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Intel® Simple Network Management Protocol (SNMP) Subagent v8.1

User Guide

A user guide for the Intel Simple Network Management Protocol (SNMP) Subagent.

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1. Introduction

The Intel® SNMP Subagent on managed servers allows you to communicate using Simple Network Management Protocol (SNMP) with the baseboard SNMP Subagent on the managed server. With the Intel® SNMP Subagent, SNMP TRAPs and GETs can be used to manage supported hardware components.

This document discusses the Intel® SNMP Subagent for the baseboard.

1.1 Getting the Latest Information

Intel® System Management Software components are frequently enhanced and updated to support new features and platforms. In addition to enhancements, your server board may also have other SNMP Subagents available on the Intel support website. See the *Intel® System Management Software Release Notes* or http://www.intel.com/go/servermanagement for the latest information.

1.2 Platform Compatibility and System Requirements

Before installing the Intel® SNMP Subagent on server systems, each system must meet the requirements described in the following sections.

1.2.1 Supported Intel® Server Platforms

- Intel® Server Systems supporting the Intel® Xeon® processor E3-1200 v5/v6 product family
- Intel® Server Systems supporting the Intel® Xeon® processor E5-2600 v3/v4/v5 product family
- Multi-Core Intel® Xeon® processor E5 Sequence-based Servers
- Intel® Server Systems supporting the Intel® Xeon® processor E-2278G product family (Intel® Server Board M10JNP)
- Intel® Server Systems supporting 3rd Gen Intel® Xeon® Scalable processor family (Intel® Server Board D50TNP, M50CYP and D40AMP families).

For the latest and up-to-date list of supported operating systems, system requirements and platforms supported, refer to the release notes available with the product. (Intel® Server Systems based on the following listed Intel® Server Boards are also supported, unless otherwise noted in the product documentation for the Intel® Server System.)

1.2.2 Supported Server Operating Systems

The Intel® SNMP Subagent is supported on the following operating systems:

- Windows Server 2012 Enterprise and 2012 R2 EM64T
- Windows Server 2016 EM64T
- Windows Server 2019 Datacenter RTM (LTSC)
- Windows 10 Enterprise 2019 LTSC
- RHEL6.* update5 (EM64T)
- RHEL7.* (EM64T)
- RHEL8.* (EM64T)
- SLES* 11 SP4 (EM64T)
- SLES* 12 SP5 (EM64T)
- SLES* 15 SP1 (EM64T)

Supported Server Platforms

- Intel® Server Board S2600WT/S2600WTR family
- Intel® Server Board S2600KP/S2600KPR family
- Intel® Server Board S2600TP/S2600TPR family
- Intel® Server Board S2600CW/S2600CWR family
- Intel® Server Board S2600BP/S2600BPR family
- Intel® Server Board S2600WF/S2600WFR family
- Intel® Server Board S2600ST/S2600STR family
- Intel® Server Board S9200WK family
- Intel® Server Board M10JNP family
- Intel® Server Board D50TNP family
- Intel® Server Board M50CYP family
- Intel® Server Board D40AMP family

1.2.3 Baseboard Management Controllers (BMC)

The Intel® SNMP Subagent is only supported on Intel® Server platforms with one of the following baseboard management controllers:

- Intel® Integrated BMC

1.2.4 SNMP Master Agent

The SNMP Master Agent must be installed on the managed server.

- For supported Linux* operating systems, use the Net-SNMP package.
- For supported Windows* operating systems, use the SNMP Service included in the Windows* operating system.

2.   Overview

Intel® SNMP Subagents are SNMP extension agents that provide interfaces and databases for retrieving server hardware information. Intel® SNMP Subagents also monitor server health status on the network using the SNMP protocol.

The Management Information Base (MIB) file that accompanies each SNMP subagent contains the definitions of the management information the SNMP subagent can access, with each definition distinguished by a unique object identifier (OID). Each SNMP subagent has its own MIB file and OID. The SNMP subagents support SNMP-based access (GETs and TRAPs) to the instrumented components on the managed server, collecting and returning information as requested by a management system. The subagents plug into the SNMP Master Agent infrastructure supported by the operating system and respond to queries and sets filtered to the subagents by the master agent, based on the OID specifying the data defined in the MIB to be retrieved.

