Intel® Server Control v2.x Technical Product Specification

Revision 1.00

December 21, 1999

Enterprise Server Group

Revision History

Date	Revision	Modifications
2/9/99	0.01	First Draft
3/3/99	0.05	First Update
3/26/99	0.08	Updated to include changes due to comments received and updated specifications
5/6/99	0.80	Updated per comments received
5/7/99	0.90	Reformatted, cleaned up, added TOC
12/21/99	1.00	Prepared for release

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Section 1: Introduction

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1 Introduction to ISC

Intel server systems are designed with a number of integrated hardware components that help the network administrator with server management functions. Intel® Server Control (ISC) v2.x is a server management tool that provides real time monitoring and alerting for server hardware sensors. ISC is implemented as client-server architecture.

The Server Manager console (client) provides the graphical user interface for the instrumented components on the managed server (server). ISC uses the standard Desktop Management Interface (DMI) 2.0 framework for managing Intelligent Platform Management Interface (IPMI) hardware components.

The agents that provide information on the status of the server components are located on each managed server. Remote Access Protocol (RAP) or Remote Procedure Call (RPC) provides the communication between the console and the managed servers.

RAP (used with DMI 1.0) uses the IPX transport protocol for communications to a Novell NetWare* Server and IP (or IPX) for communications to a Windows* NT* server. RPC (used with DMI 2.0) is used to allow ISC-based components to communicate between the console applets and the managed server instrumentation.

ISC is bundled with Intel server systems to provide a differentiated management solution. It consists of a set of components that address multiple server states and access paths. The state of the server can be 'powered off', 'OS not operational' or 'OS operational'. The access path to the server can be LAN, modem, or direct connect. The design of ISC is motivated by the following goals:

- One integrated solution for remote management of servers over LAN, modem and Serial communications.
- A single 'look and feel' for all ESG server management software.
- A single installation framework.
- Modular components for easy integration into existing OEM management stacks, with well-documented interface points for OEM integration and extensibility.
- The ability for each component within ISC to snap into selected Enterprise System Management Consoles (HP Openview*, CA Unicenter* TNG*), as well as the LANDesk® Server Manager workgroup management console.
- Support for standalone execution and execution within the Microsoft Management Console and web browsers (Internet Explorer* and Netscape Navigator*) for each component (Platform Intertmentation Control, Direct Platform Control, Client System Setup Utility, etc).

1.1 Document Scope

This Technical Product Specification (TPS) describes the architecture and features of Intel® Server Control v2.x (ISC). It also provides an overview of the installation process and presents a description of the ISC Graphical User Interface (ISC GUI), which encompasses PIC, PI, DPC, Remote Diagnostics, and CSSU.

This document is not an installation guide. It should not be used as product instructions.

1.2 Reference Documents

The following documents were used as reference materials in creating this TPS. These documents are available at http://support.intel.com

- ISC v1.6 Installation and User's Guide
- N440BX TPS
- SC450NX TPS
- T440BX TPS

1.3 Document layout

This document is organized as follows:

- **Section 1, Introduction:** An overview of the architecture and components of ISC.
- **Section 2, Platform Requirements:** Console and Managed Server hardware / operating system requirements; supported Enterprise System Management Consoles
- **Section 3, ISC Standalone Console:** Operating ISC without an Enterprise System Management Console
- **Section 4, Direct Platform Control:** Architecture and operation and user interface for the Direct Platform Control application within the ISC product.
- **Section 5, Service Partition:** Architecture and operation of the Service Partition and Service Partition boot
- **Section 6, Diagnostic Test Package:** Description of available off-line diagnostic tests and the Diagnostic Wizard
- **Section 7, Client System Setup Utility:** Description of the setup information visible and server system configuration options that can be managed from the console workstation.
- **Section 8, Platform Instrumentation Control:** Description of alerts that can be set and server statusses that can be viewed from the console.
- **Section 9, ICMB:** Definition of the ICMB (Intelligent Chassis Management Bus)
- **Section 10, Platform Event Paging:** Description of the paging feature and the events for which pages may be generated
- **Section 11, ISC Install and Uninstall:** Description of the install and uninstall process, including registry changes
- **Section 12, ISC Installation with the Installation Framework:** Silent installations, Install, Upgrade, and Uninstall screens
- **Section 13, Customization:** Features of ISC that can be customized to suit the needs of the OEM or end-user.
- **Section 14, Common Interface for FRU, SDR, and SEL:** The graphical user interface for the FRU, SDR, and SEL viewers.

1.4 Product Objectives

The primary product objectives are as follows:

- Deliver industry-leading management solutions for ESG platforms.
- Develop and deliver standards based server management building blocks that reduce TCO.
- To improve management capabilties provided by ISC for Intel Architecture (IA) platforms.

2 Architecture

- ISC Console
  - Direct Platform Control (DPC)
    - Service Partition
    - Service Partition Boot
    - Remote Diagnostics
    - Configuration Utilities
  - System Setup Utility (SSU)
    - Local SSU
    - Client SSU (CSSU)
  - Platform Instrumentation Control
    - Platform Instrumentation
    - ICMB
    - Local Response Agent (LRA)
      - LRA Paging
- Other Components
  - Platform Management Technology
  - Platform Event Paging (PEP)
  - Management Console Integration
  - Internationalization

These components are introduced briefly in the following sections and are discussed in detail later in this specification.

2.1 ISC Console

The ISC Console consists of the software portion of the architecture that is installed at the workstation or Windows NT server. This is used to manage the server. The ISC Console interacts with Enterprise System Management Consoles, or it can be used as a "stand-alone" application, using a web browser or Microsoft Management Console.

2.1.1 Direct Platform Control

DPC is an application that provides emergency and out-of-band management access to the server using a modem or a direct serial line connection. DPC provides a user-friendly interface for monitoring and controlling the platform management features of the system. DPC consists of a Windows 32 graphical user interface (GUI) that communicates directly to the Platform Management Technology resident on the server.

DPC shares the on-board Emergency Management Port (EMP) hardware with the server operating system. Since DPC does not communicate with the server-resident operating system, it can be used to manage the server even if the operating system and the primary processors of the server are not operational. Because the platform-resident support for DPC is available on 5V standby, DPC can be used to communicate with and control a powered down server.

2.1.1.1 Service Partition

The service partition is a special partition on the system drive that is ROMDOS* based and may contain the SSU, Diagnostics or other ANSI Text-based DOS programs.

The Service Partition provides a standard communication stack. It can be used over a modem or a serial port in a multitasking environment to support remote control of SSU, diagnostics or any other utility that is designed to be compatible with this environment. The Service Partition also supports the redirection of a text-based console over all of the supported communication paths.

2.1.1.2 Service Partition Boot

Using the capabilities provided by Direct Platform Control on the console and the Platform Management Technology on the server, the management console can make a modem connection to a target server, regardless of the operational state of the target server. The console can then instruct the target server to be booted from the Service Partition.

2.1.1.3 Remote Diagnostics

The Remote Diagnostics is a set of diagnostics, based on the MTA diagnostics, that are commonly used during factory testing. These diagnostics are located on the Service partition and are run using the DPC.

2.1.1.4 Configuration Utilities

The configuration utilities are comprised of SSU and BIOS Setup. The BIOS Setup is accessible through DPC while the Local SSU is accessed through the Client SSU interface.

2.1.2 System Setup Utility (SSU)

The System Setup Utility (SSU) provides a system level view of the server including the system resource configuration, multi-boot configuration, password setups, System Event Log (SEL) manager, Field Replaceable Unit (FRU) manager, and Sensor Data Record (SDR) manager.

2.1.2.1 Local SSU

The Local SSU allows the user to use the SSU locally, at the server to be configured.

2.1.2.2 Client SSU

The CSSU interface consists of a Win32* graphical user interface (GUI) resident on a console workstation. This communicates with the SSU agents and framework resident on the Service Partition at the server.

2.1.3 Platform Instrumentation Control

Platform Instrumentation Control (PIC) is a server management tool that provides real time monitoring and alerting for server hardware sensors. PIC consists of a Windows 32 graphical user interface (GUI) that communicates to the platform instrumentation (PI) resident on the server. PIC is designed to dynamically detect and display the management capabilities of ESG platforms.

2.1.3.1 Platform Instrumentation

Platform Instrumentation consists of all of the server-resident software required for monitoring and controlling the server when the operating system is on-line. The core instrumentation is implemented as platform instrumentation under the DMI 2.0 management framework

2.1.3.2 ICMB

The Intelligent Chassis Management Bus (ICMB) provides a means by which an intelligent device on the IPMB (Intelligent Platform Management Bus) in a chassis communicates with the intelligent device on the IPMB in another chassis. The ICMB protocol is used for inter-chassis communications. This is possible because the server provides two ICMB connectors so multiple servers can be daisy chained together.

The ICMB provides additional troubleshooting and status capabilities by providing information that can be used to predict and identify failures on multiple servers. The ICMB is used to provide remote power control and status information on servers that cannot be normally obtained through in-band channels.

2.1.3.3 Local Response Agent (LRA)

Event responses are directed from the Local Response Agent (LRA). This agent, running on the managed server, is capable of receiving DMI indications from the Baseboard, and from several on-board devices: Adaptec*/Symbios* SCSI, AMI* RAID, and the Intel® PRO 100™ LAN Adapter instrumentation software. It can also perform autonomous local control actions, such as powering down the server.

2.1.3.4 LRA Paging

The LRA will use the DMI interface to trigger a paging action, which will be performed by the BMC. The PIC will allow configuration of the paging feature via modification of the data in the DMI group.

2.2 Other Components

2.2.1 Platform Management Technology

All ISC components rely on a foundation of hardware and firmware support supplied by the Platform Management Technology. The core parts of this technology are:

- Intelligent Platform Management Interface (IPMI) – This is the core protocol used by the firmware management controllers to communicate to each other and to the platform instrumentation software.
- Intelligent Platform Management Bus (IPMB) – This is a set of specifications that define how the firmware management controllers communicate on the local platform Management Bus.
- Intelligent Chassis Management Bus Bridge (ICMB) – This is a set of specifications that define how the firmware management controllers communicate with the remote chassis / system connected to the Management Bus.
- Platform BIOS – The system BIOS on the platform provides functionality to configure and control the system management aspects of the system during the pre-OS Boot State.
- Emergency Management Port (EMP) – This hardware support allows for remote access of the system during various stages of system operation, including the times when the system is powered off.
- Platform Event Paging – This feature allows a firmware based paging capability on the platform.

2.2.2 DMI Service Provider

The DMI Service Provider is a piece of software code that interfaces between the platform instrumentation at the server and the ISC Console software. It is responsible for MIF access and coordinates requests between PIC and the platform instrumentation.

2.2.3 SNMP

The Simple Network Management Protocol (SNMP) is a standard management framework. Its functions are similar to that of DMI. However, DMI and SNMP operate differently; they speak a different "language." ISC takes advantage of a mapping standard to translate data from one framework to the other, thereby allowing both SNMP and DMI users to use ISC.

2.2.4 Platform Event Paging

Platform Event Paging is built into the platform management technology. This feature allows the platform to proactively alert the system administrator of critical system failures and state changes, independently of the state of the operating system or server management software. Platform Event Paging enables the platform to contact a numeric paging service using an external modem.

When an alert or a page notifies the system administrator, s/he can use the PIC software to remotely view server health / status, system logs, and current configuration. The administrator can also reconfigure, reset or power off / on the server; or execute off-line diagnostics to further analyze the condition of the server remotely. The available functionality depends on the availability of the ISC tools (PIC, DPC etc.) based on the current state of the server.

2.2.5 Internationalization

ISC components will detect the default system language and attempt to load the corresponding language resource files. If successful, all GUI display strings will be in the default system language. However, if the appropriate language resource files are not available, the default language resource files will be used. The default language resource files are in US English.

All strings and resources used within the add-ins are stored in dynamic-link libraries. Each library contains all the required strings and resources for a particular language and locale. The environment is extensible. Extra dynamic link libraries supporting additional languages and locales can be added to the product at anytime.

3 Visible Components

All components rely on a foundation of hardware and firmware support supplied by the Platform Management Technology. The following components are considered "visible." In other words, these components have a user interface:

- Platform Instrumentation Control (PIC) communicates via the LAN connection to the Platform Instrumentation (PI) resident on the Server. Standard DMI/RPC protocol is used for the communication.
- Direct Platform Control (DPC) communicates to the Emergency Management Port (EMP) on the server. The access path is via modem or via direct serial connection. This functionality is available when the system is powered off/on, and/or the OS on the server is functional/non-functional. DPC also allows for a text-based console/keyboard redirection for the server and the remote booting of the Service Partition on the target server.
- System Setup Utility (SSU) can be run remotely from an ISC console, using the communication path provided by the DPC.
- Diagnostics (resident on the Service Partition) can be remotely invoked from an ISC console, using the functionality to remotely boot the Service Partition. Again, the communication path is provided by the DPC.

These components are displayed in the following figure as they fit into the ISC product.

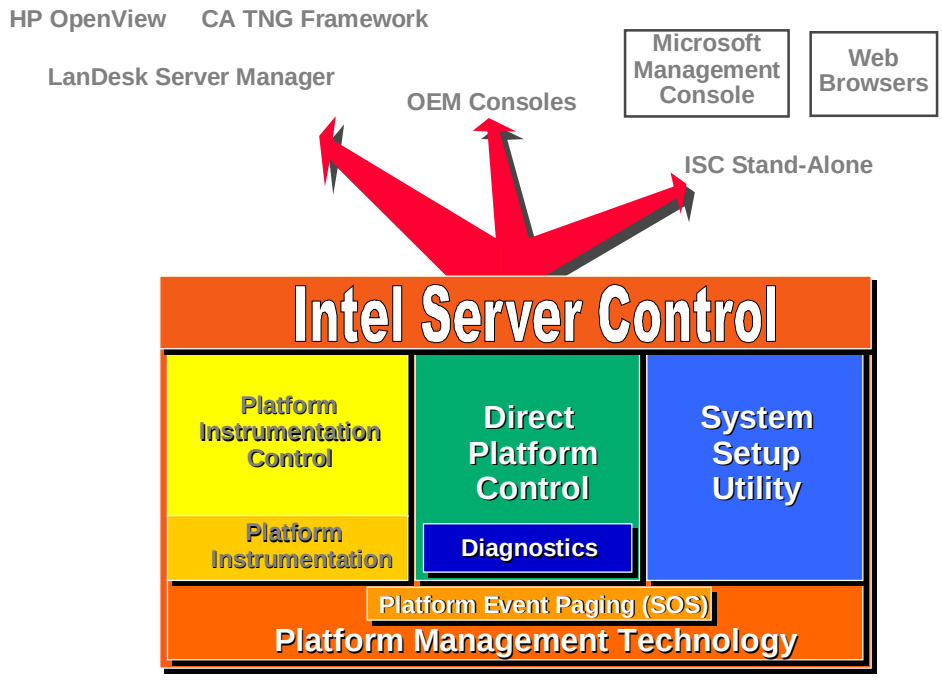

Figure 3-1: Intel® Server Control Components

3.1 Component Features

PIC provides the user with the ability to track system status, configure, diagnose, and manage hardware conditions such as:

- Temperature
- Voltage
- Cooling fans
- Chassis intrusion
- ECC memory
- Processors
- Power supplies

Each of these conditions has a threshold or range of acceptable values. The values, current readings, error status, and timer settings can be read and set through PIC. If a parameter crosses a threshold (referred to as an *event),* PIC invokes the action that was pre-determined by the user.

For example, if the temperature reaches a level that is outside the pre-set or user-defined threshold, PIC can:

- Display a message or sound an alert
- Shut down the server
- Log the system event

PIC also allows the user to view:

- System hardware inventory
- BIOS and system slot information
- Platform instrumentation from previous versions of LANDesk® Server Control (LSC)

If integrated on the server platform, the user can view:

- Onboard Adaptec SCSI controller status
- Onboard Symbios SCSI controller status
- Onboard American Megatrends, Inc. (AMI) RAID controller status
- Onboard Intel® LAN adapter status

3.1.1 Component Management with MIF files and DMI

PIC uses the Desktop Management Interface (DMI) to manage components, such as IPMI-based hardware sensors, inventory information, and third-party instrumentation on server systems. PIC manages the baseboard, chassis, onboard Adaptec and Symbios SCSI controllers, onboard AMI RAID controllers, and onboard Intel LAN adapters. PIC will also manage servers that were installed with previous versions of LANDesk® Server Control (LSC).

Each DMI component must provide a Management Information Format (MIF) file, which describes the manageable attributes of that component. For example, the current reading of a temperature sensor is an attribute that could be listed in a MIF file.

PIC can manage components on the local management console (where the PIC GUI is running) or on a remote server. For SNMP management consoles, PIC includes a translator that allows the user to manage the DMI-enabled platform instrumentation from a remote SNMP application.

The Desktop Management Task Force (DMTF) created and maintains the DMI standard. For more information about MIF files and DMI, see http://www.dmtf.org on the World Wide Web.

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Section 2: Platform Requirements

Platform Requirements Contents

Platform Requirements Figures

Section 2 contains no figures

Platform Requirements Tables

4 Introduction to Platform Requirements

This section discusses the requirements at the server and workstation, in terms of supported management consoles, operating system requirements, and hardware requirements.

Part of ISC is installed at the server and the other part is intalled at a workstation. The ISC Console Software is installed on a Windows* NT* server or workstation or on a Windows 98 workstation. The ISC Console Software allows interaction with the managed server.

The ISC Server Instrumentation Software is installed at the NetWare*, Windows NT or UnixWare* server to enable it to become a managed server. The term “managed server” refers to the NetWare, Windows NT, or UnixWare server that is to be managed from the ISC Console.

5 Console Requirements

5.1 Supported Management Consoles

ISC components integrate into an Enterprise System Management Console, which must already be in place at the Console station. The ISC installation process detects the Enterprise System Management Console and configures the ISC components to launch from within the application. ISC components appear as a component of the Enterprise System Management Console application, rather than as a separate application at the console workstation.

Once installed, the Enterprise System Management Console runs a primary discovery process to discover the managed servers attached to the network. ISC ties into the initial discovery process of the servers and runs a secondary discovery process. This process is necessary to identify the OS loaded on the server, the system type, the chassis type, and whether the DMI service provider and instrumentation is installed on the server system.

Once the managed server is selected and PIC is launched from within the Enterprise System Management Console, the Console must provide the RPC type, network type, network address, and optionally, the host name as parameters to the PIC command line. PIC uses the following command line parameters. The parameters are keyed for flexible ordering and various optional parameter combinations are included.

Table 5-1: PIC Command-line parameters

Key	Definition	Examples	Optional/ Required
/rpc:	RPCtype.	DCE, ONC	Required
/net:	Network type.	TCPIP , IPX	Required
/addr:	Machine address.	(TCP/IP) 137.46.123.123:8000 (IPX) 112233441122334455660000	Required
/name:	Displayable machine name. If not present, machine address will be displayed as the machine name.	PrintServA	Optional

An example command line is:

```
C:\>PIC.exe  /rpc:DCE  /net:TCPIP  /addr:137.46.123.123  /name:PrintServA
```

Note: RPC type is determined by OS type: DCE for NT, ONC for NetWare and UnixWare.

Indications and events are passed between the Enterprise System Management Console and PIC with either SNMP or DMI. The method used is dependent on the Enterprise System Management Console.

For an DMI-enabled Enterprise System Management Console event, actions must be configured within PIC. For each event, the user may identify a series of actions, which are to take place. For example, in case of a temperature error, the user may indicate a range of activities from simply logging the event to shutting down the server on which the temperature error occurred.

For an SNMP-based Enterprise System Management Console: To manage the DMI information supplied by PIC at an SNMP-based management workstation, MIB files, located on the ISC installation CD-ROM, must be compiled on the SNMP Enterprise System Management Console. It is then possible to use the DMI-SNMP Translator to integrate DMI management with SNMP. In this case, the management requests from SNMP are translated to DMI and responses are translated from DMI to SNMP.

The following Enterprise System Management Console are supported by ISC v2:x

- LANDesk® Server Manager 6.0
- HP OpenView* Network Node Manager 5.02 for Windows NT
- CA Unicenter* TNG* 2.01 for Windows NT
- Stand-alone ISC Console, using:
  - ISC container
  - Microsoft Management Console
  - Internet Explorer* v3.02 or above
  - Netscape Navigator* v3.0 or above with ActiveX* snap-in

5.1.1 LANDesk® Server Manager 6.0

The LANDesk® Server Manager (LDSM) console dynamically builds its feature set when communication is established with a managed server. If the managed server is running the ISC Platform instrumentation software, the LDSM 3.02 console adds an option for “Intel Server Control” as a launch point in the Tools branch of the LDSM navigation tree. The LDSM 6.0 console adds an option for “Intel Server Control” as an option under the Snap-in Branch.

5.1.2 HP OpenView Network Node Manager for Windows NT

The HP OpenView Network Node Manager Console auto-detects servers running the ISC Platform instrumentation software. ISC-enabled servers display on the HP Console network map and an “Intel Server Control Applet” option is added as an option in the Tools Menu.

5.1.3 CA-Unicenter TNG

The CA-Unicenter TNG Console auto-detects servers’ running the ISC Platform instrumentation software if the ISC to CA discovery service is enabled. This service can be started either from TNG Unicenter "Auto Discovery" dialog or from the Windows NT "Services" applet.

The "Intel Tng-ISC AutoDiscovery" service creates a new "Intel Server Control" TNG object for each server having the ISC Platform instrumentation software. That TNG object displays on the map as a child of the "ISC World View" and as a child of the ISC-enabled server. The “ISC World View” displays all ISC-enabled servers.

5.1.4 Stand-alone ISC Console

The stand-alone ISC Console can be used to manage ISC-enabled servers without installing an Enterprise System Management Console application. This environment is implemented as an ActiveX control that runs within its own container or third party “container applications,” such as Microsoft Management Console, Microsoft Internet Explorer (versions 3.02 or greater) or Netscape Navigator (versions 3.0 or greater).

5.2 Supported Console Hardware Configurations

Windows 98

- Intel® Pentium® microprocessor or higher
- At least 32 MB of RAM
- At least 60 MB of available disk space
  - PIC requires an additional 10 MB

Windows NT

- Windows NT Server or Workstation 4.0
- Intel® Pentium® microprocessor or higher
- At least 64 MB of RAM
- At least 60 MB of available disk space
  - PIC requires an additional 10 MB

6 Managed Server Requirements

ISC can be used to manage Novell NetWare, Windows NT, or UnixWare servers running on several Intel system boards. A complete list of supported server system boards and qualified BIOS revision levels can be found in the README.TXT file provided with ISC.

6.1 Novell NetWare Requirements

The following are required to manage a Novell NetWare server:

- NetWare 4.2, 5.0
- One of the Intel baseboards specified in the release notes
- At least 24 MB of RAM
- At least 30 MB of available disk space
- NetWare SNMP NLM installed (required only for connectivity to an SNMP management console)
- An account with administrative rights

6.2 Windows NT Requirements

The following are required to manage a Windows NT server:

- Windows NT Server 4.0 (SP 4)
- One of the Intel baseboards as specified in the release notes
- 32 MB of RAM
- 30 MB of available disk space
- Windows NT SNMP or SNMP service must be installed (required only for connectivity to an SNMP management console)
- An account with administrative rights

6.3 UnixWare 7 Requirements

The following are required to manage a UnixWare 7 server:

- SCO UnixWare 7.1.
- Intel® Pentium® or higher processor-based server.
- One of the Intel baseboards specified in the release notes
- A minimum of 32 MB of RAM.
- A minimum of 30 MB of available disk space.
- An account with root or equivalent rights.

6.4 Additional Requirements for DMI-SNMP Translation

SNMP support must be installed in order to integrate ISC with an SNMP-based management framework. SNMP installation information may be found in Windows NT, NetWare, or UnixWare documentation.

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Section 3: ISC Standalone Console

ISC Standalone Console Contents

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ISC Standalone Console Tables

Section 3 contains no tables

7 Introduction to the ISC Standalone Console

The Standalone Console is an ActiveX* container that provides for the discovery of servers over the LAN. The Standalone Console consists of a Windows 32* graphical user interface (GUI) that provides for the discovery of servers over the LAN and serves as a launch vehicle for PIC, DPC, and CSSU. The Standalone Console GUI is comprised of a menu bar, a tool pane and a presentation screen. The tool pane shows the launch Icons for the installed tools. See Figure 7-1: ISC Standalone Screen.

