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# **How to Update FRUSDR (Field Replaceable Unit/Sensor Data Record) for Optimum Server Performance**

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# 1. Introduction

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The Field Replaceable Unit/Sensor Data Record (hereinafter called FRUSDR) helps the BMC firmware in monitoring and managing the server. FRUSDR update is highly dependent on the hardware configuration and the chassis used. It is difficult for the user to correctly identify the hardware configuration, which is essential for ensuring an accurate FRUSDR update. Incorrectly updating the FRUs or SDRs in a server can lead to energy wastage and increase noise levels in the server.

This document introduces FRUSDR and its update process. It also identifies and provides solutions to some of the common issues faced when updating FRUSDR on Intel® Servers Boards.

This document has the following sections:

- **Chapter 2, Processes** - gives an overview of the FRUSDR processes.
- **Chapter 3, Challenges** - details the challenges in Fan and Chassis identification.

## 2. Processes

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The Intelligent Platform Management Interface (IPMI) Specifications define a set of common interfaces to manage/monitor the health of a system. The FRUSDR contains two components – the FRU and the SDR.

Field Replaceable Unit (FRU) is a component, part, or assembly that can be easily removed from a system and replaced by the user or technician without having to send the entire system to a repair facility. The IPMI specifications include support for storing and accessing multiple sets of non-volatile FRU information for different modules in the system. The FRU data includes information such as serial number, part number, model, asset tag, etc.

Sensor Data Record (SDR) describes the sensor configuration on the motherboard to the system software. Included in the SDRs is information that indicates which system entity a sensor is monitoring (for example, a memory board) and also provides a link to the FRU information for the entity. It describes information about the sensor such as location, type, units of measurement, reading type, operational ranges, and thresholds.

### 2.1 Updating FRUSDR

- Are your servers too noisy?
- Do the system fans run at higher-than-normal speeds without any reason?
- Is the system status LED not glowing steady green on the front panel of your server?

If your answer is yes, then you may have an “unhealthy” server. One or more components might not be configured properly in your server or they might need replacement. Identify faulty components if any and replace them. On reboot, if your server is still noisy, then you need a FRUSDR update. The system might have been updated with FRUSDR for the wrong configuration. Making the required changes will reduce the energy consumption and improve acoustics which will extend the life of server.

### 2.2 Identifying the Intel® Server Board

Each server board is identified by its Platform ID (Product Name). You must know the Product Name for downloading the correct FRUSDR package. This is available in the BIOS Setup screen under the *Main Tab > Platform ID* as shown in Figure 1.

*Note: To enter BIOS Setup screen, press F2 during server boot up.*

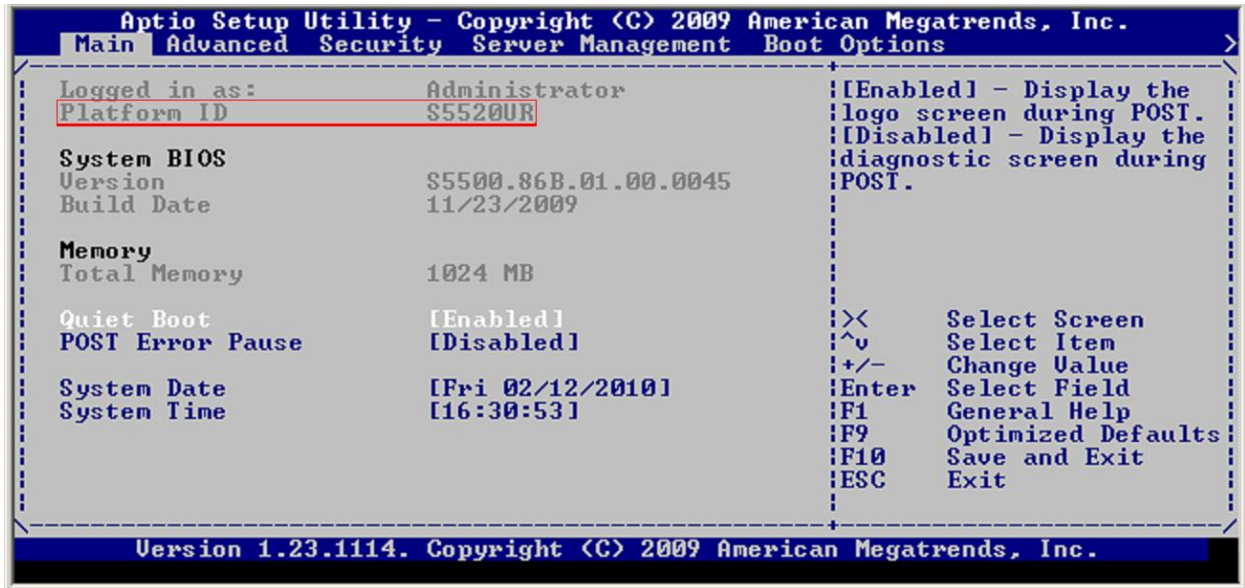


Figure 1. Platform ID in BIOS screen

## 2.3 Getting FRUSDR Updates

The latest Intel® software stack (including FRUSDR) can be downloaded from the Intel® Download Center site: <http://downloadcenter.intel.com/>

Choose the correct Product Family, Product Line, and Product Name to get the right package. The packages are available for updating on different OSs like Windows 2008\* (32 bit, 64 bit – legacy/EFI), Windows 2003\* (32 bit & 64 bit), RHEL 5\* (32 bit & 64 bit), SLES 10\* (32 bit & 64 bit), and pre-OS environments like WinPE\* (1.5/1.5/2.0/2.1/3.0/3.1) and UEFI 2.0\* (EFI shell). For workstation boards, Windows XP\* and Vista OS\* support is also available.

This document describes in detail on how to update the FRUSDR on EFI environment. For example, if you want to update the FRUSDR for a S5520UR system under the EFI environment, the steps to follow are as given below.

1. Go to [Intel® Download Center website](http://downloadcenter.intel.com/) and select Product family as “Server Products”, Product Line as “Intel® Server Boards” and the Product Name as “Intel® Server Board S5520UR” as shown in Figure 2.