Table 1. Intel® SNMP Subagents

Description	MIB File	Base OID
Baseboard (baseboard sensors, processors, memory) subagent	Basebrd7_v5.mib	Iso (1) org (3) dod (6) internet (1) private (4) enterprises (1) Intel (343) products (2) server-management (10) software (3) baseboardGroup7(5)

For systems running the Windows* operating system, the SNMP subagent is implemented as a dynamic link library (DLL) and is configured in the Registration Database. When the SNMP master agent (Snmp.exe) is started, it queries the registry, then loads and initializes the DLL for the registered SNMP subagent. The SNMP master agent invokes DLL entry points to request MIB queries, and obtains events generated by the subagent.

For Linux* systems, the SNMP subagent is implemented as an rpm package. The subagent is installed, configured and started as a service. The SNMP master agent (Net-SNMP) communicates with the subagent through AgentX protocol.

2.1   General Architecture

The Intel® SNMP Subagent makes sensor, memory, and processor information on a managed server available to SNMP-based management applications. The SNMP master agent, distributed with the operating system, must be installed and configured before installing the baseboard Intel® SNMP Subagent.

All SNMP traffic coming over the network to the managed server is received by the SNMP Master Agent. When the Intel® SNMP Subagent initializes, it tells the SNMP Master Agent which OID values the subagent is responsible for. These OID values correspond to the data provided in the MIB. The SNMP-based Management Console will use the MIB to determine the OID values for particular attributes. The SNMP Master Agent will route SNMP requests to the appropriate SNMP subagent based on the supported OIDs. The SNMP request contains information about the originator of the request. The SNMP subagent will process the request and send back the information to the SNMP Master Agent, which will then send it back across the network to the SNMP-based Management Console.

2.2   Baseboard Intel® SNMP Subagent

The baseboard SNMP subagent is described in detail in Chapter 4, Intel® SNMP Subagent Details.

3.   Installation and Configuration

3.1   Pre-installation

The SNMP Master Agent must be installed and configured on the managed server prior to installing the Intel® SNMP Subagents. The Community name string and trap destinations must be configured correctly. Once the Intel® SNMP Subagent is installed, the MIB file must be copied to any SNMP Management Applications requiring the supported OID and attribute information.

Note: The Intel® SNMP Subagent is intended for use with third-party SNMP-based management clients. For information on installing and configuring third-party SNMP-based management clients, refer to the documentation included with the client software you intend to install.

3.2   Installation using Stand Alone Installer

- To Install Intel® SNMP Subagent for 64-bit Windows Server, double click Intel_SNMP_Subagent-8.1-*-x86_64.exe from Windows folder and follow the instructions.
- To install SNMP Subagent in Linux, run snmpsubagentinstall.sh.

3.2.1   Linux*Operating System

3.2.1.1   Master Agent

The Intel® SNMP Subagent works with the Net-SNMP Master Agent.

3.2.1.2   Configuration File

Since the Intel® SNMP Subagent is designed to use AgentX protocol to communicate with the NET-SNMP Master Agent on Linux*, the snmp configuration file needs to be modified before the Intel® SNMP Subagent is used.

On Red Hat Linux*, for example, the /etc/snmp/snmpd.conf file for snmpd must be modified. Overwrite the existing snmp.conf file with the following content. Then, restart the Master Agent for any configuration file changes to take effect.

```
#  This line allows SNMP remote access to the subagent
rwcommunity    <communityname>

# This line turns on agentx master agent support
master  agentx

# This line enables V2 trap sending
trap2sink    localhost    <communityname>
```

The changes are similar for SuSE Linux*. The SuSE Linux* conf file can be viewed on the Intel® System Management Software CD.