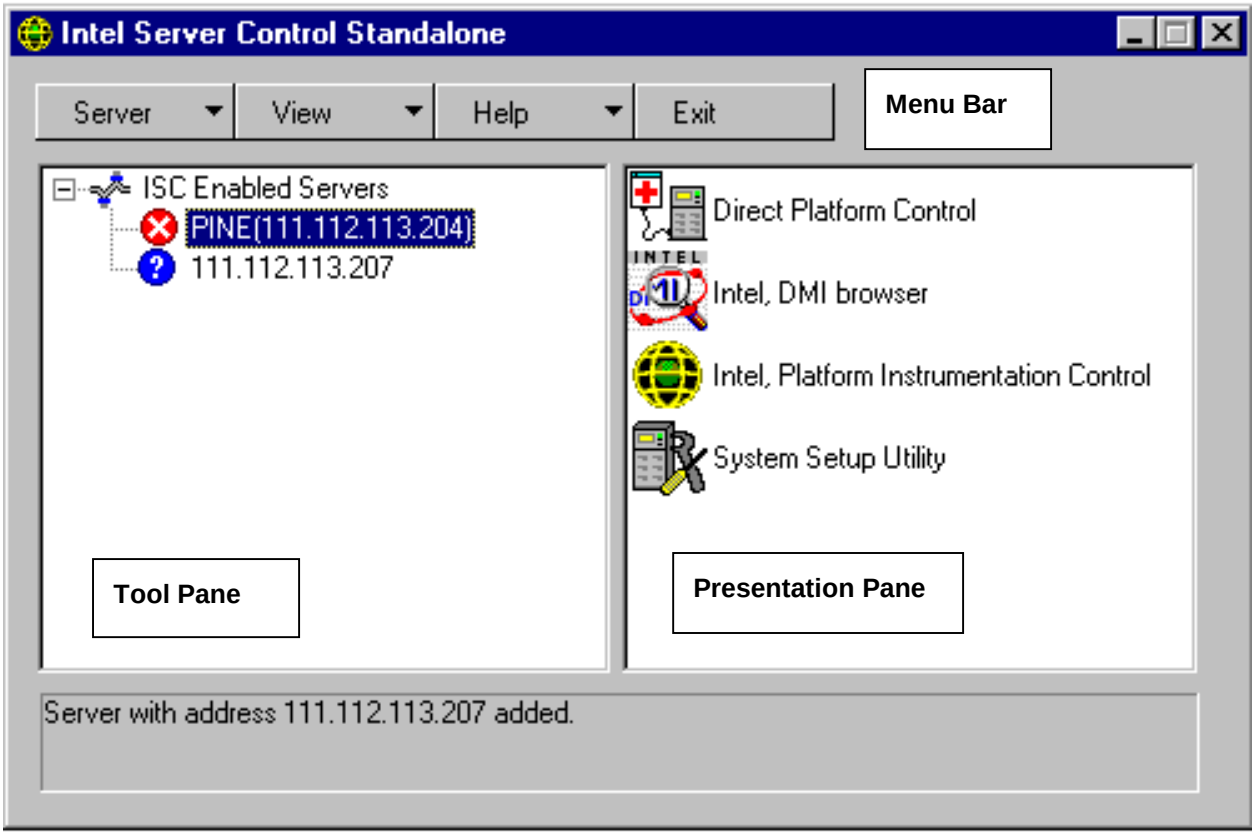

Figure 7-1: ISC Standalone Screen

As displayed in the figure, under the heading “ISC Enabled Servers”, critical ISC errors are displayed as a red circle enclosing a white “X.” Non-critical errors are displayed with a yellow triangle (not displayed). Servers that are not enabled with full ISC functionality are displayed as a blue circle encompassing a white “?.” The server name is listed to the right of the icon.

8 Standalone Console Menu Items

8.1 Drop Down Menu

The main menu options may be outlined as:

- **Server Menu**
  The Server menu item contains the following options:

Add	Adds a server to server list
Delete	Deletes a server from server list
Discover	Launches the discovery tool
Delete All	Deletes all listed servers
Exit	This option exits the applicaiton

- **View Menu**
  The View menu item contains the following options:

Icon View	Displays list view items using icons.
List View	Displays list view items in list format.

- **Help Menu**
  The Help menu item contains the following options:

Contents	Opens the ISC Standalone Console help topics.
About	Opens the ISC Standalone Console version information screen.

- **Exit Menu**
  The Exit menu item enables the user to exit the ISC Standalone console.

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Section 4: Direct Platform Control

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9 Introduction to Direct Platform Control (DPC)

The ISC Standalone application includes three major components to manage a server: PIC, DPC, and Client SSU. DPC provides emergency and out-of-band management access to the server through a modem or direct serial line connection. It also provides the ability to run DOS-based programs and diagnostics.

DPC communicates to the server through the Emergency Management Port (EMP), a server management feature that supports remote system management using a modem or serial line connection to the COM2 port on the server. Since DPC does not communicate with the server-resident operating system, it can be used to manage the server even if the operating system and the primary processors of the server are not operational. Because the platform-resident support for DPC is available on 5V standby, DPC can be used to communicate with and control a powered down server.

The capabilities provided by the DPC user interface include:

- Establish connection to remote servers
- Server Control: Reset and Power on/off operations of server
- SEL Viewer: Retrieve and display System Event Log (SEL) entries
- SDR Viewer: Retrieve and display Sensor Data Records (SDR)
- FRU Viewer: Retrieve and display Field Replaceable Unit (FRU) information
- Phonebook for remote connection management
- Modes of operation: DPC / Console redirection
- Remote control of service partition which includes the following: file transfer, program execution, and diagnostics.

Note: Available features are platform dependent.

DPC provides a user-friendly interface, the DPC Console, for monitoring and controlling the platform management features of the system. The DPC Console is a Windows 32 graphical user interface (GUI) that communicates with the Platform Management Technology resident on the server. It is the user interface to the Emergency Management Port. The GUI is designed as a set of ActiveX controls that communicates to the server using a combination of proprietary and standard networking, and serial line protocols.

The GUI integrates into a variety of widely deployed enterprise and workgroup management consoles, as well as into the ISC Standalone container. DPC relies on the management console or ISC Standalone for discovery of servers over the LAN. It supports a user-configurable phone book for aiding in dialing modem-based connections.

Figure 9-1 illustrates the architecture of the Direct Platform Control (DPC) components of the ISC product.

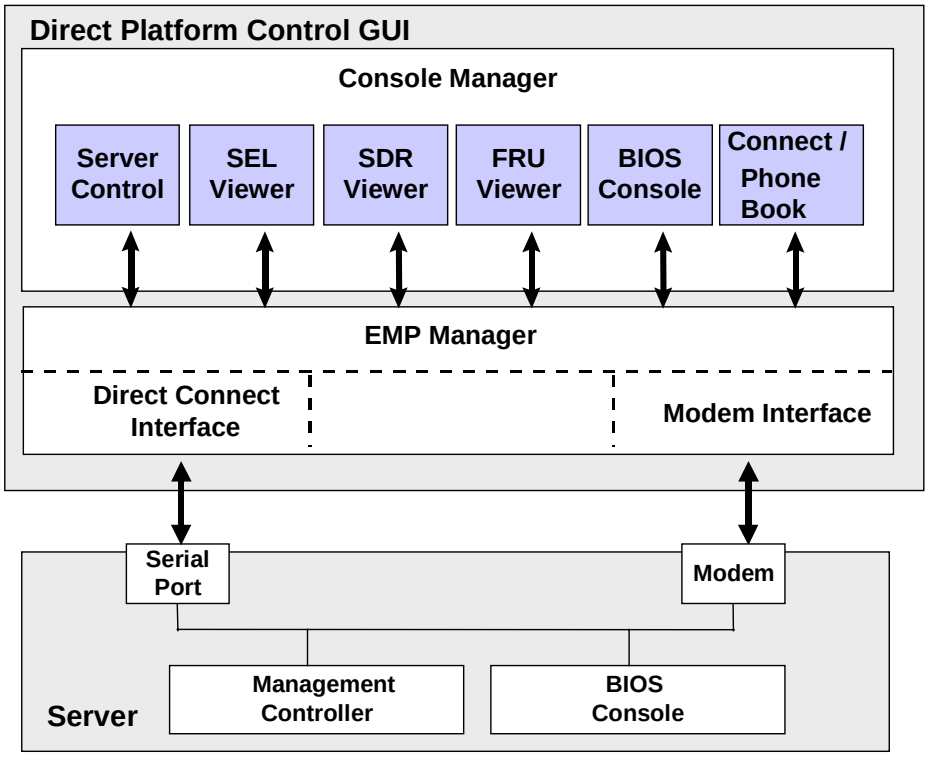


Figure 9-1: Direct Platform Control Components

Using the capabilities provided by these elements, the management console is able to make a modem connection to a target server regardless of the operational state of the server. The console can then bring the target server into a service mode by rebooting the server to the service partition, where it can perform remote operations. The DPC session to the server is secured via a BIOS-level password. The same password is used to negotiate a PPP connection after re-boot of server is initiated.

10 Console Manager

The DPC Console will support all COM ports on the client system, along with any Windows NT/98 compatible modem. The Console uses the Windows API to determine if a modem is connected and available. The DPC depends on Windows to have pre-configured the modem; the Console will configure the modem itself.

The Console Manager integrates the management plug-ins and provides a graphical user interface to launch individual plug-ins, such as the SEL Viewer, SDR Viewer, FRU Viewer, Server Control, etc. The Console Manager display consists of a menu and toolbar at the top of the display and a status bar at the bottom. The menu and toolbar provide the options to initiate plug-ins and other support functions such as modem functions. The status bar is used to display connection status information like server name, line status, mode, etc. See Figure 10-1: DPC Console Manager.

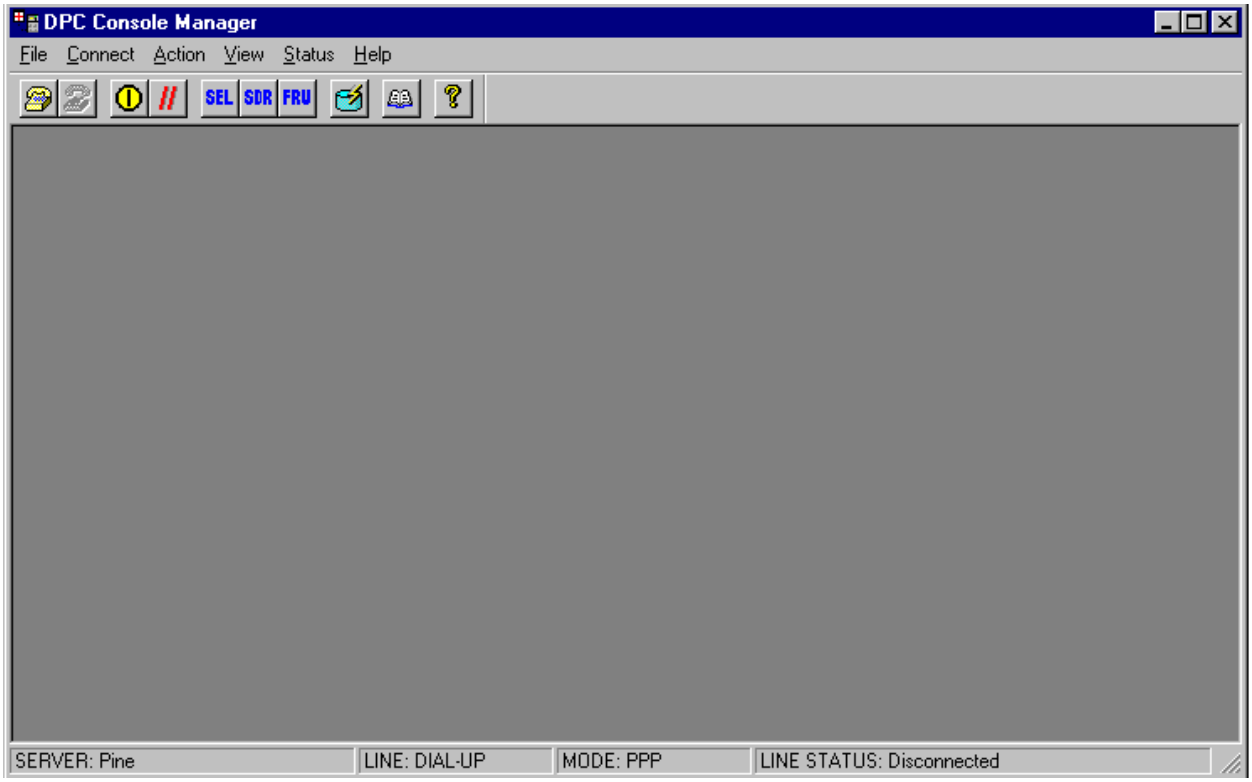


Figure 10-1: DPC Console Manager

A connection can be initiated by using the menus or toolbar icons to select the server on the dial-up line, or to select the direct line with the appropriate Serial port. This module integrates a Phonebook to maintain the list of servers and their telephone numbers. To make a connection, the user only needs to type the server name or select it from the list and click “Connect.”

The DPC Console prompts for a password before initiating a connection, even if the server is not configured with a password. If a password for the server is configured in BIOS setup, the user must enter it. If no password has been configured, the user may press the ENTER key to bypass this field. The password is not stored in the phonebook. Therefore, it must be entered each time the user begins the connection process.

Two modes of operation are available: EMP Mode and BIOS Console Redirect Mode. In EMP mode, the Console allows the user to launch one of the management plug-ins either from the tool bar or from the action menu.

In the BIOS Console Redirect Mode, the console launches a separate window and operates as a terminal. Remote server management BIOS settings can be reset / modified in this window. See Figure 10-2: EMP Console Redirect Screen.

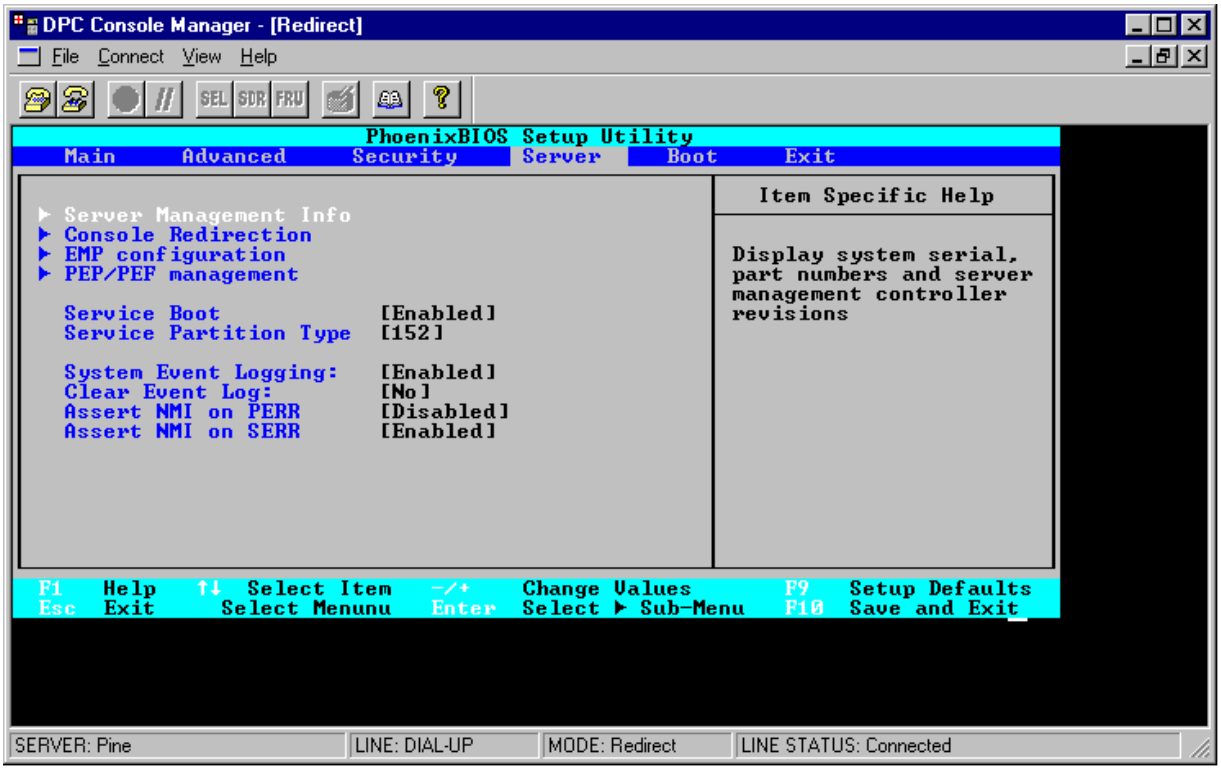


Figure 10-2: EMP Console Redirect Screen

11 Server Configuration

The BIOS on the target server supports booting from a service partition installed on the local hard disk. The EMP firmware and the BIOS on the target server together support the request and execution of a service boot.

EMP must be configured on the server to allow DPC to connect to the server using the EMP port. By default, DPC requires the use of the COM2 serial port connected to an external modem or with a serial cable.

The server must use a Hayes*-compatible 14400 BPS modem that is listed in the Windows NT Hardware Compatibility list provided by Microsoft. The server modem must be set in auto-answer mode for the DPC Console to be able to connect to it. Refer to the BIOS settings for enabling the DPC connections.

DPC requires the following elements:

- EMP firmware running on the target server.
- BIOS Console Redirection for remote access to pre-boot BIOS setup.

For running a DOS shell, DOS based programs and diagnostics, DPC needs additional elements to be available at the server.

- BIOS support on the target server for booting from a service partition.
- A service OS such as DOS or ROM-DOS installed on the target server's service partition with a third party TCP/IP stack which includes PPP.
- A remote service agent running on the target server.
- OS Agents

With the capabilities provided by these elements, the management console may make a modem connection to a target server regardless of the target server's operational state. The console can then bring the target server into a service mode by rebooting the server to service partition, where it can perform remote operations. The DPC session to the server is secured via a BIOS-level password. The same password is used to negotiate PPP connection after re-boot of server is initiated.

12 Security

When connecting to the server, DPC ensures security of the server with a password. The maximum length of the password is eight alphanumeric characters. For enhanced security, the password is case-sensitive. The user enters the password at the DPC Console and it is sent to the server in clear text.

If the user fails to enter the correct password in three successive attempts, the server rejects the password and locks up the interface for 30 seconds. The DPC Console displays a “Password rejected” message and disconnects the line. An appropriate event is logged in the SEL.

The password is not saved on the machine running the DPC Console and it is not stored in memory while DPC is running.

In addition to password security, all communication with the DPC is logged in the SEL viewer and the operating system event (system) logs. Because of this, a security breech can be detected. In addition, BIOS restricted mode prevents unwanted users from accessing servers in DPC mode.

13 Making a Connection

DPC can initiate a connection on either a serial line or a dial-up line. DPC initially expects the server to be in EMP mode and it attempts to connect using EMP protocols. After successfully connecting, the EMP supported actions, such as Power on/off, Reset and the SEL/SDR/FRU/Redirect Viewers are enabled, depending on the server configuration.

The Power off and Reset operations ensure a graceful shutdown in case an OS is running. For these actions, DPC will generate an SMS message with the OS shutdown option. This operation may take more time depending on the number of applications running on the server. In the EMP mode, the user can at any time request for a reboot of the server to the service partition by selecting the option from a menu or the toolbar. When the user requests a “power off”, DPC will send a “Shutdown command” followed by the “power off” command.

14 Console Redirection

The Console redirection control enables a display of “redirected” data from server when the server switches over to BIOS console redirection. In this mode, the Console launches a separate window, which emulates an ANSI terminal. The Redirect window display is the same as the server console display and will operate like a remote terminal. All the user keystrokes are translated and transmitted to remote server and the corresponding responses from the server are displayed.

The Console Redirection is active only when the server is operating in “real” mode. When the server is running in DOS, redirection is available, since DOS is considered to be running in real mode. When an OS like Windows NT/98 is running on the server, console redirection is not available, since the machine is switched to protected mode when an OS is running.

The operation of switching between EMP and Redirect modes will depend up on the setting of the EMP access mode in the BIOS setup of the server. This mode can be one of the following:

- Preboot only
- Always active
- Disabled

The server enters console redirect mode only if this feature is enabled through BIOS setup. The DPC Console will enter the redirect mode under the following conditions:

- When DPC Console is connected to the server in EMP mode and the server is switched to redirect mode, the BMC sends a special “EMP active” message.
- While initiating a connection, if DPC Console fails to connect in EMP mode within ten seconds. In this case, the user is given the option to switch to redirect mode, assuming that the server may be in the redirect mode. However, no data is displayed in redirect window if the redirection is either not enabled or EMP is disabled in the BIOS setup or server is in “protected” mode running OS.

15 DPC Plug-ins

The Plug-ins available through DPC include:

- Server Control
- SEL Viewer
- SDR Viewer
- FRU Viewer

15.1 Server Control

The Server Control plug-in provides power up / down and reset functions. The power up / down function is used to power-on or power-off the server. This function also allows the user to set post-power-up options, which can be used to set the operating mode to EMP active or BIOS redirection on the next power on.

The server firmware that responds to the DPC Console will operate on Standby Power. The reset function can be used to generate reset on the server with a post-reset option similar to the power up / down function. The power down and reset functions are disabled if the server is in "restricted" mode for EMP operations. However, the power up function is available even when the server is in "restricted" mode.

15.2 SEL Viewer

The SEL Viewer plug-in provides access to the System Event Log on the server and will have the functionality to display the SEL records.

Note: SEL information is displayed on supported servers only.

15.3 SDR Viewer

This plug-in allows the user to view the Sensor Data Records, retrieved from the SDR Repository. The SDR Viewer can be optionally either to display records of a particular sensor type or to display records for all sensor types.

15.4 FRU Viewer

The FRU Viewer allows the user to display the Field Replaceable Unit data. The information displayed includes chassis information, baseboard information and product information.

16 Reboot from Service Partition

Note: The reboot from service partition is NOT supported on direct line connection.

The option to reboot from the service partition allows the user to run DOS-based utilities that are installed on the service partition. When the user initiates this action, the DPC Console first checks for the presence of a service partition on the server and allows a reboot only if the server partition is detected. This option also checks the power status of the server and switches on the power if it is currently powered off.

The DPC will reboot the system with a reboot and OS shutdown option. The BIOS console redirection is enabled by the server to display the status of BIOS reboot on the DPC. It then waits for "ProtSwitchReq" message from BIOS or Remote Service Agent (RSA). The DPC then acknowledges with a "PortSwitcAck" message and prepares itself to switch from EMP to PPP connection.

After establishing the PPP connection, the DPC no longer communicates to the EMP controller. All actions that are supported in EMP mode are disabled. The user interface is modified to allow the user to run the DOS shell, DOS commands and diagnostics. After switching to a PPP connection, the user will need to disconnect from the server and reconnect to again operate in EMP mode.

17 Modes of Operation

DPC displays the current operational mode in the status bar. The following modes are displayed.

- EMP Mode
- Redirect Mode
- PPP Mode
- PPP-Redirect Mode

These modes are described in the following sections

17.1 EMP Mode

DPC always initiates a connection in this mode. If DPC fails to establish a connection, it allows the user to switch to redirect mode. EMP mode is supported in the existing DPC Console.

17.2 Redirect Mode

Redirect mode is active when server is running BIOS console redirection. DPC emulates an ANSI terminal and the redirected data is decoded and displayed in a separate window. At the same time, the keystrokes are redirected to the BIOS running on the server. This mode is supported in the existing DPC Console.

17.3 PPP Mode

PPP mode is entered when the user selects the option to reboot from the service partition, and a successful PPP connection is established. This mode allows the user to run the DOS-based utilities that are resident on the service partition.

17.4 PPP-Redirect Mode

PPP-Redirect mode is similar to the Redirect mode but differs in that it uses the TCP/IP stack for the data transfer. DPC supports two methods of executing DOS based utilities. The first method is selecting a utility from the program list. This program list is a set of standard utilities, which are pre-configured with full program path. The second method is to use DOS command shell to get the command prompt and execute the utilities. For both of these methods, DPC opens a redirection window and starts protocol based console redirection process with the server.

This mode can be entered only through “PPP mode”. When DOS shell or text based programs are executed, DPC issues “StartProtRedir**”** command to the server to enable PPP based redirection. Some of the utilities may not display any data and thus do not require redirection. Therefore, DPC stores this status in the configuration data for all the utilities.

Only one DOS-based utility or command shell may be running at one time. Because DOS is a single-threaded OS, DOS programs cannot be executed concurrently with the File Transfer Service.

18 DPC User Interface

This section provides a detailed description of the GUI for DPC and the management plug-ins.

At start-up, DPC displays the main menu, toolbar and a status bar. These can be used for start-up actions like making connection and launching a plug-in. The status bar is always active and displays the server status information (server name, line status and the mode).

18.1 EMP Mode

The Main Window of the DPC Console Manager in EMP Mode is displayed in Figure 18-1. DPC Main Window. The sections following the diagram describe the components and menu items on this screen.

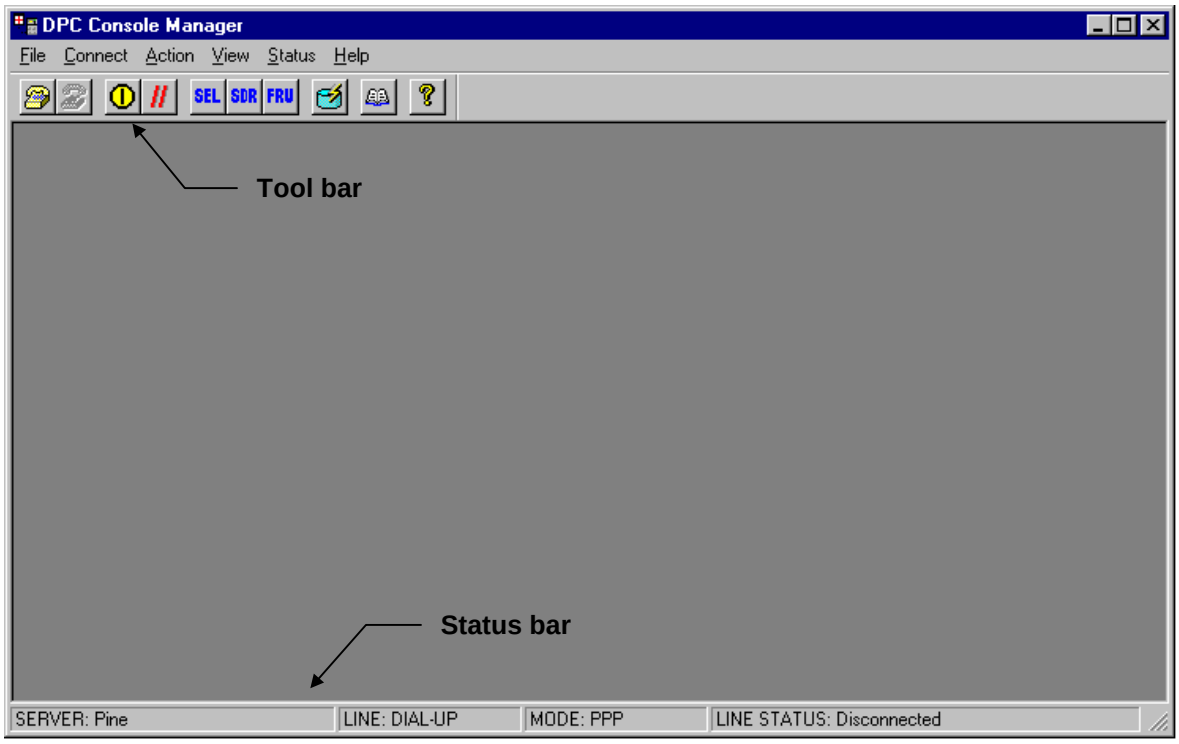


Figure 18-1. DPC Main Window

18.1.1 Main Window

The Main Menu options may be outlined as follows. Details of the Main Menu options follow in the sections below.

