ETX-205A (Ver. 4.3) 
Bandwidth	100/1000 Mbps per port, depending on license option	100/1000 Mbps per port, depending on license option	100/1000 Mbps per port
Ethernet Ports (net/net/user)	Module/4 SFP/copper combo	1/1/4 SFP/copper	1/1/4 SFP/copper combo
Network interface	Network module: 2 × GbE, 4W SHDSL, or 8W SHDSL	Up to 2 × GbE or FE SFP or copper ports	Up to 2 × GbE or FE SFP/copper combo ports
User interface	Up to 5 × GbE or FE SFP or copper ports	Up to 5 × GbE or FE SFP or copper ports	Up to 5 × GbE SFP/copper combo ports
Number of flows (EVC.cos) / shapers / MEPS	192/2/128 or 192/30/128, depending on license option	192/2/128 or 192/30/128, depending on license option	192/30/128
Service type	EPL and EVPL (flow-based)	EPL and EVPL (flow-based)	EPL and EVPL (flow-based)
Forwarding mode	Flow-based	Flow-based	Flow-based
Bandwidth profile	CIR/CBS, EIR/EBS per EVC.CoS	CIR/CBS, EIR/EBS per EVC.CoS	CIR/CBS, EIR/EBS per EVC.CoS
Max. frame size	GbE uplink: 12,288 bytes SHDSL uplink: 2,000 bytes	12,288 bytes	12,288 bytes
E1/T1, E3/T3, OC-3/STM-1 bridging	Via smart SFP, with integrated management	Via smart SFP, with integrated management	Via smart SFP, with integrated management
E1/T1 TDM pseudowire	No	No	4 E1/T1 interfaces
Timing options	1588v2 TC (Transparent Clock)	1588v2 TC (Transparent Clock)	Synchronous Ethernet (SyncE), 1588v2 slave, 1588v2 TC (Transparent Clock)
Management interface	Command line	Command line	Command line
Temperature-hardened option	No	No	Yes
Power supply	AC or DC	Universal AC/DC	AC or DC
Power supply redundancy	No	No	Yes

ETX-205A

Carrier Ethernet Demarcation Device

Ordering

RECOMMENDED CONFIGURATIONS

ETX-205A/AC/19
 ETX-205A/AC/19/SYE
 ETX-205A/AC/19/PTP
 ETX-205A/AC/19/4E1T1
 ETX-205A/AC/19/4E1T1/PTP
 ETX-205A/ACR/19
 ETX-205A/ACR/19/SYE
 ETX-205A/ACR/19/PTP
 ETX-205A/ACR/19/4E1T1
 ETX-205A/ACR/19/4E1T1/PTP
 ETX-205A/DC/19
 ETX-205A/DC/19/SYE
 ETX-205A/DC/19/PTP
 ETX-205A/DC/19/4E1T1
 ETX-205A/DC/19/4E1T1/PTP
 ETX-205A/DCR/19
 ETX-205A/DCR/19/SYE
 ETX-205A/DCR/19/PTP
 ETX-205A/DCR/19/4E1T1
 ETX-205A/DCR/19/4E1T1/PTP
 ETX-205A/ACDC/19
 ETX-205A/ACDC/19/SYE
 ETX-205A/ACDC/19/PTP
 ETX-205A/ACDC/19/4E1T1

SPECIAL CONFIGURATIONS

ETX-205A/?/I/19/\$/~

Legend

? Enclosure type (Default=Regular enclosure):
 H Industrially-hardened enclosure

Note: The ETX-205A/H version requires industrially-hardened SFP transceivers.

! Power supply (swappable):
 AC Single AC power supply
 ACDC Single AC power supply and single DC power supply
 ACR Dual AC power supply
 DC Single DC power supply
 DCR Dual DC power supply
 \$ E1/T1 ports (Default=No E1/T1 ports):
 4E1T1 Four E1/T1 ports
 8E1T1 Eight E1/T1 ports
 ~ Timing (Default=No timing):
 SYE SyncE full support
 PTP SyncE and 1588v2 clock recovery support

SUPPLIED ACCESSORIES

Power cord (one per power supply)

RM-34

Rack mount hardware kit for one unit

CBL-RJ45/D9/F/6FT

Control port cable with male RJ-45 and female DB-9 connector

OPTIONAL ACCESSORIES

WM-34

Wall mount hardware kit for one unit

ETX-205A_PS/!

! Power supply
 AC Single AC power supply
 DC Single DC power supply

CBL-RJ45/2BNC/E1/X

Balanced E1 (RJ-45) to unbalanced E1 (2 BNC) adapter cable

International Headquarters
 24 Raoul Wallenberg Street
 Tel Aviv 69719, Israel
 Tel. 972-3-6458181
 Fax 972-3-6498250, 6474436
 E-mail market@rad.com

North America Headquarters
 900 Corporate Drive
 Mahwah, NJ 07430, USA
 Tel. 201-5291100
 Toll free 1-800-4447234
 Fax 201-5295777
 E-mail market@radusa.com

www.rad.com

Order this publication by Catalog No. 803979



data communications
 The Access Company