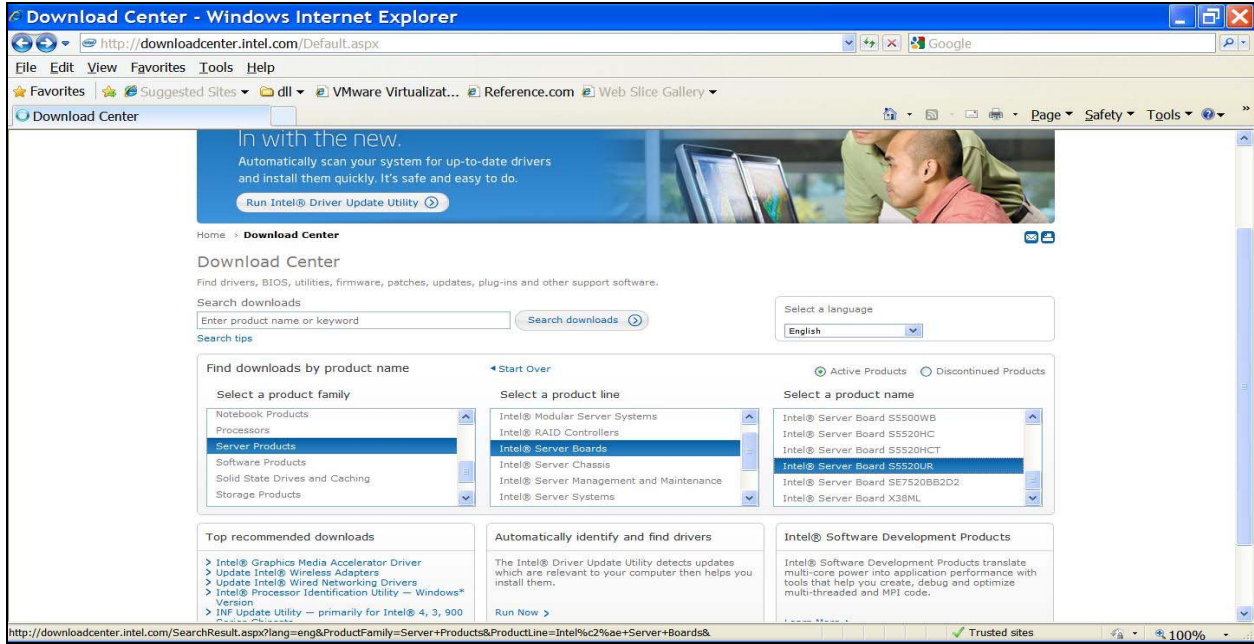


Figure 2. Download Center Page 1

2. On the following page, choose the Operating System (OS Independent) and the Download Type (Firmware).

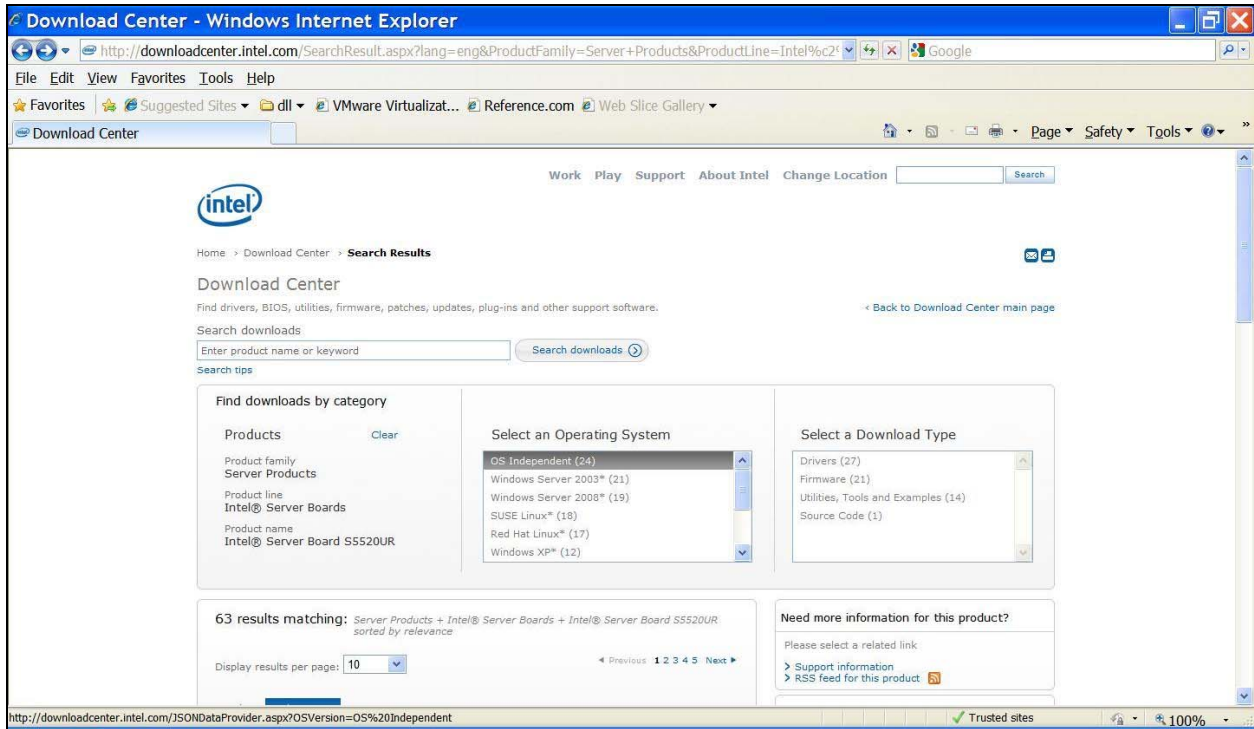


Figure 3. Download Center Page 2 (a)

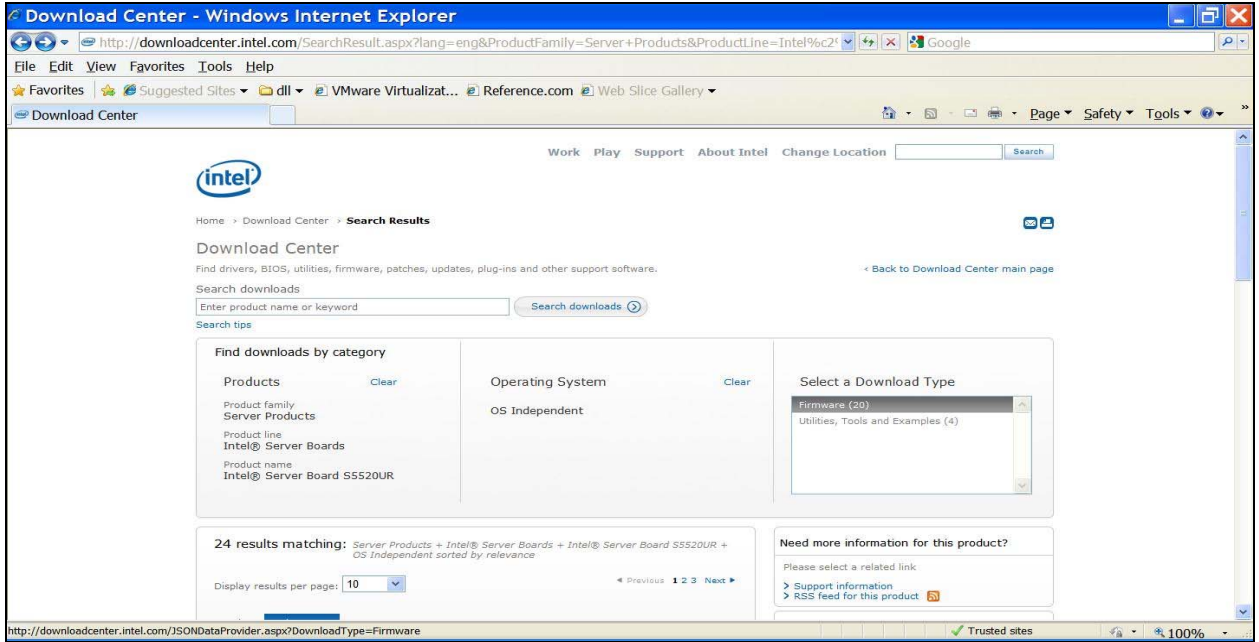


Figure 4. Download Center Page 2 (b)