File Menu

Exit
Close

Connect Menu

Disconnect
Re[connect]

[Server Name]

Action Menu

Power On/Off
Reset
SEL Manager
SDR Manager
FRU Manager
Phonebook
Reboot Service Partition

View Menu

Toolbar
Status Bar

Status Menu

Server Configuration

Help Menu

Help Topics
About DPC Console

18.1.1.1 File Menu

The File menu provides standard file menu operations like open, close, exit, etc. Menu items change depending on the active plug-in. When no plug-ins are active only "exit" menu item is displayed.

- **Close Menu Item**
  This option displayed when a plug-in window is open and allows the user to close the active plug-in.
- **Exit Menu Item**
  This option gracefully disconnects and cleans up, then terminates the execution of the DPC Console application. This option raises confirmation dialog before closing the application.

18.1.1.2 Connect Menu

This menu is used to initiate a connection or disconnect the existing connection or both. This menu also lists the last five names of servers for which a connection had been attempted. This menu displays the Disconnect, [Re-]Connect and Most Recent Connections items.

- **Disconnect Menu Item**
  This menu option is used to terminate the existing connection. The user is asked to confirm the disconnection.
- **[Re-]Connect Menu Item**
  This option is used to initiate a connection with a server. This command terminates the existing connection if any, before initiating new connection. The user is asked to confirm disconnect before initiating the re-connection. This menu displays the connect dialog with list of servers and line selection options. The Connect dialog is shown below and is followed by a description of its controls and features.

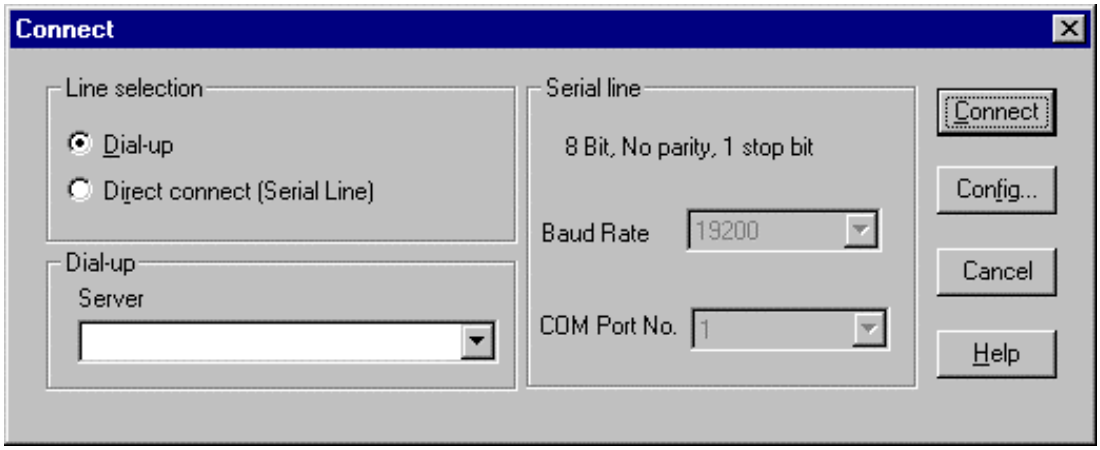


Figure 18-2: Connect Dialog

Table 18-1: DPC Connect Dialog Controls

Control	Function
Sever	The server name can be entered or selected from a dropdown edit box. The edit box displays the list of servers that are generated using phonebook option. This edit box is used only with dial-up lines and enabled only with “dial-up” line selection.
Line selection Group	Select either Dial-up or Direct connect. The default selection is Dial-up.
Dial-up Radio Button	The dial-up line initiates a connection using the modem. This selection enables the server edit box to enter/select server name.
Direct Radio Button	The direct connect option uses a local serial port selected by the user. Selecting this button enables the baud rate and serial port No edit boxes.
Serial Line Group	This group is enabled if the line selection is set to direct-connect.
Baud rate Dropdown Box	The default baud rate is 19200 bps, 8 bit, 1 stop bit with no parity. The dropdown box displays only 19200 and user can not select any other baud rate.
COM Port No. Dropdown Box	This control allows the user to select one of the four Serial ports (1 to 4).

Control	Function
Connect Button	This button initiates a connection to the selected server. A server from the server dropdown box must be selected before initiating the connection.. The user is always prompted for the password entry once connect button is clicked, even if no password is set on the server.
Config Button	This button displays the phonebook dialog. The ALT-F key combination will click the Config button.
Cancel Button	This button is used to exit the connect dialog canceling any changes. The ESC key will click the connect button.
Help Button	The help button displays the usage information for the connect dialog in a help window. The key combination ALT-H will click the Help button.

18.1.1.2.1 Making a Connection

An EMP connection can be initiated in either "direct connect" or "dial-up connect" (modem) modes. The DPC Console initially expects the server to be in the "EMP mode" of operation.

If the connection is successful, the status bar indicates "Connected". If the "EMP Active" message is not received within 10 seconds it reports a "EMP not active" message and prompts the user to switch to "redirect" mode.

If the user selects "Yes" the DPC Console switches to "redirect" mode and the status bar indicates "connected". If the server has redirection setup and enabled, the redirected data is displayed in the Redirect window.

If "No" is selected, the console waits 30 seconds for the "EMP active" message and disconnects the line after time out period. If the server has EMP disabled and redirection disabled, then EMP fails to connect in EMP mode and no redirect data is displayed in Redirect window.

18.1.1.2.2 Password Operation

When connecting to the server, the user is prompted to enter the password (8 characters maximum). If the server indicates that password is invalid, it reports back with a password error message and allows the user to enter the password again. If the user fails to enter the correct password in three successive attempts, the server rejects the password and locks up the interface for 30 seconds. The DPC Console displays "Password rejected" message and disconnects the line.

The DPC Console can enter redirect mode directly if the server is already in redirect mode and a connection is initiated. The EMP password entered by the user is stored and used for reconnection whenever the server switches from redirect mode to EMP mode. However, while in redirect mode, the user is prompted to enter the BIOS password if BIOS is setup with a password.

18.1.1.3 Action Menu

This menu is used to initiate an action with the remote server. This is also used to configure the Phonebook. When the user selects a menu item other than the Phonebook, the system checks the connection status and in case of no connection, prompts the user with Connect dialog. The management plug-ins are launched only after establishing the connection. The menu items on this menu are as follows.

- **Power on/off Action Menu Item**
  This menu item allows the user to power the server on or off, with post-power-up options. Clicking the menu item displays the Power on/off dialog, shown below.

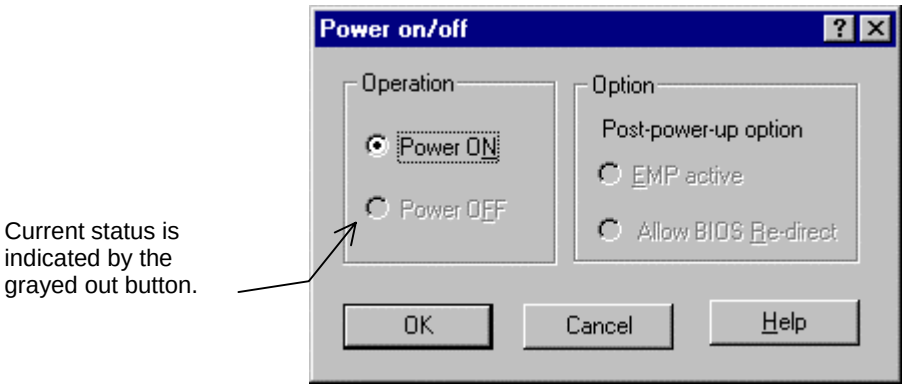


Figure 18-3: Power on/off dialog

Table 18-2: Power on/off Dialog Controls

Control	Function
Operation Group	This group displays the Power ON or Power OFF radio button and one of the buttons is automatically checked depending on the present power status of the server. The user needs to click OK button.
Power ON Radio Button	This button is enabled and checked if the server presently is powered-off.
Power OFF Radio Button	This button is enabled and checked if the server is presently powered-on. If the server is in restricted mode for EMP operations, then an error message is displayed after the user clicks OK button. In this case, the error message “Server is in RESTRICTED mode. This operation can not be performed” is displayed.
Option Group	These buttons allow the user to select the mode (EMP or Allow BIOS redirect) effective for the next power-on and are enabled only when the current operation is “power OFF”. The default selection is EMP active.
EMP active Radio Button	This button sets the mode to EMP for the next power-on and server comes up in EMP mode after next power-on. The server comes up in EMP mode although the Console Redirection is enabled on the server.
Allow BIOS Redirect Radio Button	Selecting this button during power-off sets the server to come up in redirect mode. The server switches to redirect mode only if the Console Redirection is enabled in the BIOS set up. In this case, the DPC Console displays a dialog “Server switched to Redirect mode. Switching to redirect mode”.

- **Reset Action Menu Item**
  This menu item allows the user to reset the server with post-reset options. Clicking this menu item displays the reset dialog described below.

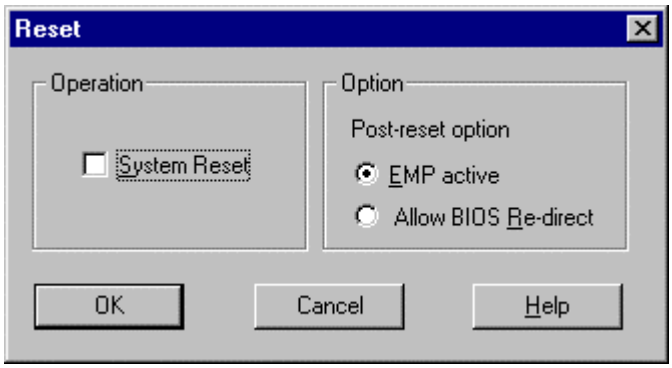


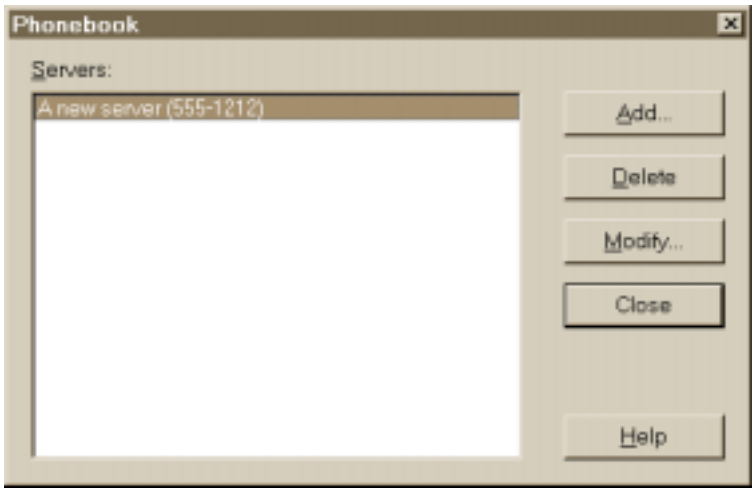
Figure 18-4: Reset dialog

Table 18-3: Reset Dialog Controls

Control	Function
Operation Group	This group contains the System Reset checkbox.
System Reset Checkbox	If this checkbox is checked and the user clicks OK, then the server is reset with the selected post-reset options. If the server is configured in RESTRICTED mode then an error message. "Server is in RESTRICTED mode. This operation can not be performed" is displayed.
Option Group	This group is used to select the post-reset option, i.e., EMP active or allow BIOS re-direction effective after reset. The default selection is EMP active.
EMP active Radio Button	This radio button sets the server in EMP mode after Reset operation. The server comes up in EMP mode even through the Console Redirection is enabled on the server.
Allow BIOS Redirect Radio Button	Selecting this button with Reset operation sets the server to come up in redirect mode. The server switches to redirect mode only if the Console Redirection is enabled in the BIOS set up. In this case, the DPC Console displays a dialog "Server switched to Redirect mode. Switching to redirect mode".

- **SEL Manager Action Menu item**
  Clicking this menu item will launch the SEL Viewer management plug-in and allows the user to view the SEL records. The data can be saved in a file for future analysis. It also provides various options to view the data selectively.
- **SDR Manager Action Menu Item**
  This option allows the user to view Sensor Data Records. .
- **FRU Manager Action Menu Item**
  This menu provides the user with Field Replaceable Unit data from the server's baseboard FRU information area. .

- **Phonebook Menu Item**
  This menu option is used to make new entries in the phonebook and/or edit the existing entries. This option pop-ups a dialog box with the following controls and buttons.



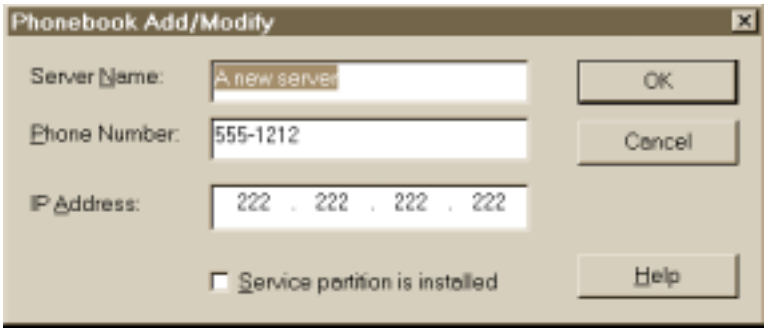


Figure 18-5: Phonebook Dialogs

The following buttons are provided to access the phonebook and/or initiate connection to the selected server.

Table 18-4: Phonebook Dialog Controls

Control	Function
Operation Group	This selects the operating mode of phonebook. Details are provided below.
Add Button	Click on this button to make a new entry in the phonebook. Selecting this pops up the Add/Modify Dialog. All fields are blank and must be filled in before clicking OK. The ALT-A key combination also selects this button.
Delete Button	Click on this button to delete the currently selected entry in the list box. The ALT-D key combination also selects this button.
Modify Button	Click on this button to edit the currently selected entry in the list box. Selecting this pops up the Add/Modify Dialog with the information for the currently selected entry in the dialog edit fields. The ALT-M key combination also selects this button.
Close Button	Click on this button to close the Phonebook Dialog.
Help Button	Click on this button to access help on the phonebook.

- **Reboot Service Partition Action Menu item**
  This menu option is used to reboot the server from the service partition. When the user selects this item a warning message requiring confirmation is displayed to the user to indicate that the server is running OS and a reboot will cause the system to shutdown. A reboot will make all server services inaccessible to end-users.

  This operation is allowed only when DPC is in EMP mode. The server's BIOS contains support for booting from a service partition installed on the local hard disk. After "Reboot" command the server enables the console redirection and attempts to reboot from the service partition. The user can view all the pre-boot messages in the redirection window.

  If BIOS fails to boot from the service partition, an error message will be displayed in the redirection window. In this case, the user needs to terminate the service boot operation. On successful completion of service boot, DPC establishes a PPP connection with server and the status bar is updated accordingly.

18.1.1.4 View Menu Item

This option displays the toolbar to display DPC icons. The SEL, FRU, SDR, RESET, Power on/off, Reboot service partition, are display when the Toolbar menu item is selected. With the "Status Bar" the server name, connection type, and connection status are displayed at the bottom of the main DPC console. Both the Toolbar and the Status Bar will have check mark next to them when they are enabled.

18.1.1.5 Status Menu Item

This option displays an information dialog and gives the chassis status and EMP configuration of the server. This information is available when DPC successfully connects in EMP mode. The information is displayed in the dialog box with separate check boxes for each capability.

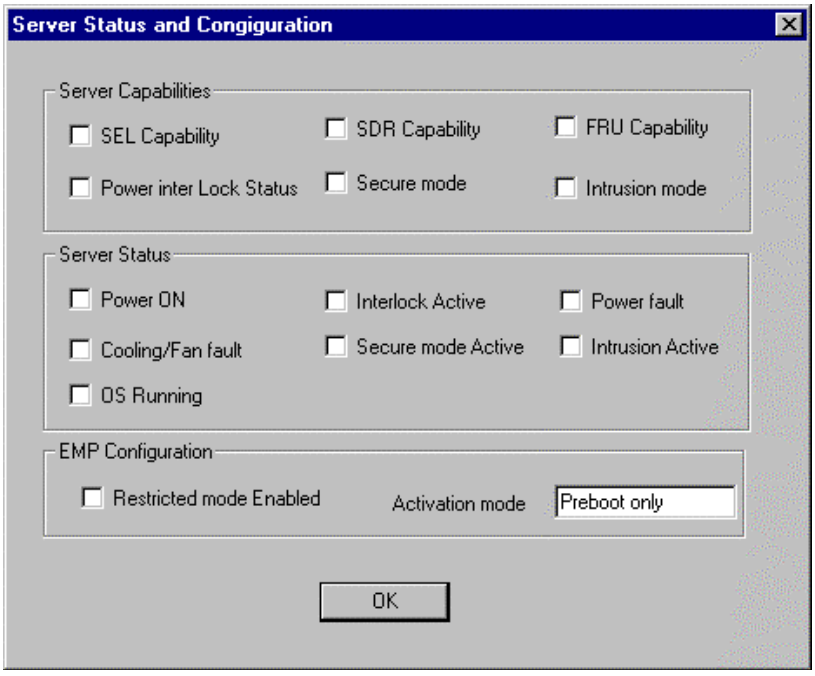


Figure 18-6: Server Status and Configuration

The information dialog box displays the status under three groups. The capability exists if check box is marked.

Table 18-5: Server Status and Configuration Controls

Control	Function
Server capabilities Group	This group gives the SEL, SDR, FRU, Power Inter Lock Status, Secure mode and intrusion status.
Server status Group	Displays the Power status, Interlock active status, Power fault, Cooling fault, Secure mode and intrusion active and OS run status.
EMP Configuration Group	Gives Restriction mode and Activation mode status.

18.1.1.6 Help Menu

This option displays detailed information about the procedures and the options to operate the DPC console. This menu displays the following menu items.

- **Help Topics menu Item**
  The operating procedures are displayed in a separate window, i.e., help window. The help explains, the step by step sequence of various operations and options provided in the application.

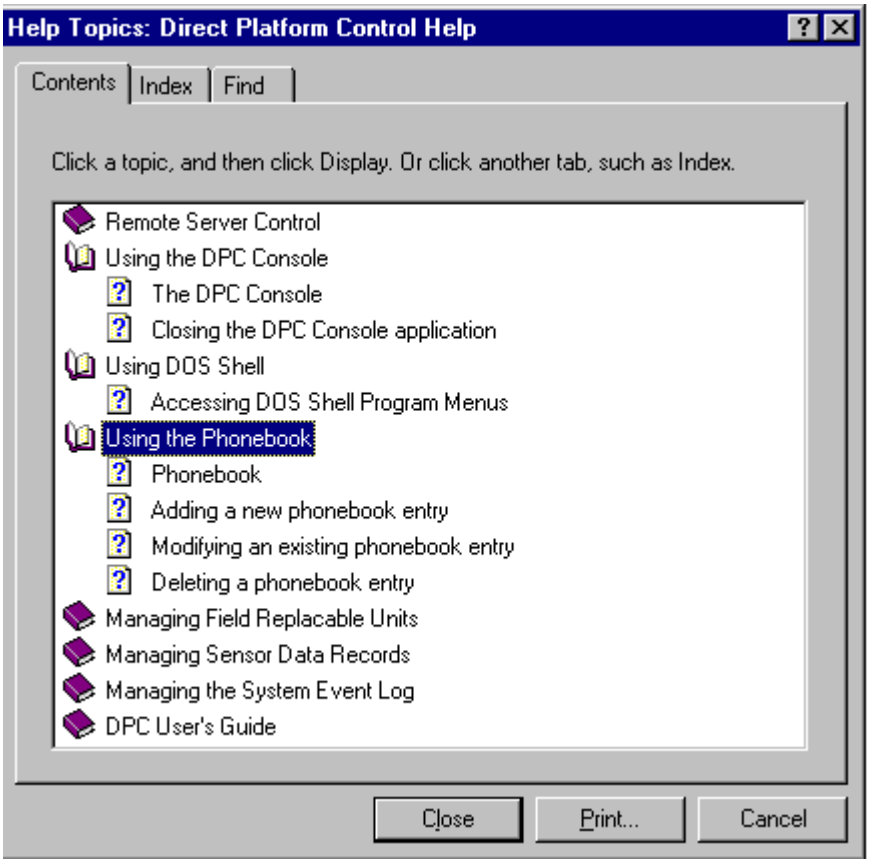


Figure 18-7: Help Topics window

- **About DPC Console Menu Item**
  This option displays the version information and release build information for the product.

18.1.2 Toolbar Buttons

The toolbar, located below the Main Menu, provides the same functionality as the "Connect", "Action" and "Help" Main Menu items. The following is the list of toolbar buttons.

Table 18-6: DPC Toolbar Buttons

Icon	Command	Function
	Connect	Opens a connect dialog to initiate a connection. This is the same action as that performed by the Main Menu / Connect option.
	Disconnect	Disconnects an existing connection. This is the same action as that performed by the Main Menu / Disconnect option.
	Power on/off	Switches on and off the server power. This is the same action as that performed by the Main Menu / Action / Power on/off option
	Reset	Resets the server with post reset options. This is the same action as that performed by the Main Menu / Action / Reset option.
	SEL Viewer	Retrieves and displays the SEL entries. This is the same action as that performed by the Main Menu / Action / SEL Viewer option.
	SDR Viewer	Retrieves and displays the SDR entries. This is the same action as that performed by the Main Menu / Action / SDR Viewer option.
	FRU Viewer	FRU Viewer retrieves and displays the FRU information. This is the same action as that performed by the Main Menu / Action / FRU Viewer option.
	Phonebook	Maintains telephone entries for dial-up lines. This is the same action as that performed by the Main Menu / Action / Phonebook option.
	Reboot Service Partition	Issues a "Reboot from Service Partition" command to the Service Partition. This is the same action as that performed by the Main Menu / Reboot Service Partition option.
	Help	Displays the help topics. This is the same action as that performed by the Main Menu / Help option.

The status bar displays the status information in the following panes, when a new connection is initiated.

Table 18-7: DPC Status Bar Information

Screen location	Status information	Status description
1st pane (left most)	Server name	The server name is displayed when the connection is initiated on dial-up line. This field is blank for direct line connection.
2nd pane	Line	Displays line selection i.e., "Direct: or "Dial-up".
3rd pane	Mode	Indicates one of the console mode i.e., "EMP" or "Redirect" or "PPP" or "PPP-Redirect".
4th pane(right most)	Line Status	Indicates all the status and error information while initiating connection and disconnection. Once the connection is successfully completed, it displays "Connected" throughout the DPC Console operation and then "Disconnected" when the line is disconnected.

18.2 Console Redirect Mode

The Console redirection control enables display of "redirected" data from server when the server. In this mode, DPC launches a separate window that emulates an ANSI terminal and operates like remote terminal. The Redirect window displays the data visible on the server console. All the user keystrokes are translated and transmitted to remote server and the corresponding responses from the server are displayed. The Console Redirection is active only when the server is operating in "real" mode.

The DPC Console expects the server in EMP mode when a new connection is initiated. While connected in EMP mode, it switches to redirect mode only when server sends a switch over message. Initiating a new connection when the server is already in redirect mode will result in message “server not responding in EMP mode”. However, the DPC Console will display an option to enter redirect mode after the time out period. This time out is presently set to 10 seconds.

DPC closes all EMP based plug-ins before switching to redirect mode and creates a redirect window. However, other operations like File-close, connect-reconnect, connect-disconnect and help are enabled. Windows system menu functions like minimize, maximize and close are allowed, but the redirect window cannot be resized. Closing the redirect window will disconnect the line.