3.2.1.3   MIB File Location

After the Intel® SNMP Subagent is installed on the server, the MIB files (basebrd7_v5.mib will be in /usr/share/snmp/mibs and /usr/local/snmpsa/mibs on Red Hat Linux* and similar locations on SuSE Linux*. To use Net-SNMP utilities such as SNMPGET on a Linux* console to retrieve data from the SNMP subagent on a server, copy the MIB files to the Linux* console, and run the command "export MIBS=ALL" from a terminal window to make the MIB information available to the utilities.

Note: Third party SNMP-based management clients may have specific requirements for the MIB file location. Consult the client software documentation for any such configuration requirements.

3.2.2   Windows* Operating System

3.2.2.1   Master Agent

For Microsoft® Windows* operating system-based systems, the SNMP service must be installed. This service is not included in the default operating system installation, but can be added after the initial operating system installation completes.

Under the properties setting for the SNMP service, the Traps tab enables the user to select the destinations for traps from the server. The Security tab under the SNMP service properties settings enables you to configure the valid community names and the access rights for those community names.

3.2.2.2   MIB File Location

The MIB files (basebrd7_v5.mib) are at the same location the SNMP subagent is installed. The MIB files are not required by the Intel® SNMP Subagent for execution but are required for management applications that issue SNMP GET commands based on the MIB.

4. Intel® SNMP Subagent Details

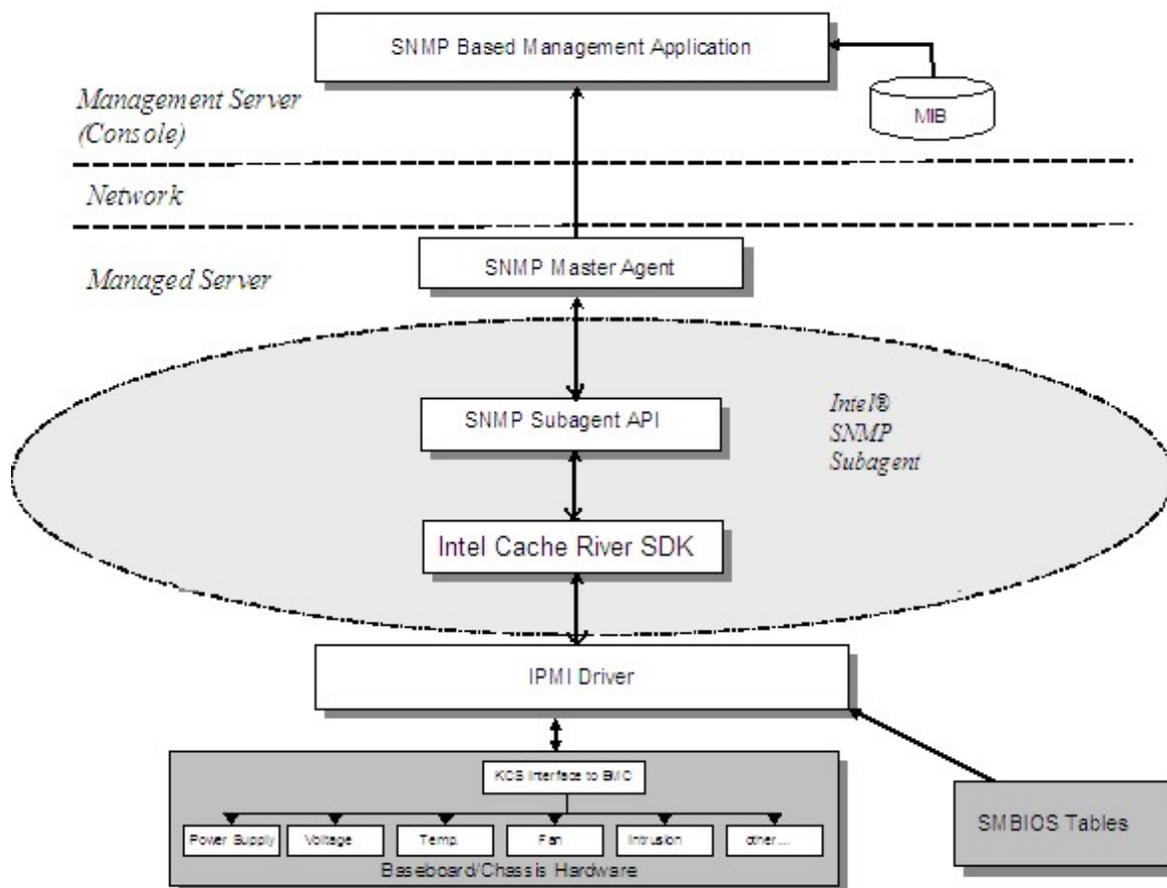Figure 1 illustrates how the Intel® SNMP Subagent interfaces with the SNMP Master Agent and the BMC on the platform.