3. Select “S5520UR Firmware Update Package for EFI\*” from the results below and proceed with the download.

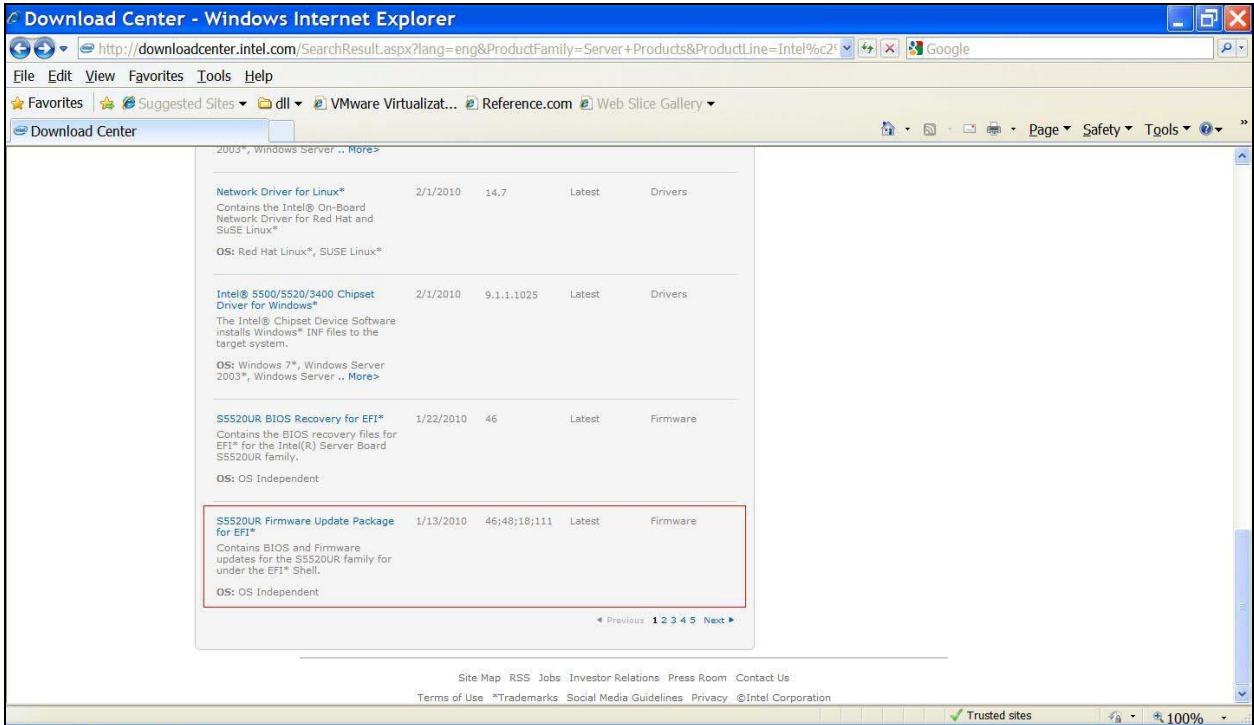


Figure 5. Download Center Page 2 (c)

## 2.4 FRUSDR Package

The FRUSDR package has the following main components: (The exact files within the package will vary among different platforms.)

1. <filename>.sdr – SDR record file
  2. <filename>.fru – FRU record file
  3. FRUSDR.EFI - the FRU & SDR loader utility.
  4. MASTER.CFG – configuration file that controls FRU & SDR loading.
  5. <filename>.nsh – script for running the update.
  6. <filename>.txt - Describes the usage to customers.
- Typically, FRU record files hold board part numbers, serial numbers, and descriptive names. Some of this information is used by BIOS and is shown in the SMBIOS tables. There is usually one FRU file for the baseboard, one for each SCSI backplane and one for each additional major hardware components (for example, memory riser, I/O riser).
  - The SDR file holds the Sensor Data Records which inform the BMC and other subsystems of critical thresholds and event data. There are often more SDRs than a given system configuration will use. For example, in a system with only one HSBP installed out of a possible two, the SDRs for the second HSBP are redundant.
  - FRUSDR.EFI is the program that actually loads the FRU and SDRs into a system in the EFI environment. In addition to loading this data, FRUSDR.EFI can also probe the system to determine which subsystems and devices are present.
  - The script for running the update will be available as an **.nsh** file – typically named as startup/updfxx.nsh (for example, *updfbc.nsh* is for S5500BC). The *nsh* script can be run in EFI prompt.
  - A configuration file, typically named MASTER.CFG, determines what FRU and SDRs are to be programmed into the system by probing and displaying questions on the screen. Through this script, the user inputs chassis, fan, processor, and any additional data that may be needed to correctly configure the system.
  - The .txt files within the package contain details of the loader utility, as well as the FRU and SDR usage.

## 2.5 Ways to Update FRUSDR

There are different ways to update FRUSDR. Once the package is downloaded and available for update, the update can be done with or without the presence of an OS (as mentioned in the earlier section).

The Intel® Deployment Assistant is a bootable CD available with Intel® Servers (also downloadable from Intel site) and can be used for FRUSDR update as well as unattended OS installation and Server configuration. Update from Linux or Windows\* environments can be done using the OFU utility. More details on the various utilities and server management softwares are available in the documentation available at this link: [Server Management Guide](#).

OS independent update using EFI shell is described here. The EFI shell is a Unix-like shell which is provided by the BIOS. It supports commands similar to DOS or Unix commands. To access the EFI shell:

1. Login to F2 (BIOS) screen and select '**Internal EFI shell**' in the **Boot Manager** tab. A shell prompt appears on screen.
2. Run "map -r" to display all the drives available under the shell.

3. Change to the current directory containing the FRUSDR package.
4. Run the *nsh* script in the FRUSDR folder.

## 2.6 The Update Process

The update process prompts the user for configuration details. Incorrect details entered during the process can lead to non-optimal energy usage and acoustics. So, make sure you have the system configuration details ready before starting the update process.

Some of the options seen while updating FRUSDR on Intel® Xeon® processor 5500 based server boards are given below for your reference.