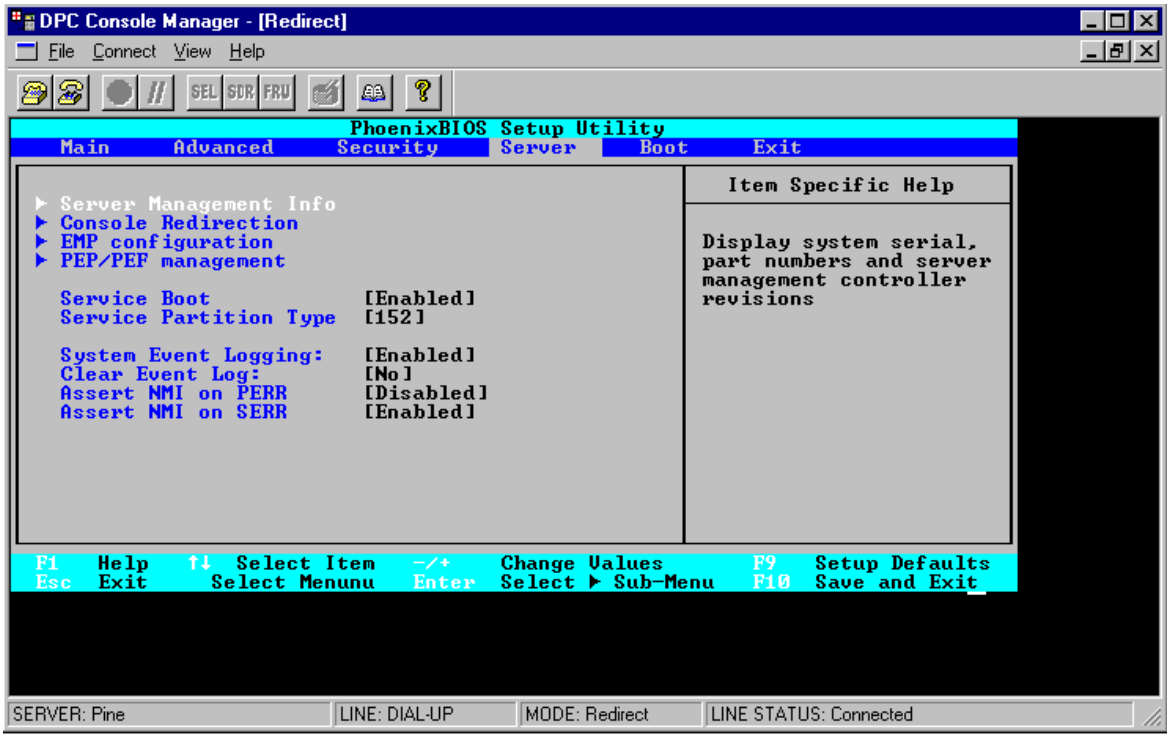


Figure 18-8: Redirect Window Showing BIOS Setup

The following menu operations are available:

Table 18-8: Redirect Window Controls

Control	Function
File	This menu provides the sub-options Close and Exit. The Close option will display a confirmation dialog before closing the redirect window and disconnecting the line.
Connect	This menu provides [Re]Connect and Disconnect menu items
Help	This menu provides Help Topics and About DPC Console menu items

18.3 PPP Mode

This menu is enabled when DPC establishes a PPP connection after service boot. The menu allows the user to run the text-based utilities. For this purpose, DPC opens a redirect window and the user can operate like a remote terminal.

18.3.1 File Menu

This menu provides the sub-options Close and Exit. The Close option will display a confirmation dialog before closing the redirect window and disconnecting the line.

18.3.2 Connect Menu

This menu is used to initiate new connection and terminate an existing connection to the server. This menu is also used to shutdown the PPP connection. The following menu items are available:

- **Disconnect**
  The disconnect option closes the current open connection to the server.
- **[Re]connect**
  The [Re]connect option establishes a connection to the selected server.
- **Close Service Partition**
  This option is used to terminate the PPP session. After closing the PPP session, DPC switches back to EMP mode and user can continue the EMP actions.

18.3.3 Action Menu

This menu option is used to execute the DOS based utilities available under service partition and the following menu items are provided.

- **Run DOS Shell**
  This option is used to start a DOS command shell. The DOS command prompt can only be started when no other DOS-based software is running. DPC opens a redirection window to display the response and the keystrokes are transmitted to the server. Figure 18-9, below, gives a snapshot of a DOS shell window. The DOS command shell can be used to change current directory and to run diagnostics.

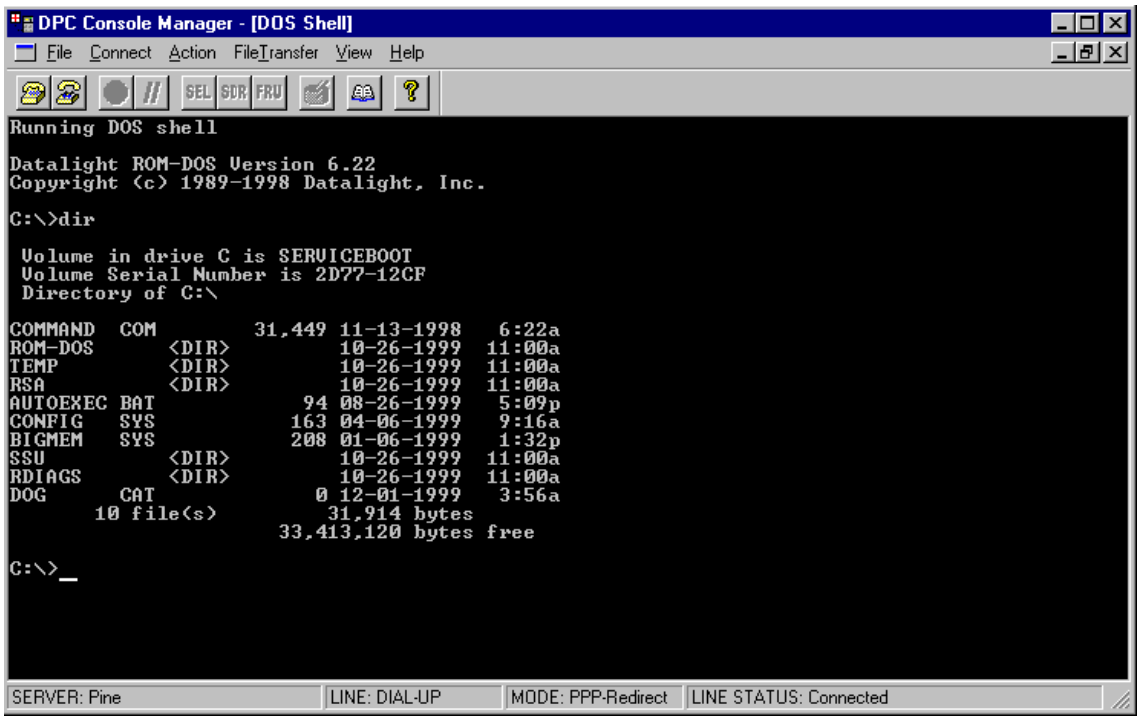


Figure 18-9: DOS Shell Window

- **Run Program**
  This menu option is used to run a program from the pre-configured utilities. The user need only to select the program name from the drop-down program list. The user can also edit the program list by clicking “Config” button, which initiates “Edit Program List” operation.

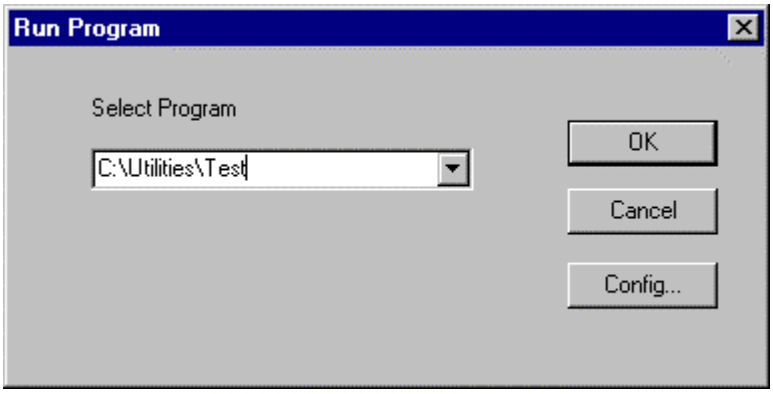


Figure 18-10: Run Program Dialog

- **Edit Program List**
  This option is used to edit programs in the list.

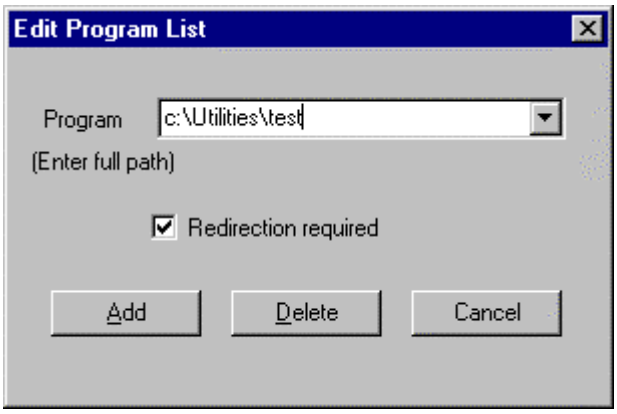


Figure 18-11: Edit Program List Window

The following controls are available:

Table 18-9: Edit Program List Controls

Control	Function
Program	Used to enter full path of the program when adding new program. This also used to select the program name when deleting entries.
Redirection Required	The redirection option creates redirect window when the program is executed.
Add	Used to add a new program. The user needs to type the full path of the program.
Cancel	This is used to terminate editing of program list.

- **Run Diagnostics**
  This menu item is selected to run the diagnostics remotely on the server. This is a pre-configured DOS program with an exception that user can not edit the program path. (If the user wants to setup another set of diagnostics to run under DPC, the edit program list menu item should be used) This action creates a redirection window and executes the diagnostic program, which launches the initial screen.

18.3.4 Upload

This menu option is used to transfer files from the client to the server in binary mode. When the user clicks this menu option, a dialog is displayed with the following controls:

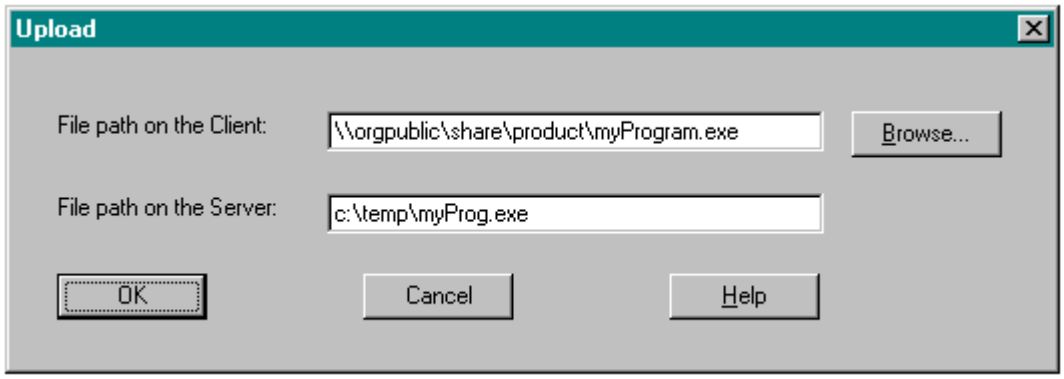


Figure 18-12. Upload Dialog

Table 18-10: Upload Dialog Controls

Control	Function
File path on the Client	This is the directory structure and the name of the file that needs to be transferred. If this file does not exist on the client, an error message is displayed to the user.
Browse	The user can click this button to browse the directory structure on the client to locate the file to be transferred to the server.
File path on the Server	This is the directory path and the name of the file, as it will be stored on the server. If the directory structure does not exist on the server an error message is displayed to the user. The user can confirm the directory structure by using the Run Dos Shell menu option specified earlier to verify or create the directory path to be used here. If the file already exists, it will be over written. The transfer is done in binary mode i.e. no conversion for CR-LF (carriage return and line feed is performed).
OK	Click this button to start the upload process, after the correct file paths have been specified. The named file is uploaded from the client to the server in binary mode.
Cancel	Click this button to dismiss the dialog, without uploading any file.
Help	Click this button to view the help related with this dialog.

18.3.5 Download

This menu option is used to transfer files from the server to the client in binary mode. When the user clicks this menu option, a dialog is displayed with the following controls:

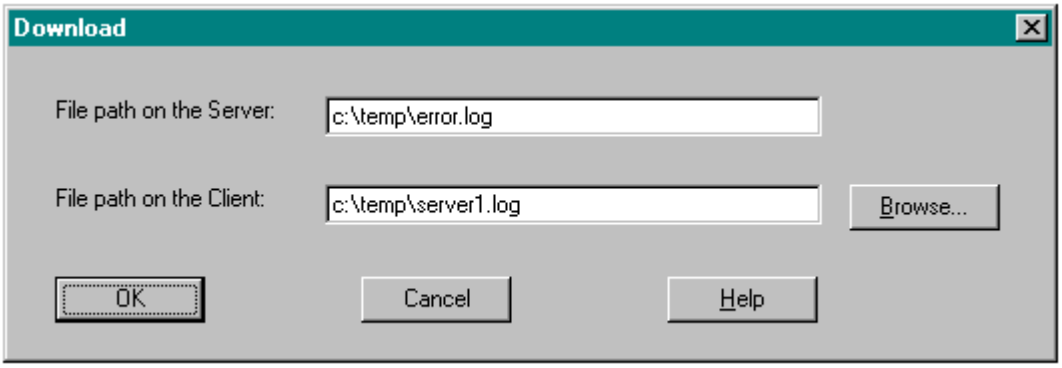


Figure 18-13: Download Dialog

Table 18-11: Download Dialog Controls

Control	Function
File path on the Server	This is the directory structure and the name of the file that needs to be transferred. If this file does not exist on the server, an error message is displayed to the user. The user can confirm the directory structure and existence of the file by using the Run Dos Shell menu option specified earlier. The transfer is done in binary mode i.e. no conversion for CR-LF (carriage return and line feed is performed).
File path on the Client	This is the directory path and the name of the file, as it will be stored on the client. If the directory structure does not exist on the client an error message is displayed to the user. If the file already exists it will be over written.
Browse	The user can click this button to browse the directory structure on the client to locate the directory to which the file is to be transferred to the client. The user needs to append the name of the file on the client to the directory path selected.
OK	Click this button to start the download process, after the correct file paths have been specified. The named file is downloaded from the server to the client in binary mode.
Cance	Click this button to dismiss the dialog, without downloading any file.
Help	Click this button to view the help related with this dialog.

18.3.6 Help Menu

This menu item is same as the Help Menu in the Main Menu.

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Section 5: Service Partition

Service Partition Contents

Service Partition Figures

Service Partition Tables

Section 5 contains no tables

19 Introduction to the Service Partition

Both the Client System Setup Utility (CSSU) and the Diagnostics components of the ISC product rely on the server's Service Partition, illustrated in Figure 19-1: Service Partition.

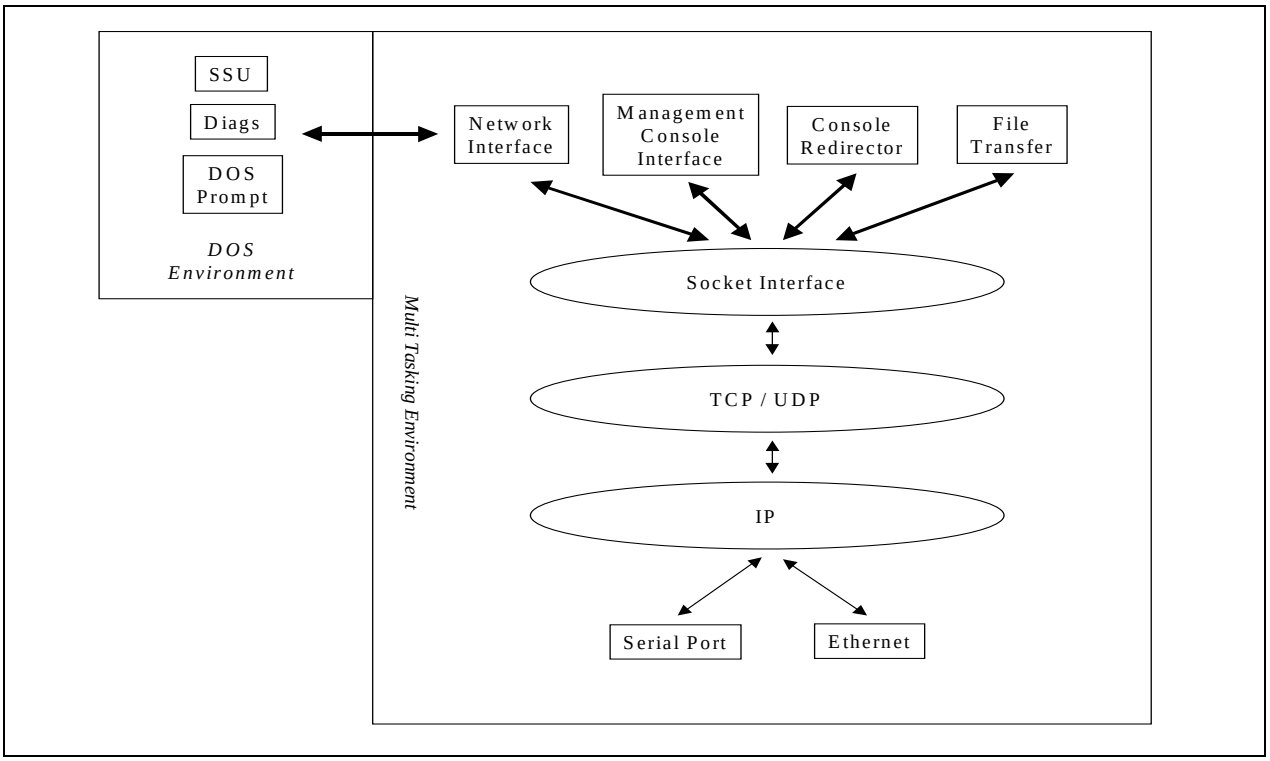

Figure 19-1: Service Partition

The Service Partition provides a standard communication stack that can be used over a modem or a serial port to support remote control of SSU, diagnostics or any other utility designed to be compatible with this environment.

The Service Partition is installed on a separate file system partition. It hosts the DOS operating system, SSU, and Diagnostics agents / tests. The Service Partition is used to host those ISC functions, which require access to local, writable media. The DOS operating system is configured with the TCP/IP, PPP and FTP protocols. The Client SSU and Diagnostics agents are used to communicate with the remote console applications.

The Service Partition also supports the redirection of a text-based console over all of the supported communication paths.

20 Service Partition Boot

Using the capabilities provided by Direct Platform Control on the console and the Platform Management Technology on the server, the management console will make a modem connection to a target server regardless of the operational state of the target server. The console may then instruct the target server to be booted from the Service Partition.

The following components of the Platform Management Technology on the Server provide the capabilities to remotely boot the server in the Service Partition mode:

- EMP firmware running on the target server
- BIOS Console Redirection for remote access to pre-boot BIOS setup
- BIOS support on the target server for booting from a Service Partition
- A service OS such as DOS or ROM-DOS installed on the target server's Service Partition

The Baseboard Management Controller (BMC) supports a remote command, which instructs it to change the BIOS boot order to boot from the Service Partition. This command may be issued over any of the supported DPC communication paths to the target server.

The DPC then determines if the target server is running a functional operating system. If so, the DPC issues a request to an operating system agent on the server to shutdown and reboot the system. If this communication fails, the DPC issues a request to the firmware controllers to reset the system.

When the OS agent or the firmware controller executes the command to reset the system, the BIOS boots the DOS operating system from the Service Partition. The agents on the Service Partition are invoked, and they establish communication with the remote console using the same communication path. When the session between the agents and the console is concluded, the normal boot order is restored before the system is rebooted.

In addition to the remote Service Partition Boot, the Server may also be booted to the Service Partition locally by configuring the BIOS (in BIOS setup) to perform a one time boot from the Service Partition. Once the utilities and the tests are executed on the Service Partition, the system may be rebooted. The BIOS reverts to the normal boot order after the reboot.

20.1 Firmware / BIOS Service Boot Support

The firmware maintains three bits related to booting from the service partition.

- BOOT bit – Request BIOS to perform a service partition boot
- PRESENT bit – Service partition is present.
- SCAN bit – Request BIOS to detect presence of service partition.

These bits are described in more detail in the sections that follow.

BIOS and firmware also include support for a service boot watchdog timer. Prior to transferring control to the service partition, BIOS starts a timer in the firmware. If software on the service partition fails to boot and stop the timer, the handler for the timer restarts the system normally.

20.2 BIOS Setup Partition Type Configuration

BIOS setup has an option to change the partition type. It defaults to type 98h, but can be changed to allow OEMs to utilize other types of service operating systems. However, the service operating system described in this document requires the partition type to be 98h.

20.3 Remotely Initiating Service Partition Boot

When the management console first connects to the target server, it communicates with the server's EMP interface. An EMP command is sent from the management console to set the BOOT bit. The next time the target server boots, the BIOS checks the BOOT bit to determine if it should boot from the service partition.

If the BOOT bit is set, the BIOS does the following:

1. First, it enables BIOS console redirection, even if it's not enabled in the normal BIOS setup, using the same serial port settings as EMP. This allows the remote user access to BIOS setup and the ability to see BIOS screen messages.
2. Then, BIOS searches the partition table for a partition type that uniquely identifies it as a service partition. BIOS always clears the BOOT bit whether or not a service partition is found to prevent repeated service partition boot attempts.
3. If a service partition is found, the BIOS sets the PRESENT bit, then loads and transfers control to the service partition boot sector. If a service partition is not found, the BIOS clears the PRESENT bit and boots normally.

   or

   If the BIOS does not find a service partition, it displays an error message on screen and logs an error to the System Event Log. The user at the management console will see the error message via BIOS console redirection.

20.4 Local Boot from Service Partition

It is also possible to boot the server from the service partition, while working at the server console. This feature allows the user to run utilities from the service partition while physically present at the target server.

To activate a local boot from the service partition, the user must shutdown and restart the machine, then enter BIOS setup. Once in BIOS setup, the user enables a one-time boot from the service partition. After the system boots from the service partition, a command-line interface is available to allow the user to execute any software that has been installed on the service partition, or to load new software via the floppy diskette drive.

21 Service Partition Installation

The service partition must be available before the target server can be managed remotely. Installation is accomplished in two steps, using utilities on the Country Kit CD.

1. A utility called Service Partition Administrator, which is similar to the DOS FDISK utility, is used to create the service partition. The system then reboots.
2. The service partition is formatted and software installed onto it using another function of the Service Partition Administrator.

The service partition is 39 MB in size and formatted with a FAT16 file system. Following successful installation of the service partition, the installation software sets the PRESENT bit. In order to install the service partition there must be at least 40 MB of un-partitioned space on the system hard drive. The service partition can only be created on the first 8GB of available space on the system hard drive.

In the event that the end user installs a new or replacement disk, the service partition should be installed prior to the installation of the end user OS. Users wishing to install the OS first must preserve sufficient space on the disk if they intend to install the service partition later. The service partition install process does not have the ability to resize existing partitions.

21.1 SCAN and PRESENT Bits

Each time the BIOS boots, it checks the SCAN bit. If the SCAN bit is set, BIOS checks for the presence of a service partition. Depending on the outcome of the check, BIOS either sets or clears the PRESENT bit. Note that the PRESENT bit will also be set during the service partition installation. After the scan, BIOS clears the SCAN bit.

The PRESENT bit is used to aid in discovering servers that have a service partition installed. Its state should always indicate whether a service partition is installed. The SCAN bit is useful to maintain the accuracy of the PRESENT bit. For example, if the disk containing a service partition is replaced, the PRESENT bit will incorrectly indicate that a service partition exists.

22 Service Partition Operating System

The service OS is a DOS-compatible operating system capable of hosting utilities, diagnostics and any other software required for remote management. It resides on the hidden service partition. The following sections describe the use of a service operating system.

22.1 Service Partition OS Installation

The service partition OS is installed following the creation of the hidden service partition. Installation is accomplished through utilities and batch files stored on the Country Kit CD.

22.2 Service Partition OS / Country Kit CD Hidden Partition Support

A special version of DOS is used to provide support for the hidden partition. The partition type of the hidden partition is not a normal DOS-compatible type. Therefore, the version of DOS that is installed on both the Country Kit CD and the hidden partition contains support to create and recognize the special hidden partition type.

22.3 Service Partition OS Initialization

When the service partition OS begins to run, software and drivers needed to initialize the remote environment are loaded via the config.sys and autoexec.bat files.

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Section 6: Diagnostic Test Package

Diagnostic Test Package Contents

Diagnostic Test Package Figures

Diagnostic Test Package Tables

23 Introduction to the Diagnostic Test Package

This section describes the off-line diagnostic tests that are available on ESG platforms. It discloses a description of Modular Test Architecture (MTA) modules that are utilized to provide local test coverage for various platforms. This section includes:

- Remote diagnostics
- Test descriptions
- Diagnostic Wizard

Note: These off-line tests require a DOS environment (Service Partition) to be loaded on the server before they can be executed.

Every server platform-specific section below refers to MTA modules to describe the desired test coverage. It also attempts to provide detailed information about non-generic tests that are developed to address unique server specific, diagnostics coverage requirements.

The Diagnostic test package will support testing on ESG servers. The goal of the diagnostic test suite is to identify hardware failures at the FRU level. Each supported FRU will have one or multiple test modules associated with it. If any of the FRU sub-test modules fail, the results are saved in a test results file, TEST.SUM.

As an added feature, a Diagnostic Wizard is included to display the hardware configuration, analyze test results and display the Pass or Fail results for each Field Replaceable Unit (FRU). The tests are capable of self sensing hardware components and enabling test modules to test the hardware detected. A test module is made up of a group of tests that directly or indirectly test a FRU. The Diagnostic Wizard is invoked at the completion of the test package and will analyze any tests that passed or failed, and will display a status of each FRU along with failing test module.

This package is intended to provide an easy to use interface. It is estimated that the average test time is less than 20 minutes, depending upon the number of disk drives and amount of memory installed. The tests are leveraged and ported (to meet the requirements of the service partition) from the Modular Test Architecture (MTA) tests suite.

24 Remote Diagnostics

The following diagram displays the architecture of the diagnostics.