Figure 1. Intel® SNMP Subagent Architecture

There are two sources of information for the Intel® SNMP Subagent on the server. The Intel® SNMP Subagent communicates with the Baseboard Management Controller (BMC) using an Intelligent Platform Management Interface (IPMI) driver. Through the IPMI driver, the Intel® SNMP Subagent has access to information on components such as power supplies, voltages, temperature sensors, cooling devices, chassis intrusion sensors, and the System Event Log (SEL). The Intel® SNMP Subagent also has access to information on processors and memory stored in the System Management BIOS (SMBIOS) tables.

In addition to responding to SNMP GET requests, the Intel® SNMP Subagent generates TRAPs. While one component of the Intel® SNMP Subagent waits for SNMP requests from the SNMP Master Agent, another component of the Intel® SNMP Subagent monitors the System Event Log (SEL). Entries are placed in the SEL when significant events occur on the server (such as, when a temperature sensor's reading exceeds a threshold, or when a power supply is removed). When a new SEL entry is detected, the Intel® SNMP Subagent analyzes the SEL entry and sends SNMP TRAPs to the SNMP Master Agent. The SNMP Master Agent duplicates and transmits the SNMP TRAP to all nodes that are configured to receive traps from the managed server. Trap recipients must be configured as part of installing and configuring the SNMP Master Agent.

4.1   Features of the Intel® SNMP Subagent

Through basic SNMP GETs and TRAPs, the Intel® SNMP Subagent provides the following functionality for managing servers:

- Accessing sensor data
- Viewing and modifying threshold settings
- Reading the SMBIOS tables
- Providing overall system health status

4.1.1   Accessing Sensor Data

The Intel® SNMP Subagent accesses management information through IPMI commands that the BMC on the managed server responds to. The information available varies by platform. For example, some servers don't support chassis intrusion detection, and some don't support server monitoring of redundant fans, although individual fans are monitored. The Intel® SNMP Subagent's Management Information Base (MIB) is designed to support the following list of components:

- Voltage
- Temperature
- System Fan (includes redundancy)
- Memory
- Processor
- Power Supply (includes redundancy)
- PCI Hot Plug Events
- Chassis

Events are generated by the SNMP agent based on SEL events and provide as much information as possible concerning the event to the event reader. The events use the NOTIFICATION-TYPE construct specified in SNMPv2C.

The SNMP agent is designed to accommodate the full range of possible events, although specific server platforms may not support all the events. Some server platforms do not support certain features in firmware. Also, some server platforms lack some sensors or the right sensor types to support a feature.

4.1.2   Displaying System Health Status

The Intel® SNMP Subagent provides system health status ("Ok", "Non-critical", or "Critical") based on the health status of the following hardware subsystems:

Sensor	Sensor Health Status	System Health Status
Voltage	Ok	Ok
Temperature	Non-Critical	Non-Critical
Fan	Critical	Critical
Processor	Ok	Ok
	All Errors	Critical
Power Supply	Ok/Redundancy regained	Ok
Power Unit	Error/Redundancy lost	Critical
PHP Slot	OK/Power On/Power Off	OK
	Fault	Critical
Memory Array	Ok	Ok
Memory Device	Single-bit Error	Non-Critical
	Multiple-bit Error	Critical
Chassis	Chassis Ok	Ok
	General Chassis Intrusion	Critical

Changes to the overall health are triggered by SEL events. These events alert the Intel® SNMP Subagent that an event has occurred that might impact the current overall health status of the server.