*Q1: Select the function you want to perform:*

- 1: Update only the SDR
- 2: Update only the FRU
- 3: Update both the SDR and the FRU
- 4: Modify the Asset Tag
- 5: Exit FRU/SDR update

The user can choose to update either or both FRU and SDR or the Asset Tag as shown by the different options. Enter the number given against the options based on your selection.

### 2.6.1 SDR Related Questions

*Q2: Select the Chassis*

- 1: Intel(R) Server Chassis SR1600UR
- 2: Intel(R) Server Chassis SR1625UR
- 3: Intel(R) Server Chassis SR2600URBRP
- 4: Intel(R) Server Chassis SR2600URLX
- 5: Other Chassis

The FRUSDR utility auto detects Intel® chassis. This question is prompted *only* if the probing fails. The user is given the responsibility to correctly identify the chassis. Please refer to the section **Chassis Identification** for more details on how to identify common Intel® chassis available for various Intel® Xeon® processor 5500 based server Boards.

If Intel® chassis is selected (that is, user selection is NOT “Other Chassis” in the options above), then the utility directly proceeds with FRU related questions (for example, Q8-Q12).

If “Other chassis” option is selected, the user has to provide the complete chassis configuration details in response to the questions that follow (for example Q3-Q7).

*Q3: Does the system detect chassis intrusion?*

The user needs to identify if the chassis intrusion switch is connected to the server. This switch will be wired from the motherboard and kept in contact with the chassis cover such that the switch position changes when chassis cover is opened or closed.

*Q4: Does the front panel support a NMI button?*

The NMI button is the Non-Maskable Interrupt button which is available on the front panel of the chassis. It can be identified from the front panel controls if the NMI button is supported. This is commonly identified as a reset button which can only be pressed using the end of a paper clip.

Q5: *Is CPU Fan 1 installed?*

Q6: *Is Memory Fan 1 installed?*

Q7: *Is System Fan 1 installed?*

These questions require the user to check the connections on the motherboard and correctly identify fan headers connected. For Fan header identification, please refer to the section on **Fan Identification** below.

## 2.6.2 FRU Related Questions:

Q8: *Do you want to update the chassis info area of the FRU (Y/N)?*

Q9: *Do you want to enter the chassis serial number (Y/N)?*

Q10: *Do you want to enter the chassis part number (Y/N)?*

Q11: *Do you want to enter data into the additional chassis field 1 (Y/N)?*

Q12: *Do you want to enter data into the additional chassis field 2 (Y/N)?*

Q13: *Do you want to update the product info area of the FRU (Y/N)?*

Q14: *Do you want to enter the product part number (Y/N)?*

Q15: *Do you want to enter the product serial number (Y/N)?*

Q16: *Do you want to enter a product asset tag (Y/N)?*

The main FRU information areas on the server board are Chassis Info Area, Board Info Area and Product Info Area. Each of these areas contains the serial number and part number fields, which are usually programmed by the manufacturer/OEM. These fields can be followed by 'custom' fields that are defined by manufacturing or the OEM (for example, Q11, 12, 16). The FRU update provides the user with an option to update the Chassis and Product Information Areas (Q8-16).

## 2.7 Customizing CFG files

The MASTER.CFG is the default configuration file used for FRUSDR update. It is written in a simple language and can be opened in any text editor like notepad. The MASTER.CFG file that comes with the package is specifically written for Intel® Server Chassis.

The system fans may run at higher-than-normal speeds when this cfg file is used for updating FRUSDR for non-Intel or Third party Chassis. Fan customization is possible with third party chassis but this should be done with great caution as incorrect update may even lead to overheating of components or noisy fans.

The MASTER.CFG can also be customized for enabling silent update of FRUSDR. The cfg file is scripted to include all the answers so that the user will not be prompted with the questions. This requires the user to understand the commands used in the configuration file.

For more details on how to customize MASTER.CFG files, please contact your Intel representative.



## 3. Challenges

This chapter identifies and addresses the challenges in Fan and Chassis identification.

### 3.1 Fan Identification

Check the chassis for fan configuration. The fans can be identified from the connection points or headers on the motherboard. The fan points are marked on the motherboard clearly as CPU/Memory/System Fans. For more details on component layout please refer to the *Intel® Server Board Technical Product Specifications (TPS)*. TPS documents can be downloaded from the Intel website at [www.intel.com](http://www.intel.com).