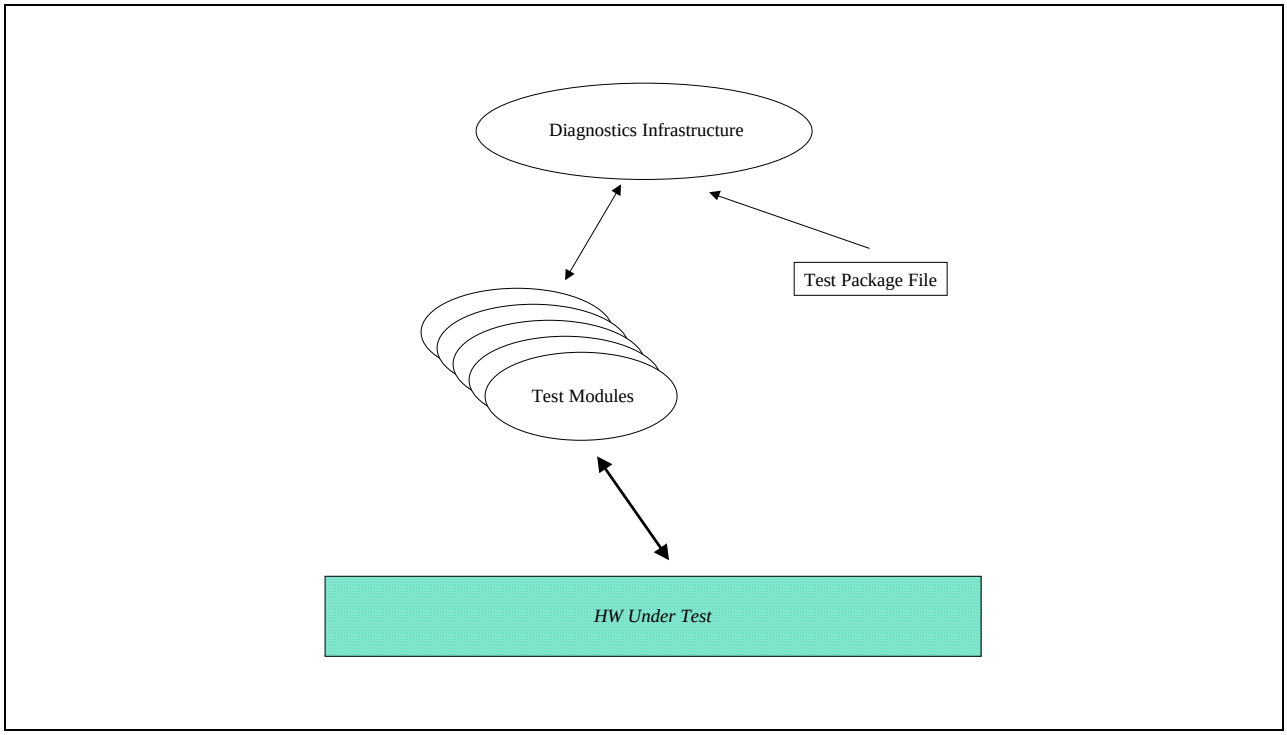

Figure 24-1: Service Partition Based Remote Diagnostics

The remote diagnostics package is installed on the Service Partition.

The infrastructure depends on a test package file to define the test modules that it needs to run. It also retrieves test parameter information from this file. The infrastructure automatically discovers the system configuration, displays it to the user, and runs the tests that the user selects. Test results are displayed for the user.

All user interactions are handled through the console. The console redirector, in conjunction with underlying off-the-shelf communication stack, enables remote control of the user interface.

The tests support online help that is available on the local server and viewable through console redirection. The user interface is provided by the BYO and/or MTA diagnostics and will differ from the general look and feel of DPC.

25 Test Descriptions

This section describes examples of the type of tests available for each FRU. In general, the subsections below relate to tests for a particular FRU, although in some cases tests overlap FRUs because of the organization of the test modules. Some tests may not be included because they are not appropriate for this test environment. These include tests such as those that require loop-back cables.

25.1 CPU FRU Tests

The following tests check the CPU on the baseboard.

- **CPU Tests**
  This test module ensures that the correct CPU is installed in a board or system, and that the correct clock speed has been selected.
- **Floating-point Unit Tests**
  This test module verifies that the FPU is present on the board or the system and that the FPU is functional.
- **Processor Board Controller Tests**
  This test module checks the I2C application command interface protocol between the baseboard I2C Controller and the Processor Board Controller (PBC 8xC751).

25.2 Baseboard FRU Tests

The following tests check various parts of the baseboard.

- **T82430 Tests**
  This test module is designed to verify the type of system controller on the UUT and whether the DIMMs plugged into the UUT are the expected size, type, and in the expected position. This also tests for the presence of the proper DIMM type to support Error Correction and Detection (ECC) feature of the chip set.
- **Cache Tests**
  This test module checks for the presence of caches in a board or system and verifies the functionality of the caches.
- **Chipset Tests**
  This test module ensures that the chipset is functioning properly, and looks at whether the DIMMs plugged into the UUT are the expected size, type, and in the expected position.
- **PCI Tests**
  This test module is designed to test the functionality of the PCI bus.
- **PCI/ISA/IDE Accelerator Tests**
  This MTA module is designed to verify functionality of the PCI ISA IDE Xcelerator (PIIX4) device.
- **Snooping Tests**
  The purpose of this module is to validate the functionality of the snoop phase by testing system cache coherency.

- **POST Results Test**
  The purpose of this test module is to report any errors that occurred during Power on Self-Test (POST), and compare the memory size reported by POST with expected values. All POST information is read from CMOS RAM.
- **Serial I/O Tests**
  This test module is designed to test the functionality of the serial ports.
- **Keyboard Tests**
  This test module is designed to check the Keyboard Controller, Mouse Port and KB LEDs.
- **Parallel Port Tests**
  This module is designed to test parallel port presence and functionality.
- **Mouse Tests**
  This test module is designed to check the Mouse Interface.
- **Programmable Interval Timer Tests**
  PIT tests are designed to work with systems that have 1 or 2 timers. The parameter found in pit.cfg, pit.first, should be set to either 1 or 2 depending on how many timers are in the system.
- **Real-Time Clock Tests**
  This test module was designed to test the Real Time Clock logic of a PC based system. It tests the CMOS RAM, clock and battery.
- **DMA Controller Tests**
  This test module is designed to check the DMA Controller.
- **Programmable Interrupt Controller Tests**
  This test module was designed to test the Interrupt logic on a PC based system.
- **Server Management and Non-Maskable Interrupt Tests**
  This test module was designed to test the SMI and NMI interrupts. smi_nmi.exe is the test program for this module. It provides tests for the SMI, and Event Logging. It also has a test that fails on any error in the SMI Error Log. It provides two utilities for looking at the Event Log area of flash. The first lists the system configuration data, and the second lists all errors in the SMI Error Log.
- **Super I/O Tests (sio308.exe)**
- **Baseboard Management Controller Tests**
  This module checks the command interface protocol for the Baseboard Management Controller.
- **Cirrus Logic* Video Controller Tests**
  This test module checks the functionality's of the SVGA Cirrus Logic CL GD542X/GD543X/GD544X video controllers. These controllers provide integrated RAMDAC, oscillator circuitry and video controller in one component.
- **VGA-Compatible Video Controller Test**
  This test module checks the functionality's of the VGA-compatible video controller, the video RAM (256K), and video DAC. The operations of the video controller at low and high-resolution displays (character and graphics) are also verified.
- **SCSI Controllers Test**
  This MTA module is designed to verify the functionality of the SCSI Controllers.

- **LED Tests**
  The purpose of this test module is to ensure that various LEDs on the UUT are connected and functioning properly. All tests in this module are interactive.
- **82440 PCI Bridge and Memory Controller Tests**
  The purpose of this module is to ensure that the PCI bridge and memory controller, is functioning properly, and whether the SIMMs plugged into the UUT are the expected size, type, and in the expected position. The PCI module and MSDRAM module may be used in addition to this module for further PCI bus and memory address lines testing.
- **Video Controller Tests (vid_wd.exe)**
  This test module checks the functionality's of the video controller, the video RAM, video DAC, video oscillator and supportive circuitry's. The operations of the video controller at low and high-resolution displays are also verified.
- **Universal Serial BUS (USB) Controller Tests**
  This test module is verifies the functionality of the Universal Serial BUS (USB) host controller.
- **SMB EEPROM Tests**
  This MTA module is designed to verify functionality of EEPROM devices with SMB (I2C) interface.
- **SIO Tests**
  The purpose of this module is to test the functionality of the Super/IO. The RTC, UART, Parallel Port, FDC and Keyboard modules may be used in addition to this module for further testing in those areas.
- **PCI IDE ISA Accelerator Tests**
  This module contains tests the registers and some general functionality of the PIIX device.
- **PCI to Xpress Bus Bridge Tests**
  This test module is designed to test the functionality of the PCI to Xpress Bus Bridge (PCXB). This chipset consists of one control ASIC (XPC) and one or two data ASICs (XPDs).
- **PCI Bridge Tests**
  The purpose of this module is to ensure that the PCI bridges are functioning properly, and to check for the correct number of bridges in a system.
- **Memory controller Tests**
  This module makes sure that the memory controllers are functioning properly, and checks for the correct number of memory controllers in a system.
- **I2CMUX Tests**
  This module tests the DMI interface protocol for the I2C MUX chip.
- **ASPI Tests**
  This module tests SCSI devices at the ASPI interface. ASPI is a software interface used by SCSI host adapter (controller card) drivers. By using an interface common to most (if not all) SCSI controllers, this test can be run on any machine that has the proper ASPI driver installed.
- **Advanced Integrated Peripheral Controller Tests**
  This module tests features of the Advanced Integrated Peripheral (AIP) I/O controller.

25.3 Memory DIMMs FRU Tests

These tests verify the functionality of the DRAM and cache memory on the board or system under test.

- **Memory Tests**
  This test module is designed to verify the functionality of the DRAM and cache memory on the board or system under test.
- **Memory Stress Tests**
  This test module stresses the memory by performing random operations with random data to simulate system OS operation.

25.4 Hard Disk Drives FRU Tests

These tests check access to hard disk drives. Included are tests for hard disks that are attached to the baseboard via the IDE bus and disks that are used with RAID software.

- **Hard Drive BIOS Tests**
  HDBIOS.EXE is a series of tests designed to test hard disks at the BIOS level of compatibly. The tests use only the documented BIOS INT 13H Fixed Disk Service functions.
- **IDE Tests**
  This test checks certain commands of IDE hard drives that HDBIOS can not check.

25.5 Floppy Disk Drives FRU Tests

These tests check the Floppy Disk Drive units.

- **ISA Floppy**
  This test checks the Floppy drives on a PC based system.

25.6 SCSI CD-ROM FRU Tests

These tests check the CD-ROM Drive Unit board.

- **SCSI CD-ROM**
  This module tests the functionality of CDROM drives. The INTELPCDIAG companion disk provides audio and data tracks for use during the test.

25.7 Hot-swap SCSI Backplane FRU Tests

These tests check the Hot-swap Backplane.

- **I2CHSPCA Tests**
  This module checks the I2C Application Command Interface Protocol between the baseboard I2C controller and the I2C-compatible microcontroller on the hot-swap backplanes.
- **Hot Swap Backplane Controller Tests**
  This module checks the I2C Application Command Interface Protocol between the baseboard I2C controller and the I2C-compatible microcontroller on the hot-swap backplanes.

25.8 Enclosure – Front Panel Tests

These tests check the Front Panel in the enclosure.

- **I2CFPPCA tests**
  This module checks the I2C Application Command Interface Protocol between the baseboard I2C Controller and the I2C-compatible Microcontroller on the POCA front-panel controller.
- **Front Panel Port Tests**
  FPANEL.EXE consists of a single test designed to test the front panel port. The test assumes that the hardware attached to the port is an LCD controller chip.
- **Front Panel Controller Tests**
  This module checks the I2C Application Command Interface Protocol between the baseboard I2C Controller and the I2C-compatible Microcontroller on the front-panel controller.

25.9 Power Share Backplane FRU Tests

These tests check the Power Share Backplane.

- **Power Share Controller Tests**
  This module checks the I^2C application command interface protocol between the baseboard I^2C Controller and the I^2C-compatible microcontroller on the Power Share Controller (PSC 8xC751).
- **APM Tests**
  The purpose of this module is to test Advanced Power management (APM) functionality in APM compliant systems.

26 Test Selection Menu Display

Runtest is called from the testmenu.bat file and displays a list of test packages to be run. The selection is made by using the UP/DOWN Cursor controls and pressing the ENTER key:

```
L440GX Version 1.0 ©Copyright 1999 Intel Corp. All Rights
Reserved.
     Server Diagnostics Options
          Quick Test
          Comprehensive Tests
          Comprehensive Test with Continuous looping
     Highlight selection-using Cursor UP/DOWN and press ENTER
```

Figure 26-1: Execution of the Testmenu.bat File

Runtest issues a system call to execute T.exe, the diagnostics controller, and places the package selected on the command line. The TEST.SUM file is deleted before each test package is called to assure that only the results of the current test run are reported. After each test selection is made, a check of the bios_id.out file is made to determine if the system is appropriate for the test package. The bios_id string is compared with the BIOS_ID in the test package. If they do not match, the following error message is displayed.

```
This Baseboard is not supported by this test.
Press any key to exit.
```

At this point, runtest ends.

27 DiagWiz Hardware Configuration (dwizcfg.exe)

The hardware configuration Utility displays a list of the hardware components detected during the self-sense probe of the hardware by the test modules. The display consists of the hardware component and its size or status. This is to aid the BYO with determining what hardware configuration has been discovered and will be tested. The user is asked to respond with ENTER if the configuration is correct or CTRL+BREAK if it is not correct.

If CTRL+BREAK is pressed dwizcfg exits and control is returned to the test selection menu (runtest.exe) after displaying a message instructing the user to check all hardware and cable connections.

Dwizcfg opens the display.cfg file created by T during self-sense operation. Key words are filtered out to prevent information from being displayed that is not useful or is confusing. The result is a list of hardware components and the size or status. A sample of the display follows:

```
              DiagWiz Test Configuration (v0.3)

Base Memory Size: 640 KB
Cpu Type: A Pentium ® II Processor
Cpu Speed: 450 MHz
CPU SMP #0: Present
CPU SMP #1: Present
Keyboard-type: 101-Key
Mouse Enabled
RTC RAM SIZE 128
Number of SCSI channels: 2
COM2 at Port Address: 2F8 is enabled
LPT1 0x378
Floppy cfg.drive A: 1.4Mb (3.5 Inch)
Hard Drive 0  Cylinders:531  Heads:255  Sectors:63  Total Size":4157MB
Video Subsystem: Curris 5446 controller, 1024 K video RAM
External Cache Size: 512 KB
Memory Size: 96 Meg

If Configuration is correct press ENTER to continue or CTRL+BREAK to quit
```

Figure 27-1: DiagWiz Test Configuration Screen Display

27.1 DiagWiz Display FRU Status

The Display FRU Status Utility displays a list pass or fail status of the FRUs tested and the corresponding test modules. The name of an FRU in-which all the sub-tests have passed is displayed in a green color with a PASSED text displayed on the right. If an FRU failed, the FRU name and failing test module name will be displayed in a red color along with a FAILED string.

The dwizstat utility opens the test.sum file. Test.sum is a file created by T or Testview and contains a list of all tests run and the pass of fail status of each. There are many tests that run for each test module, as many as tests that exist for that test module. Dwizstat reads a line from test.sum and determines the test module name. It then scans subsequent lines to determine if any of the associated tests failed. If failures have been encountered, a flag is set for later use. This operation continues until the end of the file. At this time, the results are displayed on the screen.

The display consists of each FRU name being displayed on the screen with each test module name displayed in a list under it. If all the test modules in an FRU passed the FRU name is displayed in a green color and all associated test module names are displayed in green. If a test module associated with an FRU failed, the FRU name is displayed in red and the failing test module name is displayed in red. The passing test module names are displayed in green. This allows the BYO to know which sub-unit of the FRU failed.

Sample screen display:

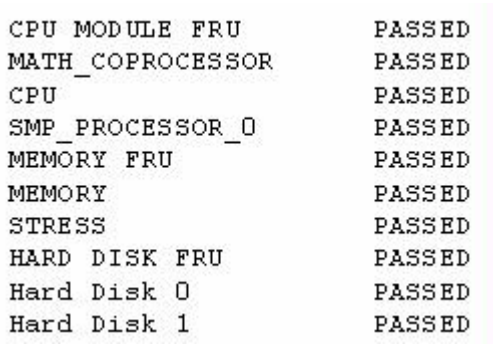

Figure 27-2: DiagWiz FRU Status Display

28 Server Test Package

This section describes the Diagnostics for Server product. The Diagnostics will use the MTA 'T' diagnostic controller to execute tests. The test package will consist of

- Quick Test package
- Comprehensive Test package
- Comprehensive Test with Continuous Looping package

The Diagnostic Wizard utilities are included to display configuration information and test results. The runtest utility prompts the user to select the test to be run. Once a test package is selected, the diagnostics self sense operation executes to determine the hardware configuration. Self-sensing causes tests to be enabled or disabled according to the hardware found.

28.1 Test Packages

Runtest.exe is invoked by entering TESTMENU at the DOS prompt, after the diskette is booted to prompt the user to select a test package to run. Runtest prompts the user to select one of the following test packages:

- Quick Test
- Comprehensive Tests
- Comprehensive Tests with Continuous Looping

After the selection is made, the self-sensing operation is executed. Invoking dwizcfg.exe to display the hardware configuration found as a result of the self-sense operation follows this. The user is asked to press ENTER if the configuration is correct or to press CTRL/BREAK if the configuration is incorrect. In this case, the tests are aborted and a screen is displayed instructing the user to check all hardware and cable connections. Control is returned to the test selection menu. If ENTER was pressed, indicating that the configuration is correct, the test is started. Upon completion of testing, dwizstat.exe is executed to display the test results indicating pass or fail status of each FRU and it's associated test modules.

28.1.1 Quick Test

The Quick test package performs only minimal tests. They include:

- Power On Self tests
- CPU test
- Cache test
- Memory tests
- Hard Disk tests

The floppy drive and video monitor are tested by using the devices.

28.1.2 Comprehensive Tests

The Comprehensive tests include all the tests listed in the Test List and perform tests that test the entire system. The Comprehensive tests take between 15 and 20 minutes depending upon hardware configuration.

28.1.3 Comprehensive Tests with Continuous Looping

The Comprehensive Tests with continuous looping tests include all the tests listed in the Test List but run continuously, until stopped by the user by entering CTRL/BREAK. Dwizstat is then executed to display the test results.

29 Test List

A typical test package may include the following tests. This test list is subject to future adjustments to address coverage enhancements and other requirements:

Table 29-1: Diagnostics Test List

CPU support	**Test Module**	**System Test**
Primary Slot 1	**cpu.exe:** Tests for CPU type, floating point unit, clock speed, checks CPU information and MMX instructions. **cache.exe :** Tests cache read/writes **dualpent.exe:** Tests communication between multiple CPUs	**cpu.exe:** Tests for CPU type, floating point unit, clock speed, checks CPU information and MMX instructions. **cache.exe:** Tests cache read/writes **dualpent.exe:** Tests communication between multiple CPUs
Secondary Slot 1	Same as Primary CPU	Same as Primary CPU
Chipset	Test Module	System Test
82440BX	**82440.exe:** Verifies the type of 82450 system controller on the UUT, whether the DIMMs plugged into the UUT are the expected size, type, and in the expected position.	**82440.exe:** Verifies the type of 82450 system controller on the UUT, whether the DIMMs plugged into the UUT are the expected size, type, and in the expected position.
PIIX4	**piix4.exe:** tests all the registers and timers on the device.	**piix4.exe:** tests all the registers and timers on the device.
Video	**Test Module**	**System Test**
CL-GD5480 Graphics controller	**vid_cl.exe:** Tests Cirrus specific registers and functions **vid_vga.exe:** Tests standard VGA functions of video **vid_vmu.exe:** Non-interactive testing of video modes	**vid_cl.exe:** Tests Cirrus specific registers and functions **vid_vga.exe:** Tests standard VGA functions of video **vid_vmu.exe:** Non-interactive testing of video modes
SGRAM	Same as GD5480 tests	Same as GD5480 tests
SM Video Blanking	Not tested	Not Tested
Hardware Mgmt	**Test Module**	**System Test**
5V Standby	power on of system	power on of system
Server Management Controller (BMC)	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller
Server Management Memory	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller
Temperature Sensors	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller
Conn/Jumpers	**Test Module**	**System Test**
ATX PWR	Not tested	Not Tested
PWR Conn	Power on	Power on
Aux Power	Power on	Power on
BB Fan 0	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller

BB Fan 1	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller
CPU Fan 2	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller
CPU Fan 3	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller	**bmc.exe:** checks the command interface protocol for the Baseboard Management Controller
DIMM 1	**msdram.exe:** verify the functionality of the DRAM and cache memory **stress.exe:** stress memory by performing random operations with random data to simulate system OS operation **post.exe:** report any errors that occurred during Power on Self Test	**msdram.exe:** verify the functionality of the DRAM and cache memory **stress.exe:** stress memory by performing random operations with random data to simulate system OS operation **post.exe:** report any errors that occurred during Power on Self Test
DIMM 2	**msdram.exe:** verify the functionality of the DRAM and cache memory **stress.exe:** stress memory by performing random operations with random data to simulate system OS operation **post.exe:** report any errors that occurred during Power on Self Test	not tested
DIMM 3	**msdram.exe:** verify the functionality of the DRAM and cache memory **stress.exe:** stress memory by performing random operations with random data to simulate system OS operation **post.exe:** report any errors that occurred during Power on Self Test	not tested
DIMM 4	**msdram.exe:** verify the functionality of the DRAM and cache memory **stress.exe:** stress memory by performing random operations with random data to simulate system OS operation **post.exe:** report any errors that occurred during Power on Self Test	not tested
USB	**usb.exe:** tests functionality of USB feature on board by verifying presence and resources for USB. A stress test is performed to verify the connections in and out of the board. **Note:** Connect the baseboard to USB test cards via USB cables	TBD
PCI Slot #1	**pro100b.exe:** tests functions of Pro100B hardware or PCI slot	**pro100b.exe:** tests functions of Pro100B hardware or PCI slot
PCI Slot #2	**pro100b.exe:** tests functions of Pro100B hardware or PCI slot	not tested
PCI Slot #3	**pro100b.exe:** tests functions of Pro100B hardware or PCI slot	not tested
Conn/Jumpers	**Test Module**	**System Test**
PCI Slot #4	**pro100b.exe:** tests functions of Pro100B hardware or PCI slot	not tested
ISA Slot #1	**smmtest.exe:** uses Server Monitor Module to test SMM Feature connector	**smmtest.exe:** uses Server Monitor Module to test SMM Feature connector
ISA Slot #2	testhook card	not tested

IDE Primary	**hdbios.exe:** tests hard disks at the BIOS level of compatibly	not tested
IDE Secondary	**hdbios.exe:** tests hard disks at the BIOS level of compatibly	not tested
Floppy	**floppy.exe:** tests read/write capability of floppy	**floppy.exe:** tests read/write capability of floppy
Keyboard	**kb.exe:** tests keyboard controller and mouse port	**kb.exe:** tests keyboard controller and mouse port
Mouse	**mouse.exe:** tests mouse interface	**mouse.exe:** tests mouse interface
Serial Com 1	**serio.exe:** tests functionality of serial ports	**serio.exe:** tests functionality of serial ports
Serial Com 2	**serio.exe:** tests functionality of serial ports	**serio.exe:** tests functionality of serial ports
Parallel Port	**pario.exe:** test functionality of parallel port	**pario.exe:** test functionality of parallel port
VGA	**vid_cl.exe:** tests the functionality's of the SVGA Cirrus Logic GD542X/GD543X/GD544X video controllers **vid_vga.exe:** tests the functionality's of the VGA-compatible video controller, the video RAM(256K), video DAC **vid_vmu.exe:** test video modes non-interactively using the VMU	**vid_cl.exe:** tests the functionality's of the SVGA Cirrus Logic GD542X/GD543X/GD544X video controllers **vid_vga.exe:** tests the functionality's of the VGA-compatible video controller, the video RAM(256K), video DAC
NIC Connector	**pro100b.exe:** tests functions of Pro100B hardware or PCI slot	**pro100b.exe:** tests functions of Pro100B hardware or PCI slot
SCSI UW 68pin	**hdbios.exe:** tests hard disks at the BIOS level of compatibly	**hdbios.exe:** tests hard disks at the BIOS level of compatibly
SCSI Narrow 50pin	**hdbios.exe:** tests hard disks at the BIOS level of compatibly	**hdbios.exe:** tests hard disks at the BIOS level of compatibly
ITP Connector	not tested	not tested
SMM Feature Conn.	**smmtest.exe:** uses Server Monitor Module to test SMM Feature connector	**smmtest.exe:** uses Server Monitor Module to test SMM Feature connector
Front Panel Conn.	not tested	**led.exe:** tests functionality of LED's
Override Jumper	not tested	not tested
FSB Speed Jumper	**cpu.exe:** tests that fsb is operating at the correct frequency but does not test the alternate speed.	**cpu.exe:** tests that fsb is operating at the correct frequency but does not test the alternate speed.
Wake-on-Lan Jumper	not tested	not tested
Boot Blk WE Jumper	not tested	not tested
Ext IMB Jumper	not tested	not tested
Ext WOL Jumper	not tested	not tested
CMOS Jumper Block	If jumper is in wrong position, the system will not boot correctly.	If jumper is in wrong position, the system will not boot correctly.
FRB,Intrusion,BMC Update jumper block	If FRB jumper is in the wrong position, the system will not boot correctly. Intrusion/BMC not tested.	If FRB jumper is in the wrong position, the system will not boot correctly. Intrusion/BMC not tested.
Speaker	**pit.exe:** tests functionality of speaker through the PIT	**pit.exe:** tests functionality of speaker through the PIT
LED jumper Block	not tested	not tested
Clocks	**Functional test**	**System Test**
Clock Gen/drvr	not directly tested	not directly tested
Crystal 14.318mhz	not directly tested	not directly tested
SM Cryst. 22.11mhz	not directly tested	not directly tested

Miscellaneous	Functional test	System Test
PC87309 SIO	**sio308.exe:** test the functionality of the PC87308 (SIO308) and PC87307 Super I/Os	**sio308.exe:** test the functionality of the PC87308 (SIO308) and PC87307 Super I/Os
Pro100 (IN82558)	**pro100b.exe:** tests functions of Pro100B hardware	**pro100b.exe:** tests functions of Pro100B hardware
8MB Flash	Not directly tested. Features of the BIOS are tested which are contained in the flash. If the UUT has an old version of BIOS, it will be flashed with the new version. Some DMI information is written into the flash.	Not directly tested. Features of the BIOS are tested which are contained in the flash. If the UUT has an old version of BIOS, it will be flashed with the new version. Some DMI information is written into the flash.
I/O APIC	**Dualpent.exe:** tests symmetrical multiprocessing capabilities of multiprocessor boards	**Dualpent.exe:** tests symmetrical multiprocessing capabilities of multiprocessor boards
Basic Util Router(Altera)	new test	new test
Primary VRM	Tested by powering on the system and recognizing both processors.	Tested by powering on the system and recognizing both processors.
Secondary VRM	Tested by powering on the system and recognizing both processors.	Tested by powering on the system and recognizing both processors.
Primary VRM VID Compare Logic	If VID is incorrectly, the voltages supplied to the processor will be incorrect causing the processor to fail	If VID is incorrectly, the voltages supplied to the processor will be incorrect causing the processor to fail
Secondary VRM VID Compare Logic	If VID is incorrectly, the voltages supplied to the processor will be incorrect causing the processor to fail	If VID is incorrectly, the voltages supplied to the processor will be incorrect causing the processor to fail
SCSI Sym53C876	**symc8xx.exe:** verify the functionality of the SYMBIOS 53C8XX SCSI Controllers **hdbios.exe:** tests hard disks at the BIOS level of compatibly	**symc8xx.exe:** verify the functionality of the SYMBIOS 53C8XX SCSI Controllers **hdbios.exe:** tests hard disks at the BIOS level of compatibly
SCSI Terminators	not directly tested	not directly tested

Intel® Server Control v2.x TPS

Section 7: Client System Setup Utility (CSSU) Application

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30 Introduction to the Client System Setup Utility (CSSU) Application

The Client System Setup Utility (CSSU) provides a system level view of the local server platform from a remote client workstation. The CSSU interface consists of a Win32* graphical user interface (GUI) resident on a console workstation. This communicates with the SSU agents and framework resident on the Service Partition at the server. The GUI employs the common look-and-feel of ISC components and integrates into the ISC stand-alone console as well as Enterprise System Management Consoles from HP and CA.