4.2   Intel® SNMP Subagent Configuration Files

4.2.1   Linux* Operating System Configuration Files

- snmpd.conf – for the master agent
- snmpsa.conf – for the subagent

After installing the subagent, both configuration files are at /usr/local/snmpsa/conf on the system (Red Hat Linux*). The snmpd.conf file is a sample configuration file that includes lines necessary to configure the master agent to properly recognize the subagent. Use these sample configuration files as an example for editing the system's configuration files.

4.2.2   Windows* Operating System Configuration Files

- snmpsa.conf for the subagent

After installation, the configuration file is at:

\Program Files\Intel\ServerManager\SNMP_SA\baseboard.

Note: In the Windows* operating system, the Master Agent configuration is handled through the Properties of the SNMP Service. See the operating system documentation for details.

4.3   Linux* SNMP Command-Line Options

The 'start' option should be used the first time the subagent is loaded or right after the server boots. The Intel® SNMP Subagent requires that the IPMI driver be started.

To start the IPMI service

Enter "modprobe ipmi_devintf" and "modprobe ipmi_si" in a Linux terminal.

*These commands work only if the openIPMI package has been installed in the operating system.

- Stop the subagent by entering the following command:

  ```
  /etc/init.d/snmpsa stop (or) systemctl stop snmpsa
  (for RHEL6.x, RHEL7.x, RHEL 8.x, SLES11, SLES12 & SLES15)
  ```

- Restart the master agent by entering the following command:

  ```
  /etc/init.d/snmpd* restart (or) systemctl restart snmpd
  (for RHEL6.x, SLES11 & SLES12)
  ```

- Start the subagent by entering the following command:

  ```
  /etc/init.d/snmpsa start (or) systemctl start snmpsa
  (for RHEL6.x, RHEL7.x, RHEL 8.x, SLES11, SLES12 & SLES15)
  ```

  *If snmpd file is missing in the path /etc/init.d for Linux OS (esp if RHEL7.x, RHEL8.x and SLES15), use "systemctl restart snmpd" or "service snmpd restart" commands in linux terminal.

4.4   Restarting SNMP Agents

If the Intel® SNMP Subagent or Master locks up, both agents must be restarted. Use the following steps from the command line to restart the agents, depending on the operating system. For information on setting services or daemons to start at system boot, see the operating system documentation.

4.4.1   Linux* Operating System

- Stop the subagent by entering the following command:

  ```
  /etc/init.d/snmpsa stop (or) systemctl stop snmpsa
  (for RHEL6.x, RHEL7.x, RHEL 8.x, SLES11, SLES12 & SLES15)
  ```

- Restart the master agent by entering the following command:

  ```
  /etc/init.d/snmpd* restart (or) systemctl restart snmpd
  (for RHEL6.x, SLES11 & SLES12)
  ```

- Start the subagent by entering the following command:

  ```
  /etc/init.d/snmpsa start (or) systemctl start snmpsa
  (for RHEL6.x, RHEL7.x, RHEL 8.x, SLES11, SLES12 & SLES15)
  ```

  *If snmpd file is missing in the path /etc/init.d for Linux OS (esp if RHEL7.x, RHEL8.x and SLES15), use "systemctl restart snmpd" or "service snmpd restart" commands in linux terminal.

4.4.2   Windows* Operating System

In Windows* Operating System, choose **Start > Control Panel > Administrative Tools > Services**, then stop and restart the SNMP Service.

5. Uninstalling the Intel® SNMP Subagent

To uninstall the Intel® SNMP Subagents on a Microsoft® Windows* operating system, select **Intel® System Management SNMP Subagent** in the Add/Remove Programs applet in the Control Panel then choose Remove.

To uninstall the Intel® SNMP Subagents on a Linux* system, run the uninstall script installed with the Intel® SNMP Subagent:

snmpsubagent_uninstall.sh

Or

To uninstall the Intel® SNMP Subagents on a Linux* system, run the uninstall script installed in /usr/local/snmpsa/bin

uninstall.sh