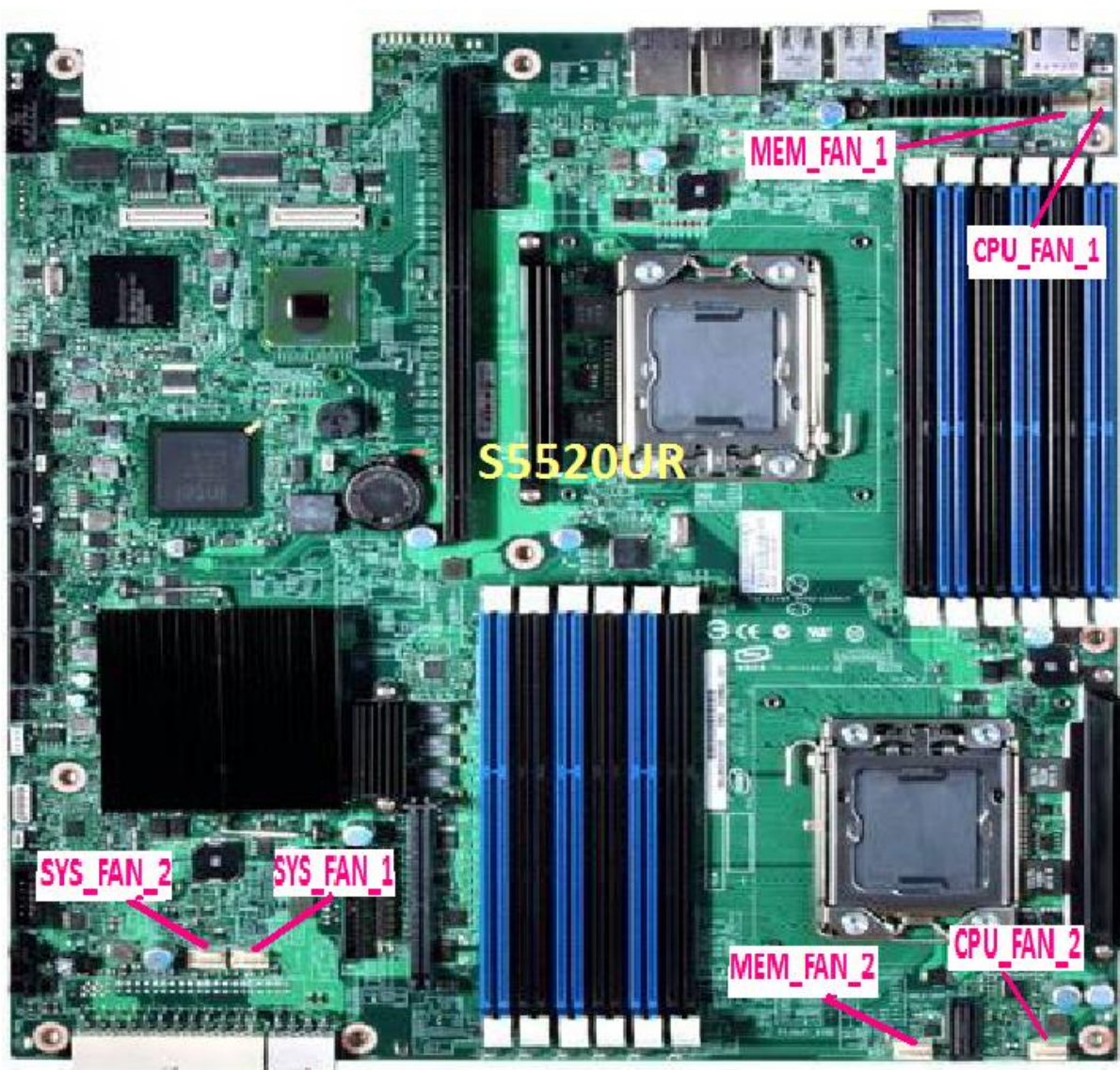


Figure 6. S5520UR Fan Headers

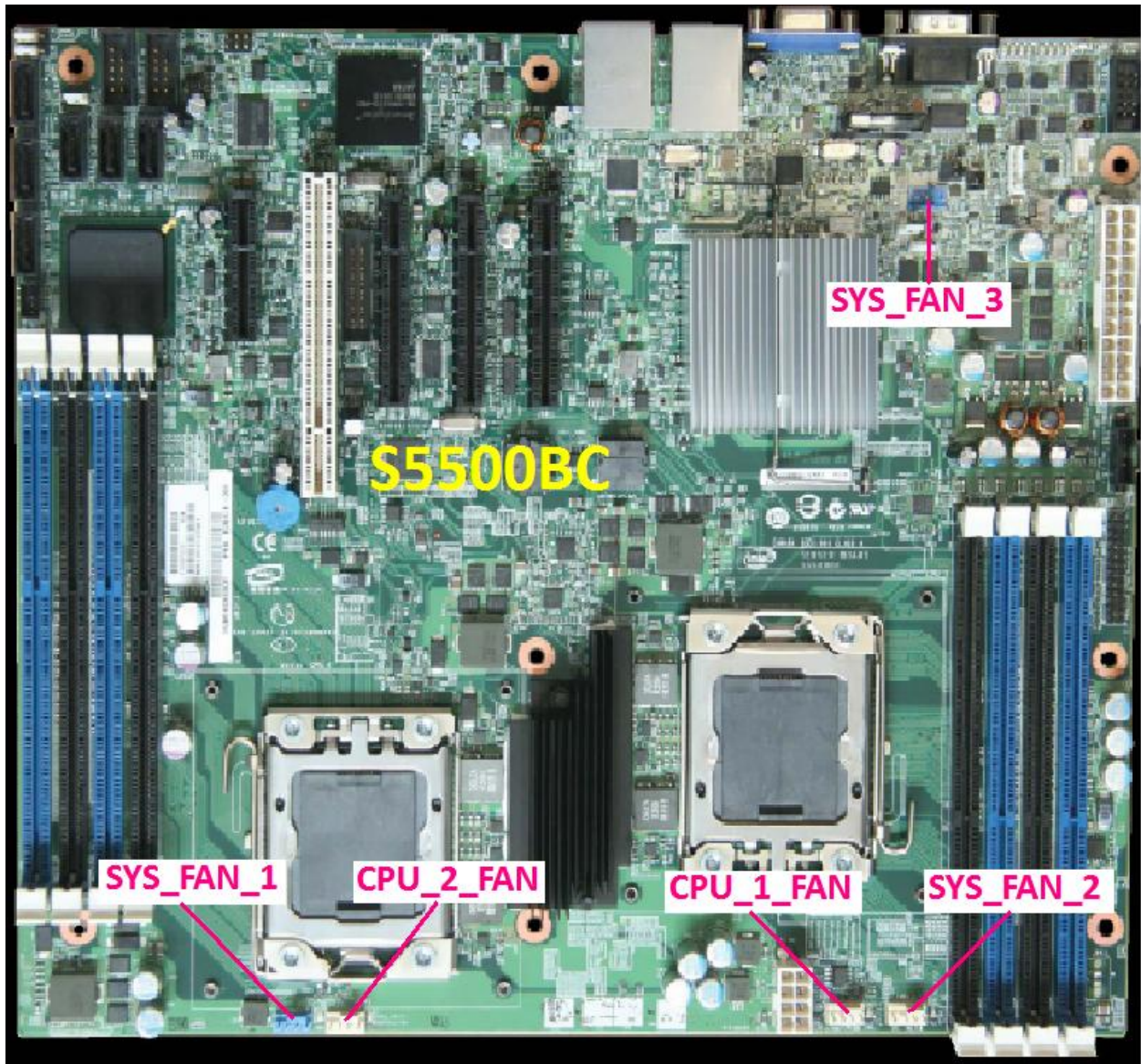


Figure 7. S5500BC Fan Headers



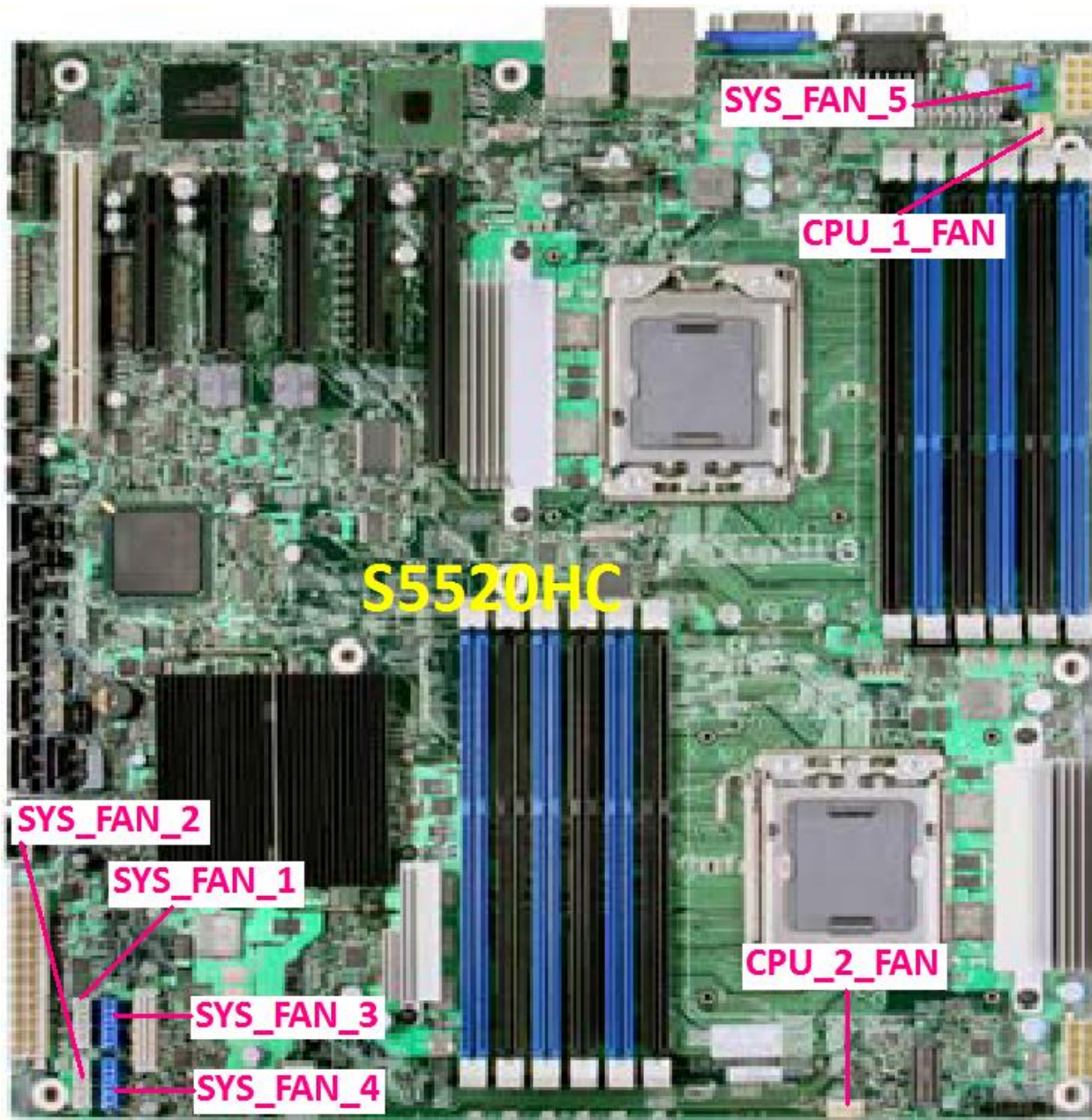


Figure 8. S5520HC Fan Headers



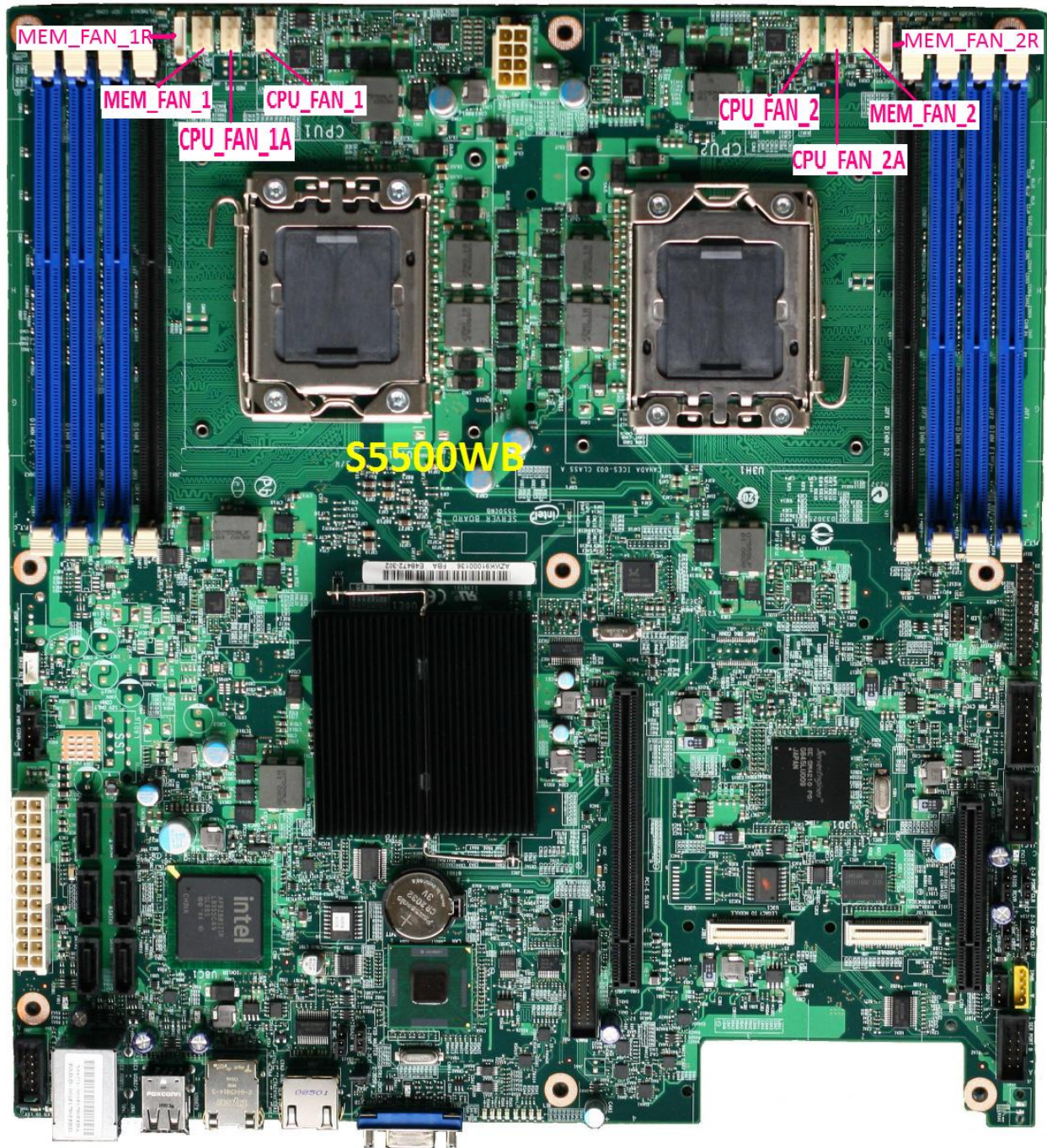


Figure 9. S5500WB Fan Headers