To initiate a CSSU session, the client requests a service boot through the EMP. As the service environment boots, a network stack and agent are started and communication between the server and client switches to a packet-based protocol. Using the new protocol, the client launches the SSU and begins communicating with the SSU through a socket interface. The application then allows the user to perform a variety of configuration tasks and setup tasks that normally would only be available at the local server platform.

The SSU software can also be executed locally at the server by booting it from a floppy disk, CD-ROM, or the Service Partition and using the local monitor and keyboard.

The figure below illustrates the architecture of the server-resident portions of the SSU component of the ISC product. This architecture consists of an SSU framework and a collection of add-in modules that use the framework to access and control the server and to communicate to both local and remote user interfaces.

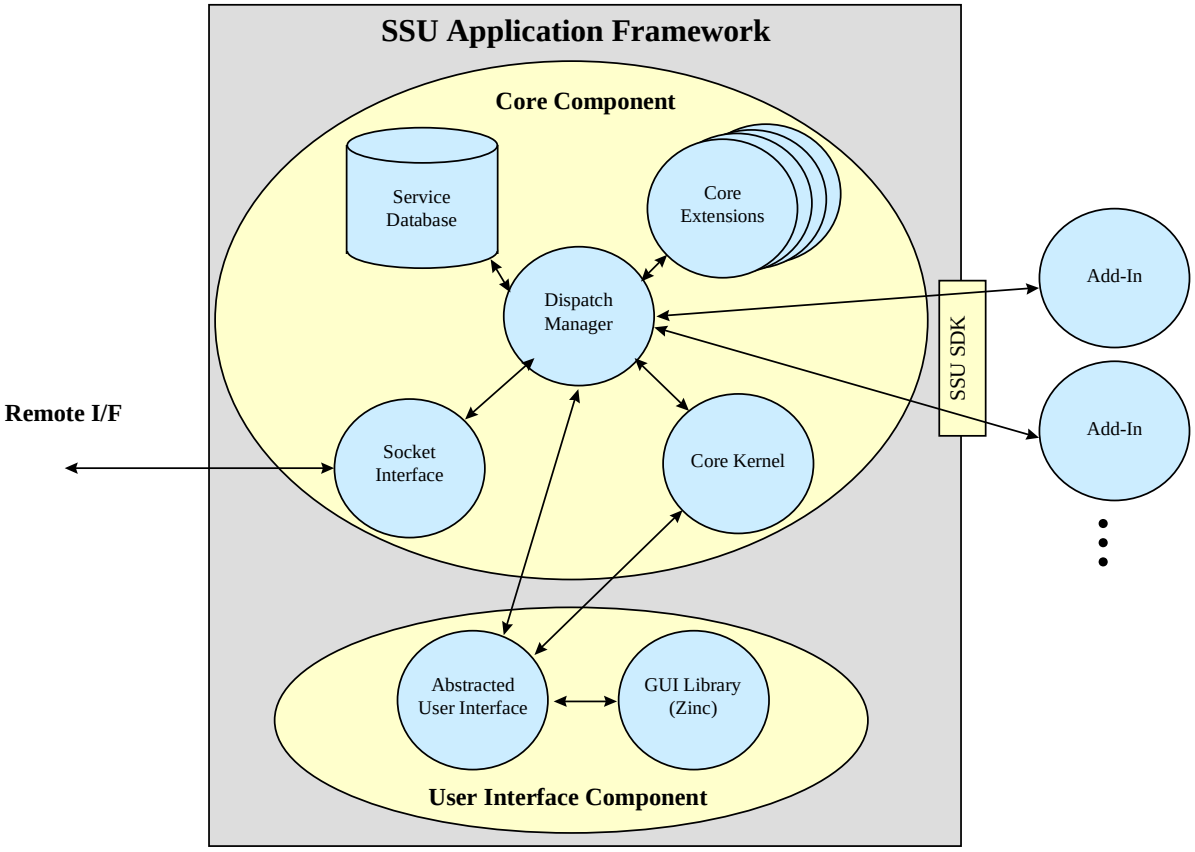

Figure 30-1: System Setup Utility Framework

The add-in modules to the right of the figure correspond to functions available through the SSU. Add-ins support management of FRU, SDR, and SEL information; setting of system boot order and security options, and the configuration of resources for ISA devices. In addition, an add-in SDK is available to OEMs that want to supply their own add-in features.

31 Client Application Framework

The environment for remote SSU operation is provided by the Client Application Framework (CAF). The CAF integrates SSU-based features through a set of management plug-ins called add-ins. The add-ins allow the user to perform remote system management tasks from the client workstation. Functionality provided by the add-in may vary by server platform.

The add-in modules may include support for the configuration of system resources, selection of boot options, specification of the password, and viewing of system information such as the system event log, the sensor data records, and the field replaceable unit information. Within this architecture, the CAF is implemented as a MDI container application and each add-in component is implemented as an ActiveX control.

31.1 Command Line Options

The CAF supports the following command-line options:

Option	Meaning
/P phone_number	Specifies phone number to be used to establish a connection with the SSU Server.

31.2 Initialization Files

The CAF does not include support for initialization files. Instead all parameters required to configure the operation of the CAF are stored in the Windows* registry.

32 CSSU Graphical User Interface

Only a single instance of the CAF may be launched on the client platform. Multiple CAFs connected to multiple SSU Servers is not supported.

If the Client SSU is launched with a telephone number specified on the command line, it will attempt to establish a connection with a SSU Server at the given telephone number. If the Client SSU is launched without a telephone number specified on the command line, the Client SSU will display the main window and wait for user input.

While the connection is being established, the Client SSU will display connection information on the status bar of the main window. If the connection cannot be established with the remote server, the Client SSU will display an error message and return to the Main Window to wait for user input.

Once a connection is initiated, the user will be prompted for an EMP password if a password has been configured in the server system BIOS. All options within the Client SSU add-in modules will be available, unless both a system BIOS admin password and a user password have been set and the user has provided only the user password. In this case, the functionality that is provided in the password add-in module would be limited to changing the user password. The password prompt cannot be selectively enabled or disabled within the CAF.

After the password has successfully been entered, the CAF will return to the Main Window to wait for user input.

The Main Window consists of a Main Menu, Toolbar, and Status Bar, as displayed in the following diagram.

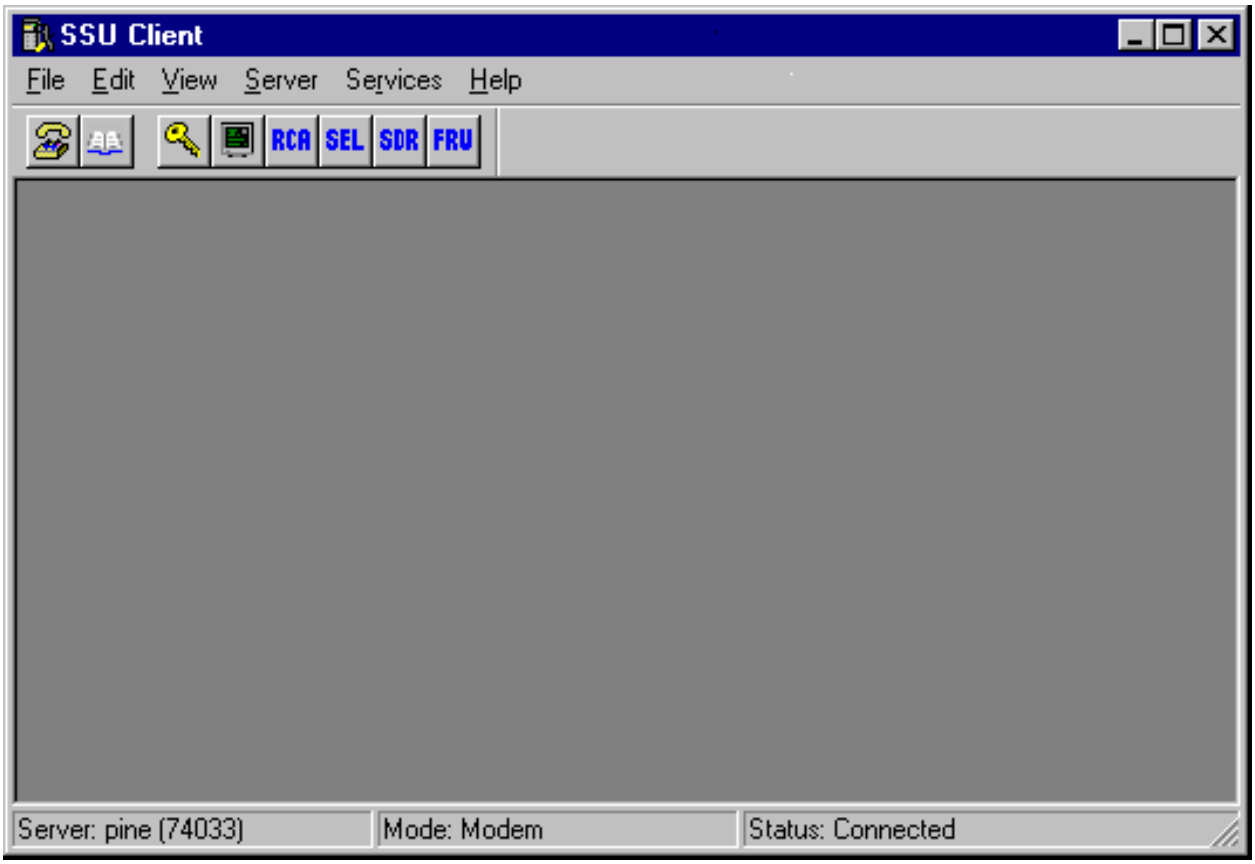

Figure 32-1: Client Main Window

32.1 Main Menu

The Main Menu provides access to most other screens and tasks. For this discussion, the Main Menu refers to the bar located at the top of the screen. The Main Menu may be outlined as:

- **File Menu**
  The File menu is dynamic and may include other options when other add-in modules are active. The File menu will always contain the following items, although some may at times be unavailable (grayed out), depending on upon the add-in component that is active.
  Save
  Save As
  Close
  Print
  Exit
- **Edit Menu**
  The Edit menu is available only when an one add-in component is inititated. It contains the following options:
  Cut
  Copy
  Paste
  Clear

- **Server Menu**
  The Server menu contains the following options, some of which may at times may not be available (grayed out) depending on whether a server connection has been established.

  Connect / Disconnect — If no current connection exists, the Connect option is displayed. The Connect dialog box is used to establish a connection between the Client SSU and the SSU Server. The Client SSU can connect to only one server at a time. From the Client SSU, connections can be made only via modem. Direct (serial) connections are not supported.

  If a connection to a server is already in place, the Disconnect option is available instead.

  Phonebook — The Phonebook allows the user to associate telephone (modem) numbers with server names to facilitate connections. The Phonebook dialog box contains fields and sub-screens to add, modify, and delete phone number associations.

- **Services Menu**
  The Services menu is populated with add-in options that can be accessed remotely by the Client SSU. If a user selects an add-in option when no connection is in place, a connection dialog box will be displayed to allow the user to select the server to which a connection is to be initiated.

  After establishing the connection, the Client SSU can determine if the server supports the requested add-in service. The connection will be maintained, but the service will not be launched if the server does not support it.

  The Services Menu is a dynamic menu and may include additional options, depending on the add-in modules provided. The Services menu will usually contain the following items, although some may at times be unavailable (grayed out), depending on upon the add-in components that are available.

  FRU Viewer — The FRU Viewer provides access for the user to view system Field Replaceable Unit information.

  SDR Viewer — The SDR Viewer provides access for the user to view Sensor Data Record information.

  SEL Viewer — The SEL Viewer provides access for the user to view System Event Log information.

  Boot Device Configuration — The Boot Device Configuration module allows the user to determine the order in which the system will look for boot devices

  System Security Configuration — The System Security Configuration module allows the user to set and change passwords.

  Resource Configuration — The Resource Configuration option allows the user to detect and resolve resource conflicts

- **Window Menu**
  The Window menu is available only when an add-in component is initiated. It contains the following options:

  Cascade

  Tile

  Arrange Icons

- **Help Menu**
  The Help menu is a dynamic menu and may include additional options depending on the add-in modules that are active. The Help menu contains the following options:

  Client SSU Help Topics

  Help (specific to active add-ins)

32.2 Tool Bar

The Tool Bar contains buttons to support frequent operations. Each button on the tool bar supports tool-tip help. Although additional add-in modules may be integrated into the Client SSU and appear as menu options, additional buttons on the Tool bar are not supported.

From left to right, the Tool Bar contains the following options:

Table 32-1: CSSU Tool Bar Options

Icon	Option	Function
	Connect / Disconnect	If no current connection exists, the Connect option is displayed. The Connect dialog box is used to establish a connection between the Client SSU and the SSU Server. The Client SSU can connect to only one server at a time. From the Client SSU, connections can be made only via modem. Direct (serial) connections are not supported. If a connection to a server is already in place, the Disconnect option is available instead.
	Phonebook	The Phonebook allows the user to associate telephone (modem) numbers with server names to facilitate connections. The Phonebook dialog box contains fields and sub-screens to add, modify, and delete phone number associations.
	FRU Viewer	The FRU Viewer provides access for the user to view system FRU information.
	SDR Viewer	The SDR Viewer provides access for the user to view SDR information.
	SEL Viewer	The SEL Viewer provides access for the user to view SEL information.
	Boot Device Configuration	The Boot Device Configuration module allows the user to determine the order in which the system will look for boot devices
	System Security Configuration	The System Security Configuration module allows the user to set and change passwords
	Resource Configuration	The Resource Configuration option allows the user to detect and resolve resource conflicts

32.3 Status Bar

The Status Bar displays information about the current connection. For modem-based connections, the 'Status Bar' includes the server name (if the connection was launched from the Client SSU), telephone number, the connection mode, and the connection status. These areas include information only if an active connection exists.

33 Add-in Components

The add-in components described here do not include support for initialization files. Instead, all parameters required to configure the component are stored in the Windows registry. The add-in components are implemented as ActiveX controls within the MDI CAF application.

33.1 Resource Configuration (RCA) Add-in

The Resource Configuration Add-in (RCA) provides resource conflict detection and resolution services. Its purpose is to facilitate the creation of a working configuration after the addition or removal of hardware from the system. This Main Window for this add-in is displayed in following Figure.

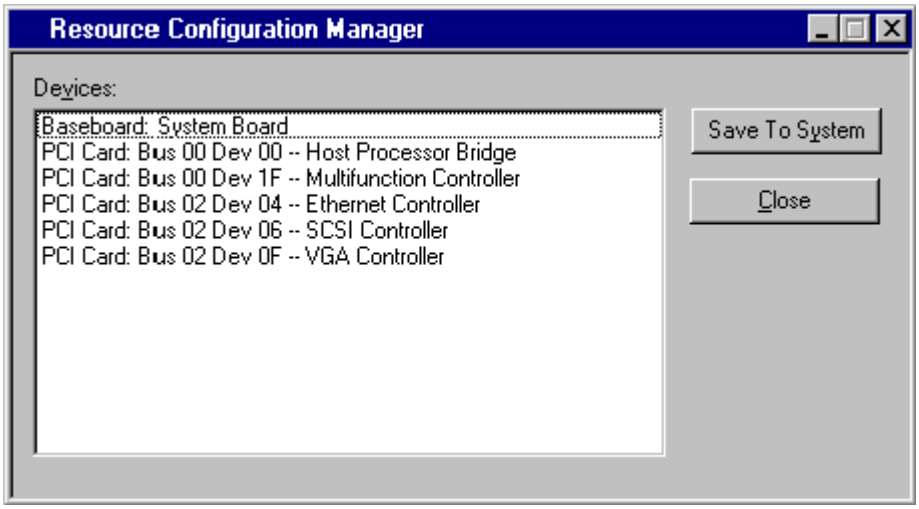

Figure 33-1: Resource Configuration Main Window

The Main Window provides the following screen options:

Table 33-1: CSSU Resource Configuration Options

Option	Function
Devices List	Provides a list of specific items that can be accessed with a double-click and then modified in subsequent screens.
Save to System	Writes the current configuration to non-volatile storage on the server system. Once the configuration has been saved, the screen closes and may not be opened again for this server until the server system is rebooted.In addition to saving the configuration information to non-volatile storage, the user may chose to create a backup file containing all of the system configuration data that is included in the RCA. This binary file can be used to restore configuration information during a later SSU session and may be stored on either the client or server system. Restoration from a backup file is accomplished prior to complete initialization of the RCA. During the initialization of the RCA, the user will be prompted to restore from a backup file prior to loading the RCA. The file used for restoration may be stored on either the client or server system.
Close	Exits the RCA Add-in. If configuration changes have been made but not saved, the user is given the option of saving changes before exiting.

33.1.1 Device Window

Modifying the resources of a device may be necessary to accommodate certain operating systems, applications, and drivers. The 'Device Window' provides several features to aid in this process. (See Figure 33-2: Device Window)

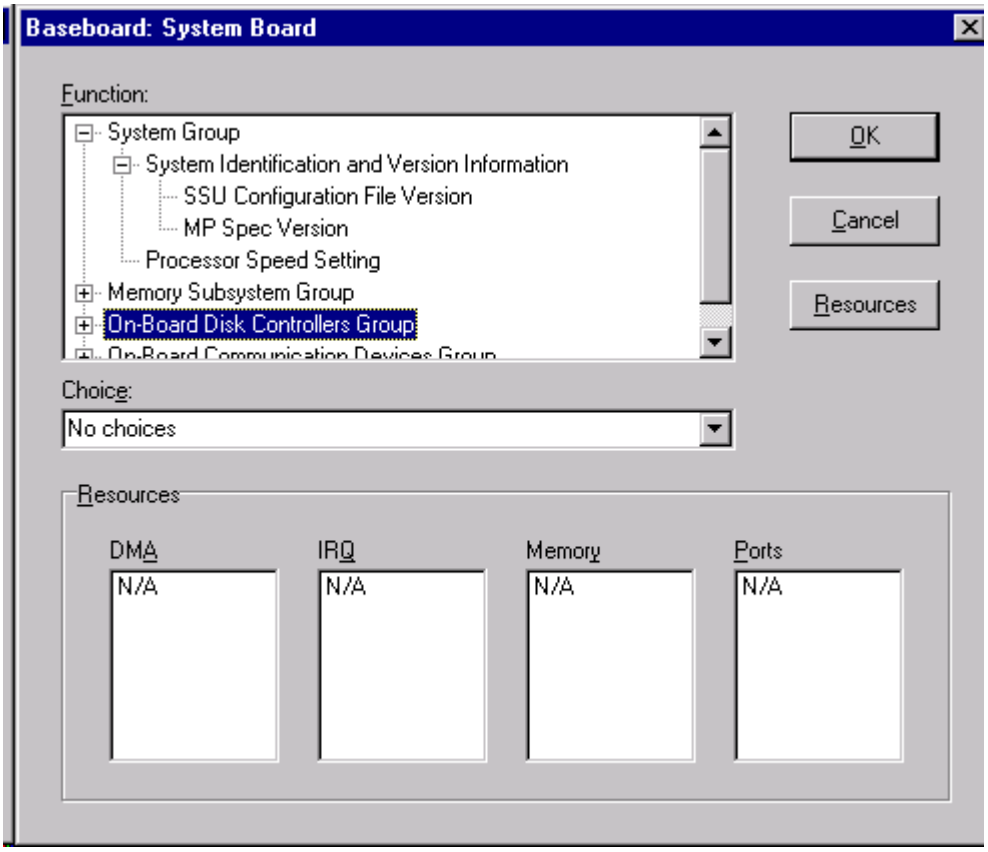

Figure 33-2: Device Window

The Device Windows provides the following screen options:

Table 33-2: Device Window Options

Option	Function
Function List Box	The Function list box is used to select the device's function so that the configuration choices and resources associated with the function may be updated. Selection of a new function updates the Choice combo and the DMA, IRQ, Memory, and Ports list boxes as required. Some functions may not contain choices or resources but are instead used for grouping or organizational purposes.
Choice Combo Box	The Choice combo box is used to provide a list of configuration choices associated with the current function. Choices may be changed by selecting the desired choice from the combo box. Selection of a new choice updates the DMA, IRQ, Memory, and Ports list boxes.
DMA List Box	The DMA list box is used to change an existing setting of a DMA resource associated with the current function. DMA resources can be changed by double-clicking on the desired entry and updating the DMA entry in the Change DMA window. If a DMA resource is not required for the current choice, 'N/A' is displayed as the only item in the DMA list box.

Option	Function
IRQ List Box	The IRQ list box is used to change an existing setting of an IRQ resource associated with the current function. IRQ resources can be changed by double-clicking on the desired entry and updating the IRQ entry in the Change IRQ window. If an IRQ resource is not required for the current choice, 'N/A' is displayed as the only item in the IRQ list box.
Memory List Box	The Memory list box is used to change an existing setting of a memory resource associated with the current function. Memory resources can be changed by double clicking on the desired entry and updating the memory entry in the Change Memory window. If a memory resource is not required for the current choice, 'N/A' is displayed as the only item in the Memory list box.
Ports List Box	The Ports list box is used to change an existing setting of a ports resource associated with the current function. Port resources can be changed by double clicking on the desired entry and updating the port entry in the Change Port window. If a port resource is not required for the current choice, 'N/A' is displayed as the only item in the Ports list box.
OK Button	The OK button commits any resource changes made to the device to the internal resource database and returns the user to the RCA main window. Updated information is not stored in non-volatile storage until the Save button is selected on the RCA main window.
Cancel Button	The Cancel button discards any changes made to the device and returns the user to the RCA main window. Note that after the RCA conflict detection and resolution algorithm is run, it is not possible to cancel changes to the selected device.
Resources Button	The Resources button invokes the Resource Usage window.

33.1.2 System Resource Usage Window

Viewing of system resources is useful to setup and debug system configurations. The System Resource Window provides several features to present this information.