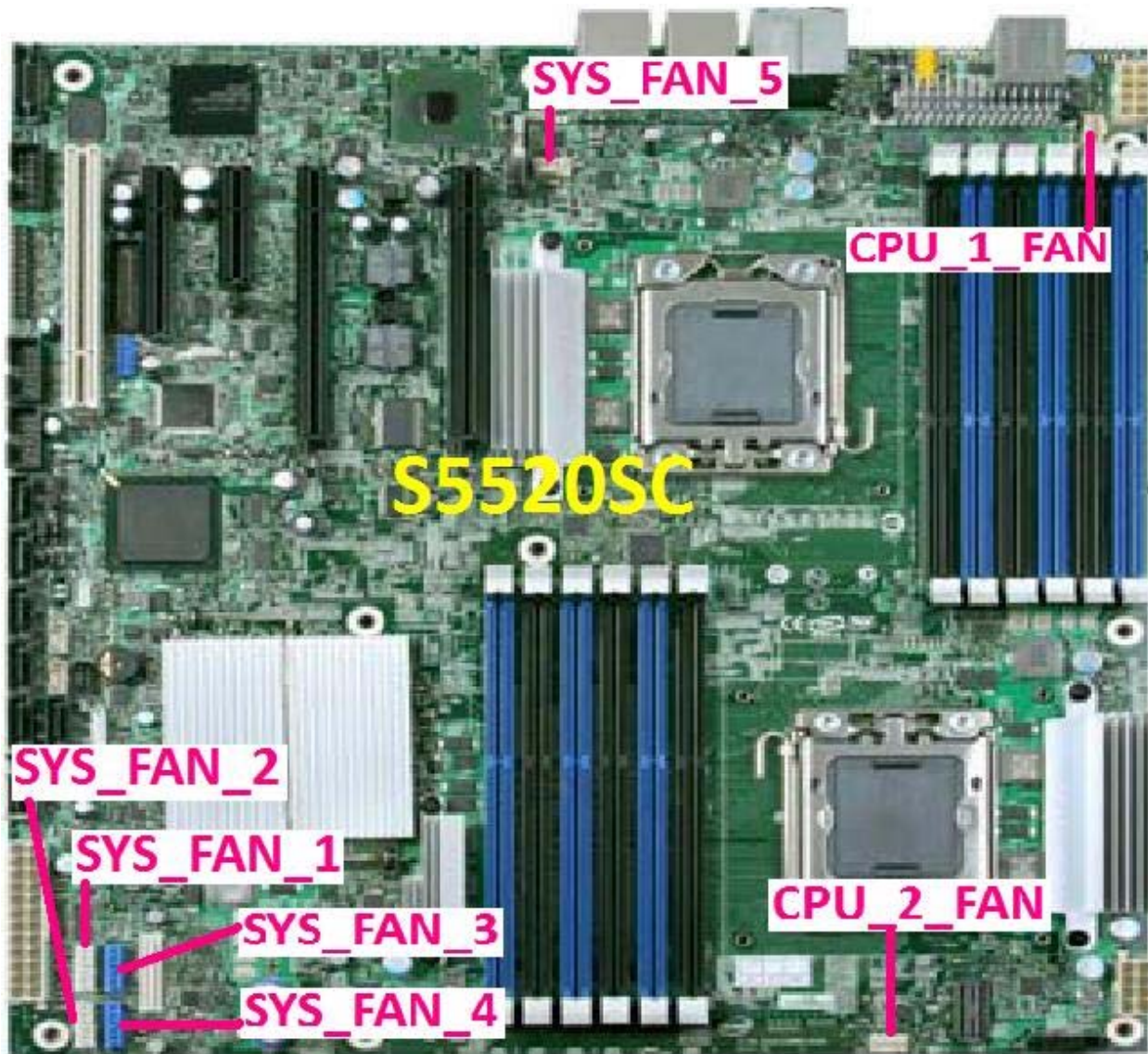


Figure 10. S5520SC (workstation) Fan Headers



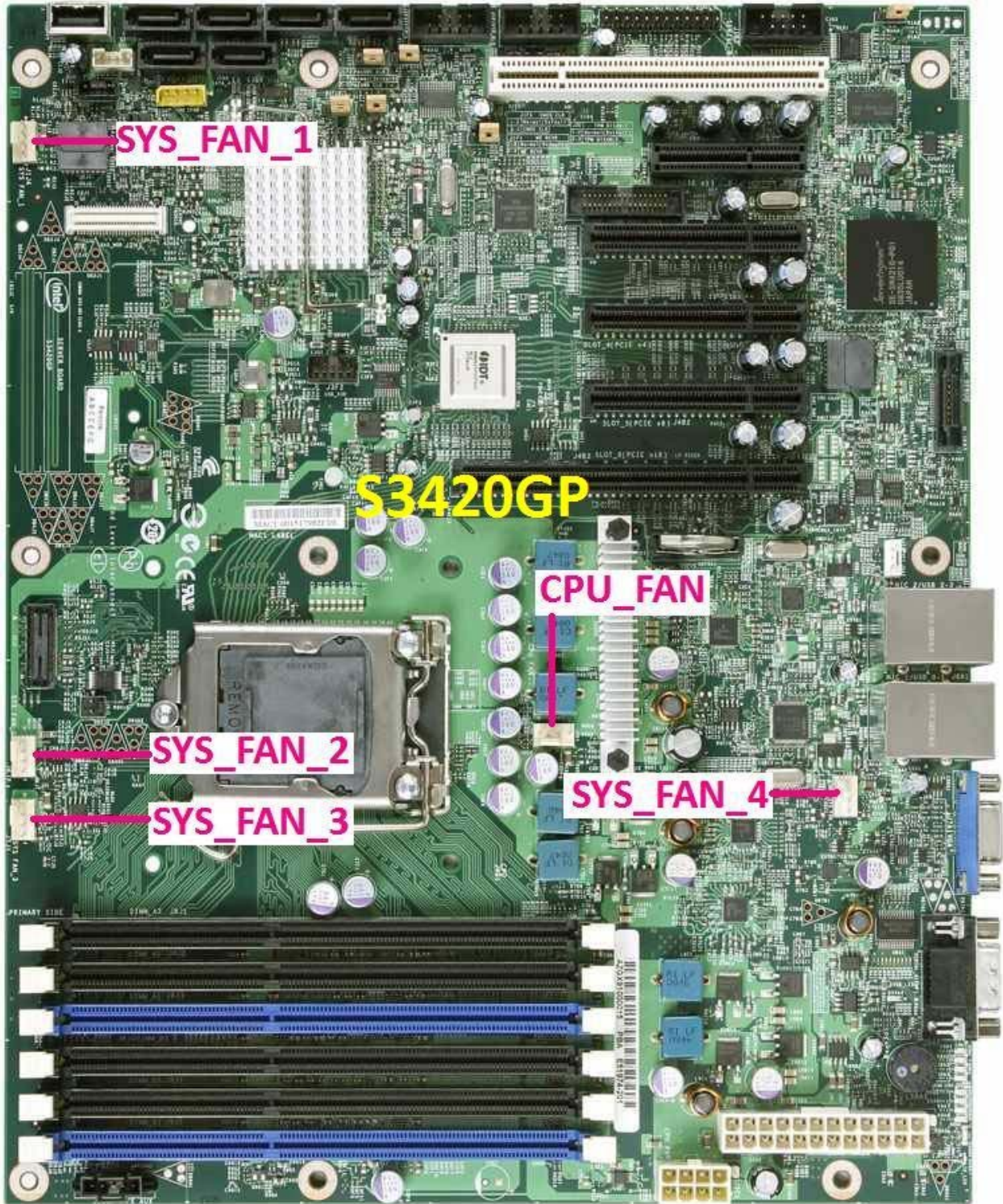


Figure 11. S3420GP Fan Headers

## 3.2 Chassis Identification

The different Intel® chassis can be identified based on the configuration such as Form Factor or components included. The Form Factor of server chassis is usually described in terms of U or Rack Units. The common Intel® chassis comes in form factors of 1U, 2U or 5U. 1U measures 1.75 inches or 44.45 mm high. 2U and 5U will be 3.5 (2 x 1.75) and 8.75 (5 x 1.75) inches respectively.