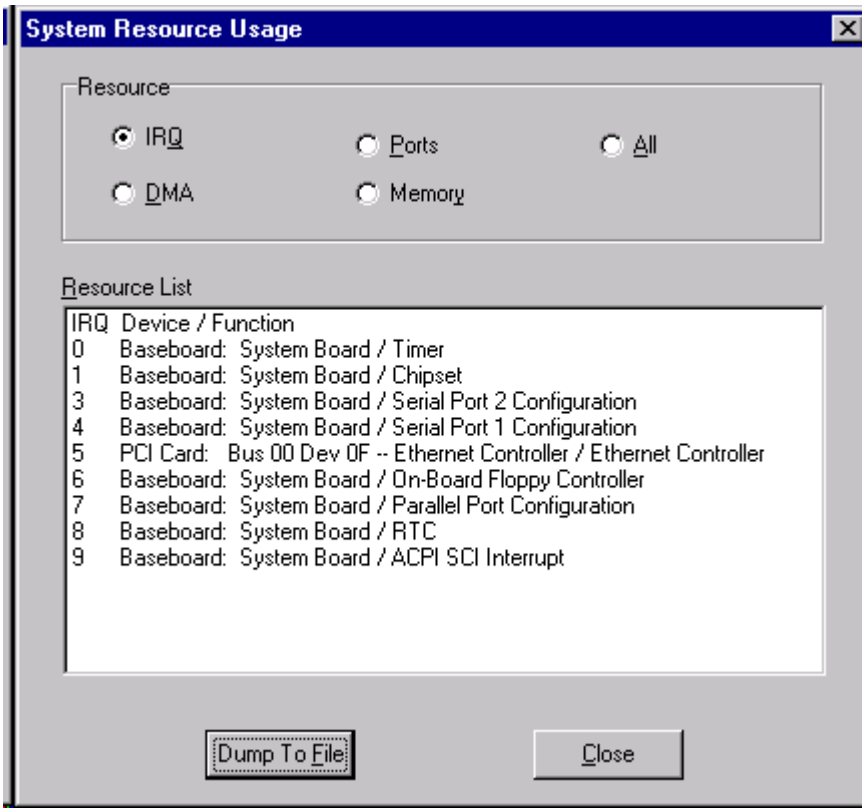

Figure 33-3: System Resource Usage Window

The System Resource Usage Window provides the following screen options:

Table 33-3: System Resource Usage Window Options

Option	Function
Resource List Box	The 'Resource' list box provides a complete listing of the specified resources currently used in the system except for any re-locatable expansion ROM images. Re-locatable expansion ROM images are not included in the set of system resources because the address ranges occupied by these expansion ROM images should not be considered in the conflict detection and resolution algorithm provided in the RCA since they are fully re-locatable by the system BIOS.
IRQ Radio Button	The 'IRQ' radio button updates the 'Resource' list box to include only IRQ resources.
DMA Radio Button	The 'DMA' radio button updates the 'Resource' list box to include only DMA resources.
Ports Radio Button	The 'Ports' radio button updates the 'Resource' list box to include only port resources.
Memory Radio Button	The 'Memory' radio button updates the 'Resource' list box to include only memory resources.
All Radio Button	The 'All' radio button updates the 'Resource' list box to include all system resources. This includes IRQs, DMAs, ports, and memory resources.
Dump To File Button	The 'Dump To File' button writes the system resource usage information to the plain text file specified by the user. The system resource usage information file may be stored on either the client or server system.
Close Button	The 'Close' button exits the 'System Resource Usage' window.

33.2 Add-in Components – Multi-boot Add-In

The Multi-boot Add-in (MBA) provides an interface for selecting Initial Program Load (IPL) devices. Using the MBA, the user can identify all IPL devices in the system and prioritize their boot order. On power-up, the BIOS will sequentially attempt to boot from each device. Only a single instance of the MBA may be launched within the CAF.

33.2.1 Initialization Files

The MBA does not include support for initialization files. Instead all parameters required to configure the operation of the MBA are stored in the Windows* registry.

33.2.2 User Interface

The MBA is implemented as an ActiveX control within the MDI CAF application.

33.2.3 MBA Operation

The following sections briefly describe the overall operation of the MBA.

33.2.3.1 MBA Main Window

The MBA presents a main window to the user (see Figure 33-4: Multi-boot Main Window) which supports several features. These features are described in the following sections. The main window itself supports border icons for minimization and the system menu.

The IPL and Boot Connection Vector (BCV) priority in the 'Boot Device Priority' list shows that the first boot attempt will be on 'Removable Devices', followed by 'ATAPI CD-ROM drive', 'Hard Drive', and finally the 'LANDesk Service Agent'. The hard drive boot priority is determined by the 'Hard Drive' list, which shows the 'Other Bootable Device' will be booted first.

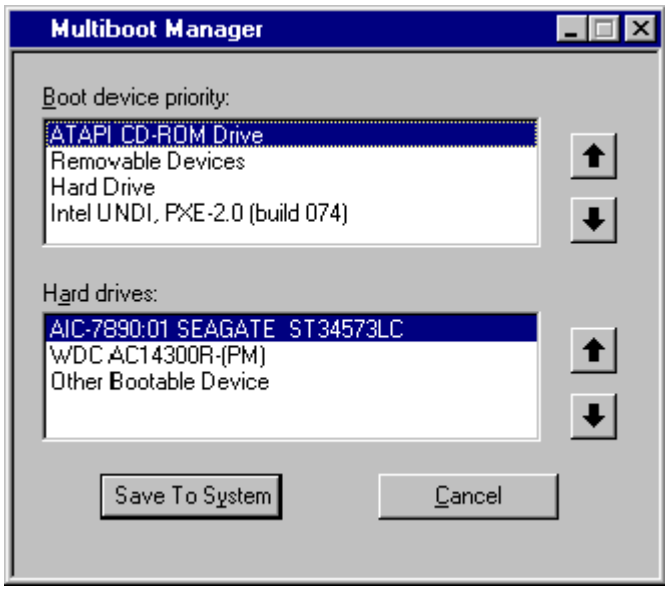

Figure 33-4: Multi-boot Main Window

The Multi-boot Main Windows provides the following options:

Table 33-4: Multi-boot Main Window Options

Option	Function
Boot Device Priority List Box	The 'Boot Device Priority' list box contains the IPL devices in the system in descending boot priority.
Hard Drives List Box	The 'Hard Drives' list box contains the list of BCV devices in descending priority. Typically, the BCV device list contains hard disks installed in the system.
Move Up Buttons	The 'Move Up' buttons allows the user to move the selected IPL or BCV device up in the 'Boot Device Priority' or 'Hard Drives' list box respectively.
Move Down Buttons	The 'Move Down' buttons allows the user to move the selected IPL or BCV device down in the 'Boot Device Priority' or 'Hard Drives' list box respectively.
Save To System Button	The 'Save To System' button writes the updated boot priority information to non-volatile storage. Any changes made in the MBA are preserved by the MBA when it is re-invoked.
Cancel Button	The 'Cancel' button exits the MBA and returns the user to the AF. No configuration information is automatically written to non-volatile storage with this selection, and the user is not prompted to save any outstanding changes before exiting.

33.3 Add-in Components – Password Add-In

The Password Add-in (PWA) provides security and password support options. Within the PWA, the user can either set or modify the current system passwords or update any of the various security options available. Only a single instance of the PWA may be launched within the CAF.

33.3.1 PWA Initialization Files

The PWA does not include support for initialization files. Instead, all parameters required to configure the operation of the PWA are stored in the Windows registry.

33.3.2 PWA User Interface

The PWA is implemented as an ActiveX control within the MDI CAF application.

33.3.3 PWA Operation

The following sections briefly describe the overall operation of the Password Add-in.

33.3.3.1 PWA Main Window

The PWA presents a main window to the user which supports several features broken into three sections relating to the 'Administrative Password', 'User Password', and the 'Security Options'. These features are described in additional detail in the following sections. The main window itself supports border icons for minimization and the system menu.

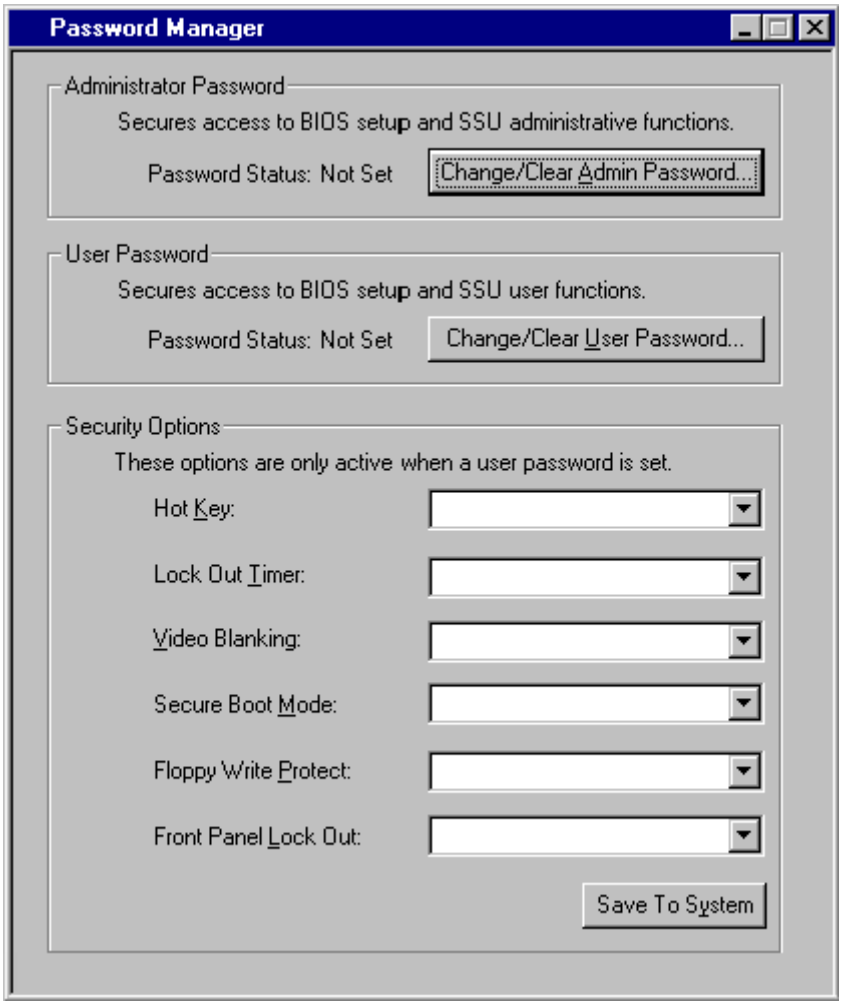

Figure 33-5: Password Main Window

The Password Main Window provides the following options:

Table 33-5: Password Main Window Options

Option	Function
Administrative Password Status Text	The administrative password support includes a text control used to display 'Password Status' information. The control displays either "Set" or "Not Set" depending on the current status of the administrative password.
Change/Clear Admin Password Button	The 'Change/Clear Admin Password' button allows the user to set or change the administrative password used by both the SSU and the system BIOS. All changes to the admin password take place immediately and do not require the 'Save To System' button to be pressed. Updates to the administration password are reflected in the 'Password Status' information as required.
User Password Status Text	The user password support includes a text control used to display 'Password Status' information. The control displays either "Set" or "Not Set" depending on the current status of the user password.
Change/Clear User Password Button	The 'Change/Clear User Password' button allows the user to set or change the user password used by both the SSU and the system BIOS. All changes to the user password take place immediately and do not require the 'Save To System' button to be pressed. Updates to the administration password are reflected in the 'Password Status' information as required.
Hot Key Combo	The 'Hot Key' combo provides a list of valid secure mode hot keys, which may be selected. This option is only available when the user password is set, otherwise the option is "grayed out". The 'Hot Key' selection is saved to the platform via the 'Save To System' button. Note that support for this option may vary between platforms.
Lock Out Timer Combo	The 'Lock Out Timer' combo provides a list of valid secure mode timer values which may be selected. The option is available only when the user password is set, otherwise it is "grayed out". The 'Lock Out Timer' option is saved to the platform via the 'Save To System' button. Note that support for this option may vary between platforms.
Secure Boot Mode	The 'Secure Boot Mode' combo allows the user to 'Enable' or 'Disable' secure boot made. The option is available only when the user password is set, otherwise it is "grayed out". The 'Secure Boot Mode' option is saved to the platform via the 'Save To System' button. Note that support for this option may vary between platforms.
Video Blanking	The 'Video Blanking' combo allows the user to 'Enable' or 'Disable' secure boot made. The option is available only when the user password is set, otherwise it is "grayed out". The 'Video Blanking' option is saved to the platform via the 'Save To System' button. Note that support for this option may vary between platforms.
Floppy Write Protect	The 'Floppy Write Protect' combo allows the user to 'Enable' or 'Disable' writing to the floppy drive when secure mode is active. The option is available only when the user password is set, otherwise it is "grayed out". The 'Floppy Write Protect' option is saved to the platform via the 'Save To System' button. Note that support for this option may vary between platforms.
Front Panel Lock Out	The 'Front Panel Lock Out' combo allows the user to 'Enable' or 'Disable' front panel support when secure mode is active. The option is available only when the user password is set, otherwise it is "grayed out". The ''Front Panel Lock Out' option is saved to the platform via the 'Save To System' button. Note that support for this option may vary between platforms.
Save To System	The 'Save To System' button writes the updated security options to non-volatile storage. Note that the 'Save To System' button does not update either the administration or user password as they are updated immediately following a change. Any changes made in the PWA are preserved by the PWA when it is re-invoked.
Cancel Button	The 'Cancel' button exits the PWA and returns the user to the AF. No configuration information is automatically written to non-volatile storage with this selection, and the user is not prompted to save any outstanding changes before exiting.

33.4 Add-in Components – System Event Log Add-In

The System Event Log Add-In (SEL) provides basic support for viewing and clearing the system event log on the server platform. Only a single instance of the SEL may be launched within the CAF.

33.4.1 Initialization Files

The SEL does not include support for initialization files. Instead, all parameters required to configure the operation of the SEL are stored in the Windows registry.

33.4.2 User Interface and SEL Viewer Operation

The SEL user interface and operation are described in the chapter on Common GUI for SEL, SDR, and FRU.

33.5 Add-in Components – Sensor Data Record Manager Add-In

The Sensor Data Record Add-In (SDR) provides basic support for viewing sensor data record information on the server platform. Only a single instance of the SDR may be launched within the CAF.

33.5.1 Initialization Customization Files

The SDR does not include support for initialization files. Instead, all parameters required to configure the operation of the SDR are stored in the Windows ® registry.

33.5.2 User Interface and SDR Viewer Operation

The SDR user interface and operation are described in the on Common GUI for SEL, SDR, and FRU.

33.6 Add-in Components – FRU Manager Add-In

The Field Replaceable Unit Add-In (FRU) provides basic support for viewing the FRU Inventory areas on the server platform.

Only a single instance of the FRU may be launched within the CAF.

33.6.1 Initialization Customization Files

The FRU does not include support for initialization files. Instead, all parameters required to configure the operation of the FRU are stored in the Windows registry.

33.6.2 User Interface and FRU Viewer Operation

The FRU user interface and operation are described in the section titled Common GUI for SEL, SDR, and FRU.

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Intel® Server Control v2.x TPS

Section 8: Platform Instrumentation Control (PIC)

Platform Instrumentation Control Contents

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34 Introduction to Platform Instrumentation Control (PIC)

Platform Instrumentation Control (PIC) is a server management tool that provides real time monitoring and alerting for server hardware sensors. PIC consists of a Windows 32 graphical user interface (GUI) that communicates to the platform instrumentation (PI) resident on the server. PIC is designed to dynamically detect and display the management capabilities of ESG platforms.

PIC allows system administrators to:

- Remotely monitor server hardware sensors
- Configure sensor thresholds
- Configure, receive, and act upon alert events
- Configure options to shutdown, reboot, or power-off the system automatically

As with the other ISC components, PIC uses a user-friendly graphical interface for monitoring and controlling the platform management features of the system. It is designed as a set of ActiveX controls that communicates to the server using the standard Desktop Management Interface Version 2.0 (DMI 2.0) remoting interfaces.

PIC integrates into the enterprise and workgroup management consoles, as well as into the ISC Standalone container. It relies on the management console or ISC Standalone for discovery of servers over the LAN. Changes in the server state are propagated to the management consoles for appropriate alert handling.

35 Platform Instrumentation

Platform Instrumentation consists of the server-resident software required for monitoring and controlling the server when the operating system is on-line. The core instrumentation is implemented as platform instrumentation under the DMI 2.0 management framework.

A large set of the standard DMI 2.0 groups are used to make the instrumentation more manageable by management consoles that understand the semantics of the standard groups. All DMI standard groups that are required by 'Wired For Management' (WFM) 1.1a specifications are instrumented. The instrumentation retrieves data from the operating system as well as from the Platform Management Technology (hardware, firmware and BIOS).

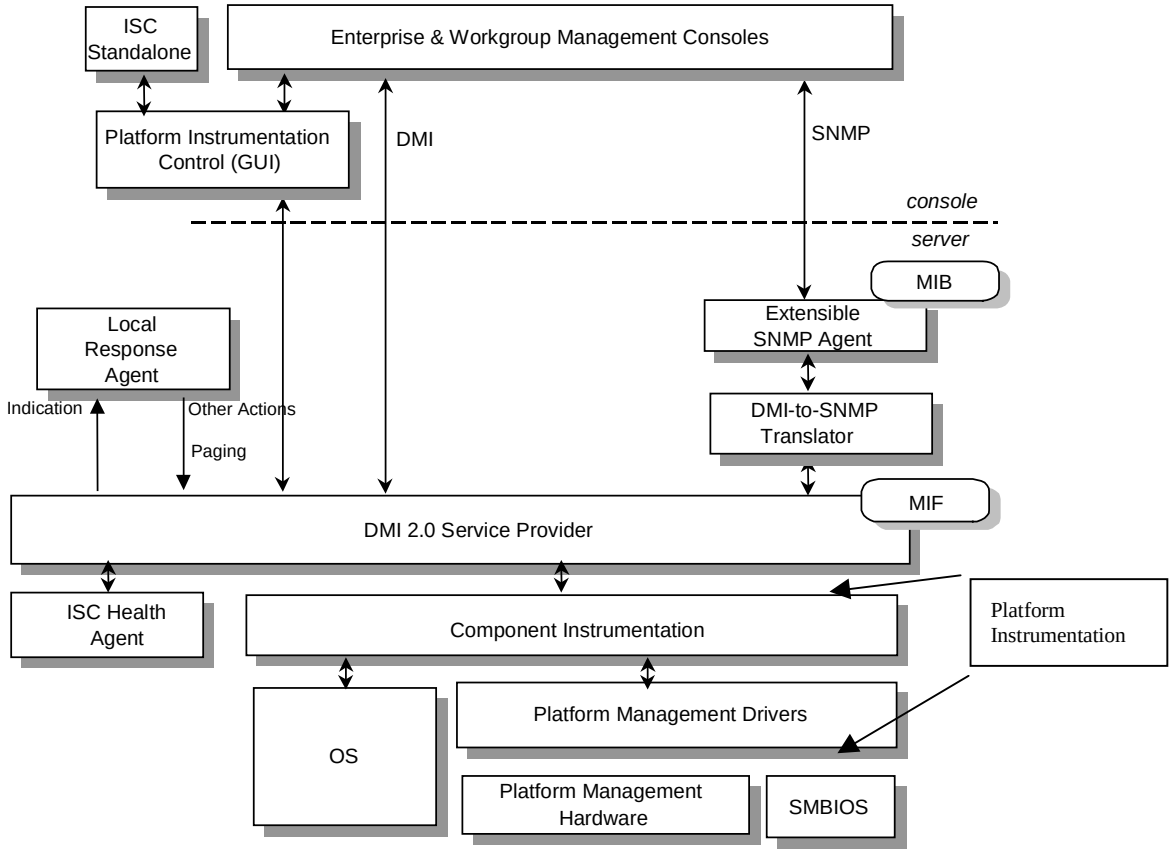

Figure 35-1: Platform Instrumentation Control and Platform Instrumentation

Platform Instrumentation also provides instrumentation data for the servers connected through the Intelligent Chassis Management Bus Bridge (ICMB). This allows PIC to use the Platform Instrumentation on one server to access the Platform Management Technology on another target server/chassis. This is useful when the target server is not fully operational and can not be reached directly by the PIC, or when the target server is running an OS that is not supported by the Platform Instrumentation.

35.1 Local Response Agent

Any change in the Server State generates a DMI indication. These indications are consumed by the Local Response Agent, which responds to the arrival of indications by taking actions such as

- power off
- reset
- shutdown
- NMI
- beep the system speaker
- log to disk
- broadcast a message on the network and display a message on the system console.

If the LANDesk Server Manager components are installed on the server and at the console, then the LRA also converts the DMI indication into an alert that is sent to the LANDesk Alert Management System (AMS-2).

A new paging capability has been added to the set of LRA actions. The Local Response Agent actions are programmable on a per-indication basis. Indications are also exported from the server directly to the interested DMI management applications.

A cross-mapper (SDLINK) is supported to allow access to the core DMI instrumentation on the servers from the SNMP consoles. The cross-mapper supports read and modify operations (gets and sets) from the SNMP consoles. The cross-mapper supports conversion of DMI indications into SNMP traps.

36 PIC Graphical User Interface

Note: Before launching the ISC GUI, a five-minute delay should be allowed after Windows 95 or Windows NT loads. This will allow the OS sufficient time to start all services required for the ICMB discovery process.

As pictured below, PIC application uses a Windows Explorer-like model, with a Navigation (tree view) Pane on the left and a Presentation (list view) Pane on the right.

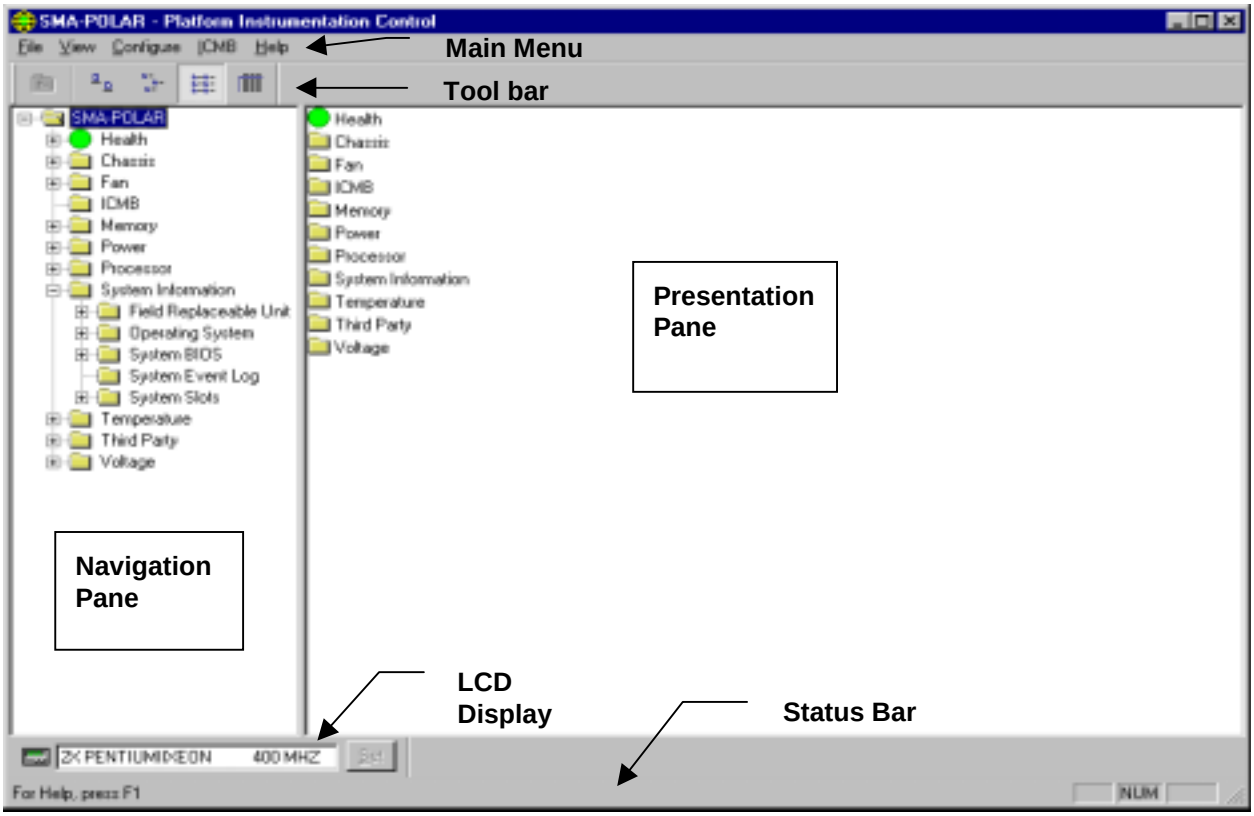

Figure 36-1. PIC Container

During initialization, PIC communicates with the managed server to determine which sensors are supported on the server. This information is used to build the navigation tree in the main window. PIC also determines the server health status and initializes the Health branch in the navigation tree.

While initializing, the ISC bitmap is displayed in the Presentation Pane. The initialization progress is visible in the status bar as a series of vertical bars that are drawn from left to right until the initialization is complete and the status bar changes to “Ready”.

The Health branch provides the user with a quick and simple view of the current server health. All unhealthy sensors (status not OK) will be collected under the Health branch. If the server supports an LCD, then the LCD display pane is also visible on the main window. When initialization is complete, the ISC bitmap is replaced with the list of managed sensors.

When the user navigates to a sensor in the tree view, a set of tabbed pages will appear in the Presentation Pane displaying sensor specific information. The administrator uses the Navigation Pane to select a sensor. Sensor information can be viewed, or sensor information updated, in the Presentation Pane.

The following sections provide a detailed overview of the screen components and activities that may be performed by using PIC.

36.1 Main Menu

Figure 36-2. Main Menu

The Main Menu options may be outlined as follows. Details of the Main Menu options follow in the sections below.