The table below will help you differentiate between the different Intel® chassis supported by the Intel® Xeon® processor 5500 based Server Boards. More details can be obtained from the Configuration Guide and other documents available at the Intel website ([www.intel.com](http://www.intel.com)).

**Table 1: S5520UR related 1U/2U Rack chassis**

	SR1600UR	SR1625UR	SR2600URBP	SR2600URLX
<b>Form Factor</b>	1U Rack	1U Rack	2U Rack	2U Rack
<b>Drive Bays</b>	Three Fixed 3.5" SATA HDDs	Up to Eight Hot Swap 2.5" SATA HDDs	Up to six Hot Swap 3.5" SAS/SATA HDDs One 3.5 tape drive	Up to six Hot Swap 3.5" SATA HDDs One 3.5 tape drive
<b>Fans</b>	5 fans	5 fans	3 fans	6 fans

	SR2612UR	SR2625URBP	SR2625URLX	SR2625URSAS
<b>Form Factor</b>	2U	2U Rack	2U Rack	2U
<b>Drive Bays</b>	Up to Eight Hot Swap 2.5" SATA HDDs	Eight Hot Swap 2.5" SATA HDDs	Eight Hot Swap 2.5" SAS/SATA HDDs	Up to six Hot Swap 3.5" SAS/SATA HDDs One 3.5 tape drive
<b>Fans</b>	4 fixed fans	3 fans	6 fans	3 fans

**Table 2: S5500BC related chassis**

	SC5650DP	SC5650BRP	SR1630BC
<b>Form Factor</b>	5U	5U	1U
<b>Drive Bays</b>	Up to six tool-free non hot-swap 3.5" SATA hard drives. Upgradeable to hot swap SAS/SATA 6-drive bay	Up to six tool-free non hot-swap 3.5" SATA hard drives. Upgradeable to hot swap SAS/SATA 6-drive bay	up to two non hot-swap 3.5" SATA hard drives
<b>Fans</b>	Three non-redundant cooling fan	Three non-redundant cooling fan	Two non-redundant cooling fan
<b>Power Supply</b>	Fixed PSU	Base Redundant Power Supply	Fixed

**Table 3: S5520HC related chassis**

	SC5600BASE	SC5600BRP	SC5600LX	SC5650DP	SC5650BRP
<b>Form Factor</b>	Pedestal, convertible to 5U Rack	Pedestal, convertible to 5U Rack	Pedestal, convertible to 5U Rack	Pedestal, convertible to 6U Rack	Pedestal, convertible to 6U Rack
<b>Drive Bays</b>	Six 3.5" SAS / SATA drives	Ten 3.5" fixed or hot swap SAS / SATA	Ten 3.5" fixed or hot swap SAS / SATA	Up to six 3.5" fixed or hot swap SAS/SATA drives	Up to six 3.5" fixed or hot swap SAS/SATA drives
<b>Fans</b>	Three fixed, non redundant chassis fans	Three fixed, non redundant chassis fans	Four redundant, hot swappable chassis fans	Three non-redundant cooling fans	Three non-redundant cooling fans

**Table 4: S5500WB related chassis**

	Chenbro RM13204* (Non-Intel Chassis)
<b>Form Factor</b>	1U
<b>Drive Bays</b>	Four Hot Swap SAS/SATA Drive Bays supporting 3.5" HDD
<b>Fans</b>	Fixed 4 fans

**Table 5: S5520SC (Workstation) related chassis**

	SC5600BASE	SC5650WS
<b>Form Factor</b>	Pedestal, convertible to 5U Rack	Pedestal, convertible to 6U rack
<b>Drive Bays</b>	Up to six 3.5" fixed or hot swap SAS/SATA drives	Up to six 3.5" fixed or hot swap SAS/SATA drives
<b>Fans</b>	Three fixed non-redundant chassis fans	Three non-redundant cooling fans
<b>Power Supply</b>	Non-redundant 670W fixed PSU	Non-redundant 1000W fixed PSU

Table 6 : S3420GP related chassis

	SC5650UP	SC5299DP	SC5299BRP	SR1630GP	SR1630HGP	SC5299UP
<b>Form Factor</b>	5U Pedestal	5U Pedestal	5U Pedestal	1U Rack mount	1U Rack mount	5U Pedestal
<b>Drive Bays</b>	Up to six tool-free non hot-swap 3.5" SATA hard drives. Upgradeable to hot swap SAS/SATA 6-drive bay	Up to six tool-free non hot-swap 3.5" SATA hard drives. Upgradeable to hot swap SAS/SATA 6-drive bay	Up to six tool-free non hot-swap 3.5" SATA hard drives. Upgradeable to hot swap SAS/SATA 6-drive bay	up to two non hot-swap 3.5" SATA hard drives	up to three hot-swap 3.5" SATA hard drives	Up to six tool-free non hot-swap 3.5" SATA hard drives. Upgradeable to hot swap SAS/SATA 6-drive bay
<b>Fans</b>	2 Fans (link to SYS_FAN2 and SYS_FAN4)	1 real fan (link to SYS_FAN4)	1 real fan (link to SYS_FAN4)	2 blower(link to SYS_FAN2 and SYS_FAN3)	2 blower(link to SYS_FAN2 and SYS_FAN3)	1 real fan (link to SYS_FAN4)
<b>Power Supply</b>	Fixed PSU	Fixed PSU	Fixed PSU	Fixed PSU	Fixed PSU	Fixed PSU

### 3.3 Summary

The FRUSDR update improves the performance of an Intel® Server by optimizing the energy consumption and correctly setting the fan speeds. The major challenge faced during a FRUSDR update is identification of the proper Intel® chassis and configuration.

This paper helps the user understand the significance of FRUSDR update and overcome some of the challenges encountered during the update.

## References

1. *Intelligent Platform Management Interface (IPMI) specifications v2.0.*
2. Websites :
  - a. Intel Download Center : <http://downloadcenter.intel.com/>
  - b. Technical Product Specifications, Configuration Guide, other related documents for Intel® Server Boards available at [www.intel.com](http://www.intel.com)
3. *IPMI - Platform Management FRU Information Storage Definition v1.0*