File Menu
- Exit

View Menu
- Toolbar
- Status Bar
- LCD Display
- Large Icons
- Small Icons
- List
- Details
- Arrange Icons
- Refresh
- Options

Configure Menu
- Enable Front Panel Power & Reset
- Power off the server immediately
- Immediate Hardware Reset Server
- Enable Watchdog Timer
- Watchdog Timeout Value
- Paging Configuration
- Restore Factory Defaults

ICMB Menu
- View Managing Server
- View Managed Server(s)
- Reclaim Inactive Resources

Help Menu
- Help Topics
- About PIC

36.1.1 File Menu

The File Menu option contains only Exit. This command exits the application.

36.1.2 View Menu

The View Menu offers options to change options that are visible and to change the order in which options may be seen. The following menu options are available from the View Menu:

- **Toolbar**
  This command toggles the toolbar visibility. By default this option is checked and visible.
- **Status Bar**
  This command toggles the status bar visibility. By default this option is checked and visible.
- **LCD Display**
  This command toggles the LCD pane visibility. By default this option is checked and visible.
- **Large Icons**
  This command displays list view items using large icons. Large Icon view is the default choice.
- **Small Icons**
  This command displays list view items using small icons.
- **List**
  This command displays list view items in list format. This is the default view format.
- **Details**
  This command displays list view items in detail format.
- **Arrange Icons**
  This command allows the user to arrange the list view item icons by name or by status. Default value is by status.
- **Refresh**
  This command triggers an immediate screen and data refresh.
- **Options**
  This command displays the view options dialog, which allows the user to configure viewing preferences such as temperature display unit and GUI refresh interval (see section 38.1 for details).

36.1.3 Configure Menu

The Configure Menu provides selections to perform power-related functions at the server, and to perform select configuration functions at the server, such as Paging and changing the Watchdog timeout value. The available options are as follows:

- **Enable Front Panel Power & Reset**
  This command toggles the server's front panel power and front panel reset buttons. By default, these features are enabled. If disabled, the server front panel buttons will not respond when pressed.
- **Power off the server immediately**
  This command immediately powers down the server. This action is an immediate power-off without a shutdown of the OS; it might corrupt files. Use with caution.
- **Immediate Hardware Reset Server**
  This command immediately resets the server via hardware. This action is an immediate hard reset without a shutdown of the OS; it might corrupt files. Use with caution.
- **Enable Watchdog Timer**
  This command toggles the watchdog timer option. When the user enables the Watchdog Timer, the Watchdog Time-out configuration dialog will appear automatically for the user to configure its value. By default, the Watchdog Timer is enabled.

- **Watchdog Timeout Value**
  Default value is two minutes. Its value range is from two minutes to 60 minutes.
- **Paging Configuration**
  This command displays the paging Configuration dialog box (see section 38.4 for details). This configuration is not sensor specific, this is global to a server.
- **Restore Factory Defaults**
  This command restores the sensor threshold values to its default values. (see section 38.2 for details).

36.1.4 ICMB Menu

The ICMB Menu provides the following options:

- **View Managing Server**
  his command enables the default local managing server view. The Navigation Pane and Presentation Pane is redrawn with information on the primary server. This is the same information displayed when PIC initialized.
- **View Managed Server(s)**
  This submenu brings up the ICMB managed server view(s).
- **Reclaim Inactive Resources**
  This command reclaims inactive ICMB resources.

36.1.5 Help Menu

The Help Menu displays detailed information about the procedures and the options to operate the PIC Console. This menu displays the following menu items:

- **Help Topics**
  This command brings up the PIC help topics.
- **About PIC**
  This command brings up the PIC version information.

36.2 Toolbar

The Toolbar is displayed on the main dialog directly under the Main Menu items. The Toolbar consists of five buttons described below. The Toolbar is displayed by default, but can be hidden by toggling the Toolbar option accessed under the Main Menu, View, Menu, Toolbar. The Toolbar can also be hidden by right clicking with the mouse over the Toolbar and selecting the Hide menu option.

Figure 36-3: Toolbar

The Toolbar options can be described as follows:

Table 36-1: Toolbar Options

Icon	Command	Function
	Up One Level	This button brings the user up one level in the tree (navigation) view.
	Large Icons	This button displays list view items using large icons.
	Small Icons	This button displays list view items using small icons.
	List	This button displays list view items in list format.
	Details	This button displays list view items in detail format.

When the toolbar is hidden, the main dialog appears as follows:

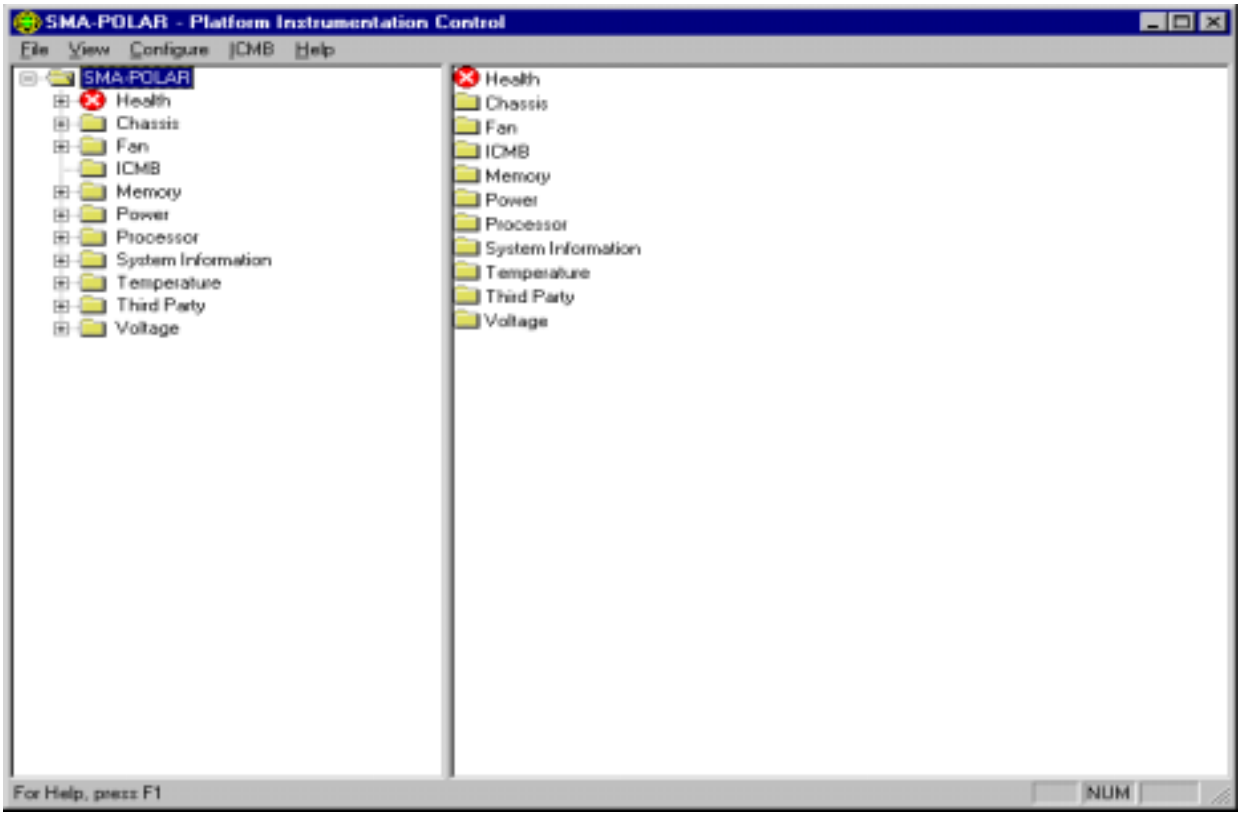

Figure 36-4. PIC Main Dialog, Toolbar Hidden

36.3 Navigation Pane

The Navigation Pane appears on the left side of the main dialog. It is used to organize the server information.

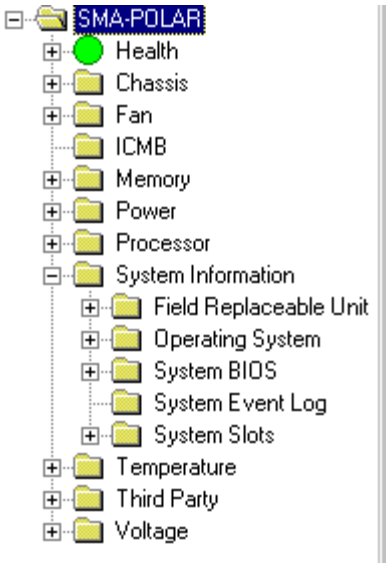

Figure 36-5. Navigation Pane

The Navigation Pane contains a tree view, which presents the server object hierarchy. The root of the tree is the server name or server IP address. Each "group" branch within the tree with a ⊞ symbol can be expanded to view additional tree information. Each "group branch with a ⊟ symbol can be collapsed to hide additional tree information. By default, the tree information is organized as follows:

- Health branch first
- Sensor group sorted alphabetically
- System Information groups sorted alphabetically within that branch

The tree view is also expanded by default to the group level.

36.3.1 Health

Health is always the first branch of the server tree. Health provides the user with a quick and simple view of the current server health. All unhealthy sensors (status not OK) will be collected and displayed under the Health branch. These sensors are the same sensors found in other branches of the Navigation tree. For example, an unhealthy 12 V sensor would be found under the Health branch and the Voltage branch of the tree.

Within the health branch, sensors are organized alphabetically. Colored icons in the Health branch of the server tree indicate individual sensor status and overall server status:

- **Green:** healthy server
- **Yellow:** non-critical conditions
- **Red:** critical failures
- **Blue:** unknown state or status

The color of the server health icon will display the state of the most severe sensor status. If any sensor is in a critical condition, the server health status will be shown as critical (red), even if other sensors are not in a critical state. If there are only non-critical sensors, the server health status will be shown as non-critical (yellow). Only if all sensors report normal conditions will the server health status be shown as OK (green).

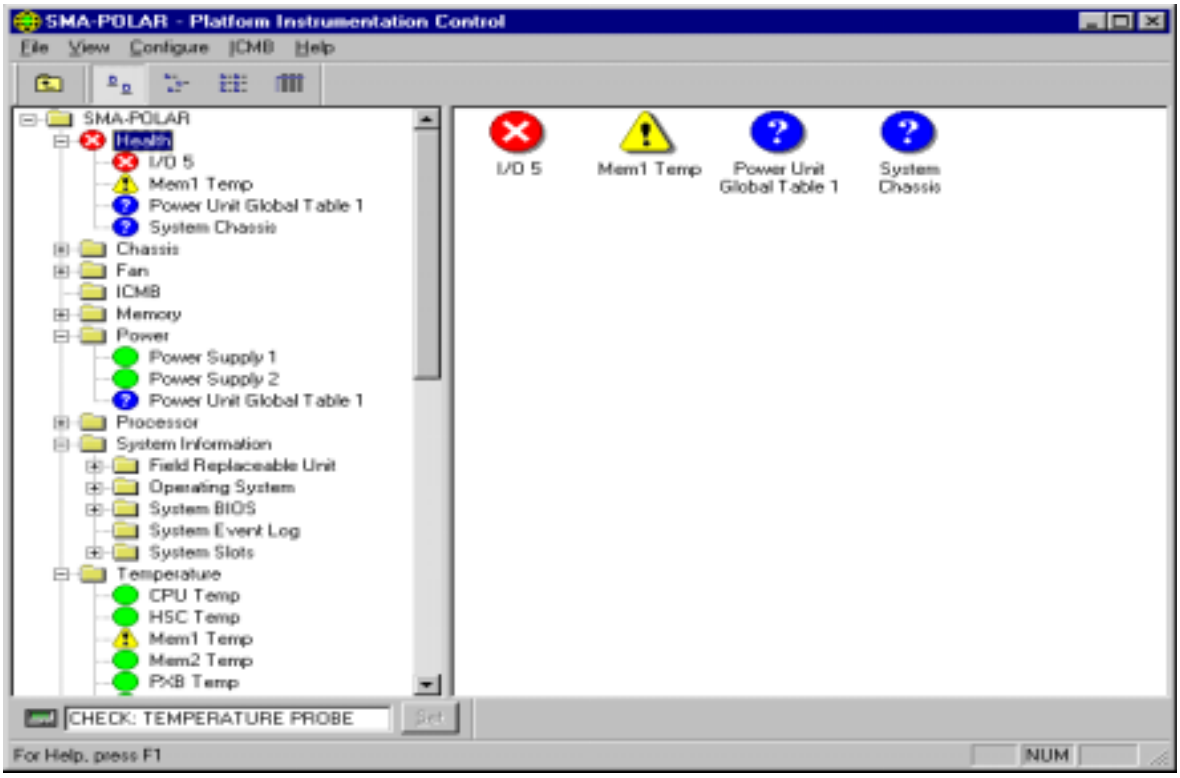

Figure 36-6. Health View in Main Dialog

36.4 Presentation Pane

The Presentation Pane appears on the right side of the main dialog. It is used to display server and sensor information for the sensor that is selected in the Navigation Pane.

36.4.1 Group Information

When browsing the tree in the Navigation Pane, information about groups – information related to a major heading, is displayed in the Presentation pane. An example of grouped information is if the user selects the major heading “Temperature” in the Navigation Pane, the available temperature sensors are displayed in the Presentation Pane.

36.4.1.1 Viewing Grouped Information – Icon Selection

Group information displayed in the Presentation Pane will appear in Large Icon, Small Icon, List or Detail view, depending on the View option selected from Main Menu / View. List View is the default view when the PIC GUI is initialized. See Figure 36-7, Figure 36-8, Figure 36-9, and Figure 36-10.

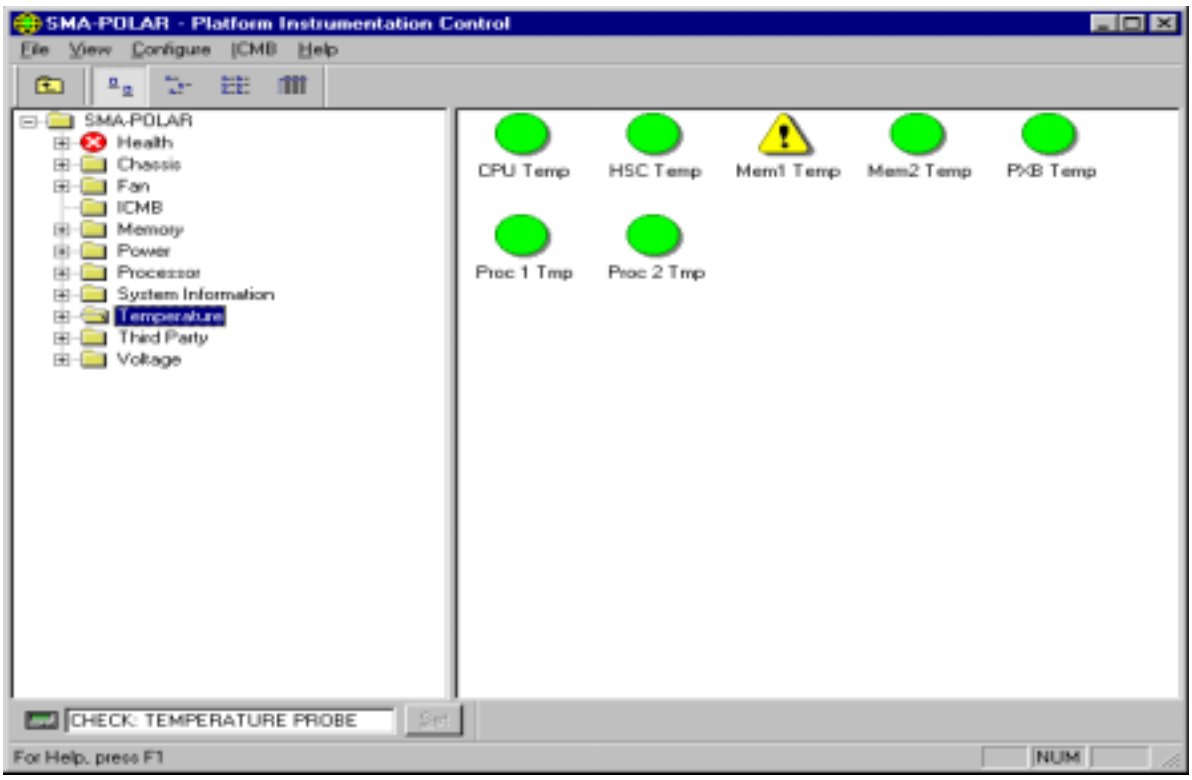

Figure 36-7. Presentation Pane, Large Icon View

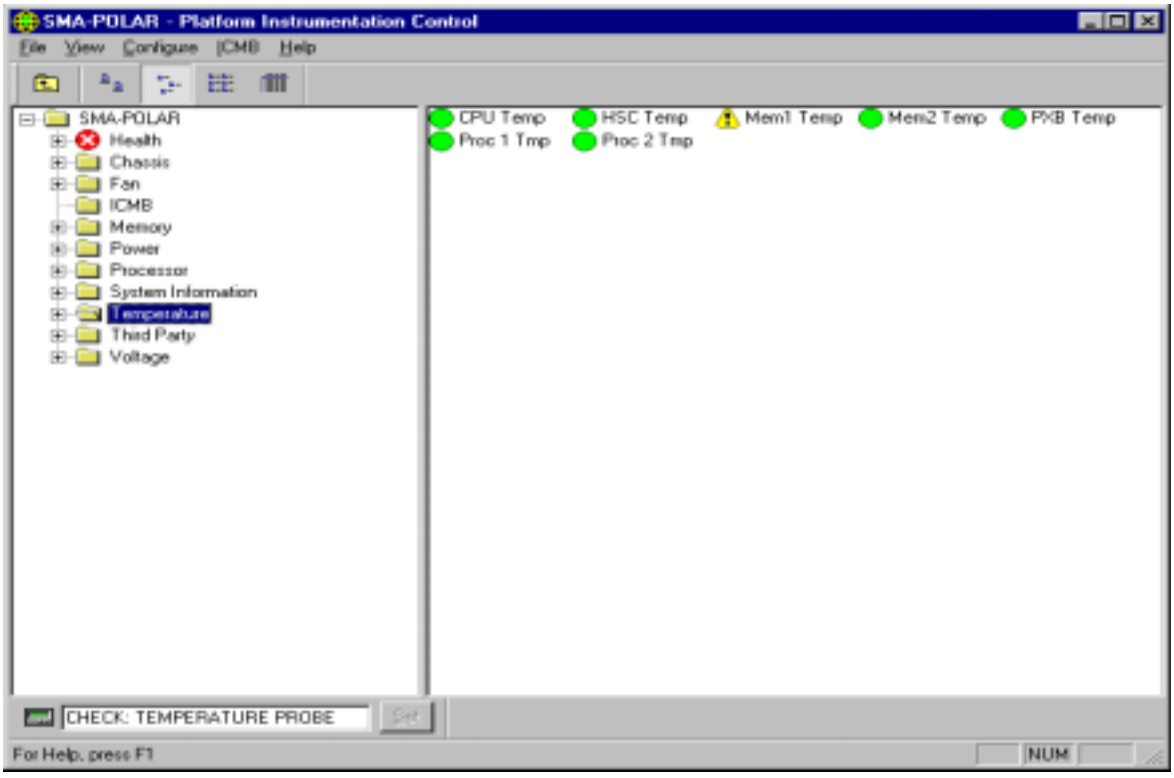

Figure 36-8. Presentation Pane, Small Icon View

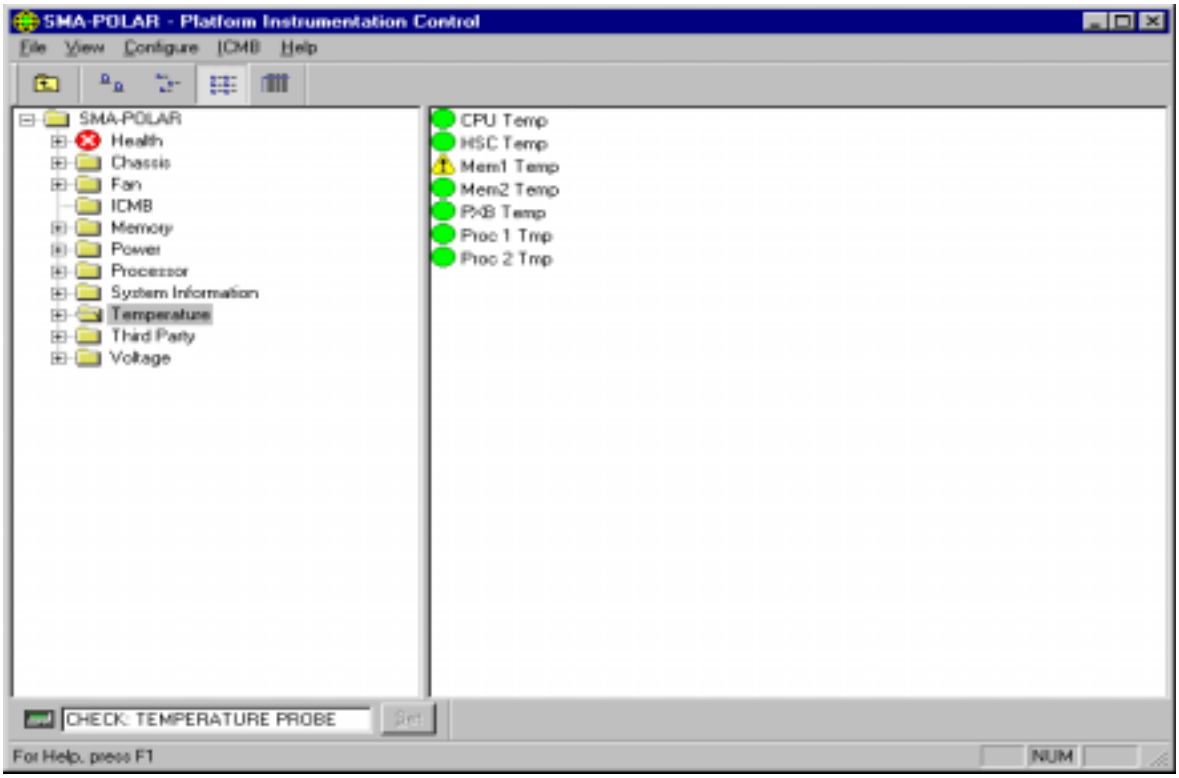

Figure 36-9. Presentation Pane, List View

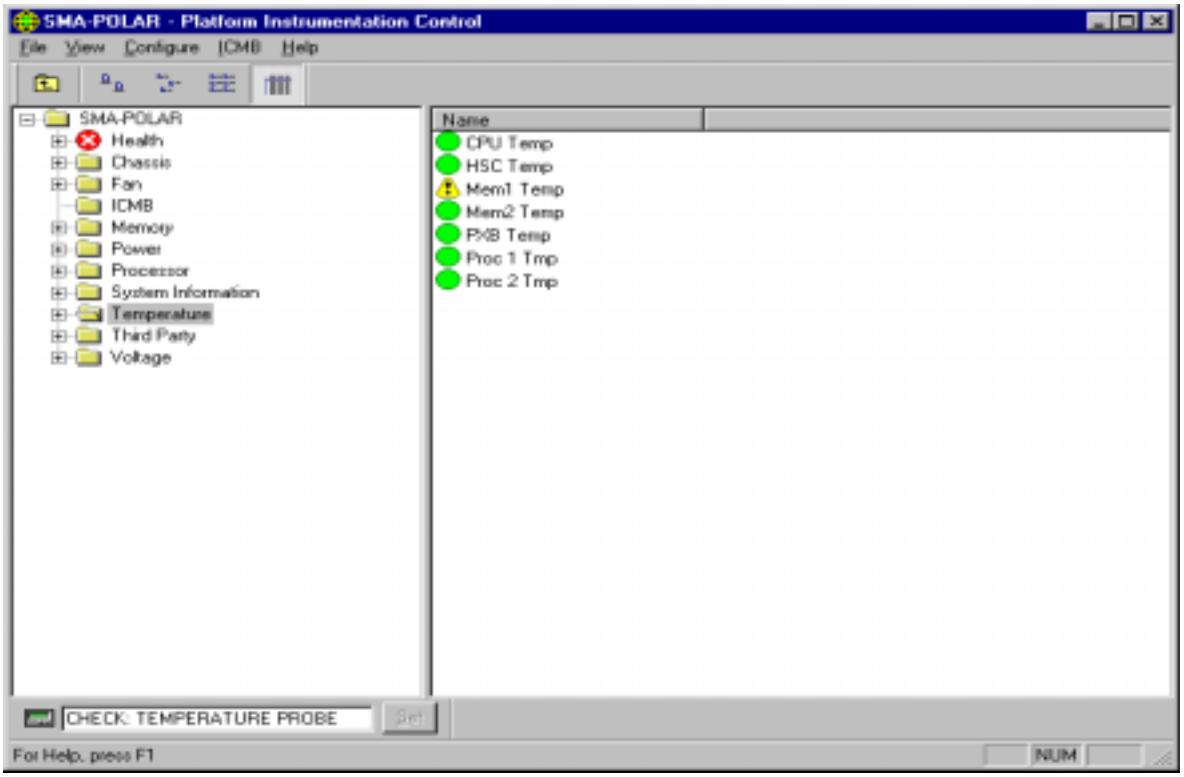

Figure 36-10. Presentation Pane, Detail View

36.4.1.2 Viewing Grouped Information – Name / Status Selection

Group information can also be arranged on the screen by name or by status, with the exception of Health views. Health is always arranged by status. The “Arrange by Name” and “Arrange by Status” options are available from the Main Menu / View.

“Arrange by Name” will sort the list of items alphabetically. “Arrange by Status” will sort these items by their status. The possible values of status are “Critical”, “Non-Critical”, and “OK”.

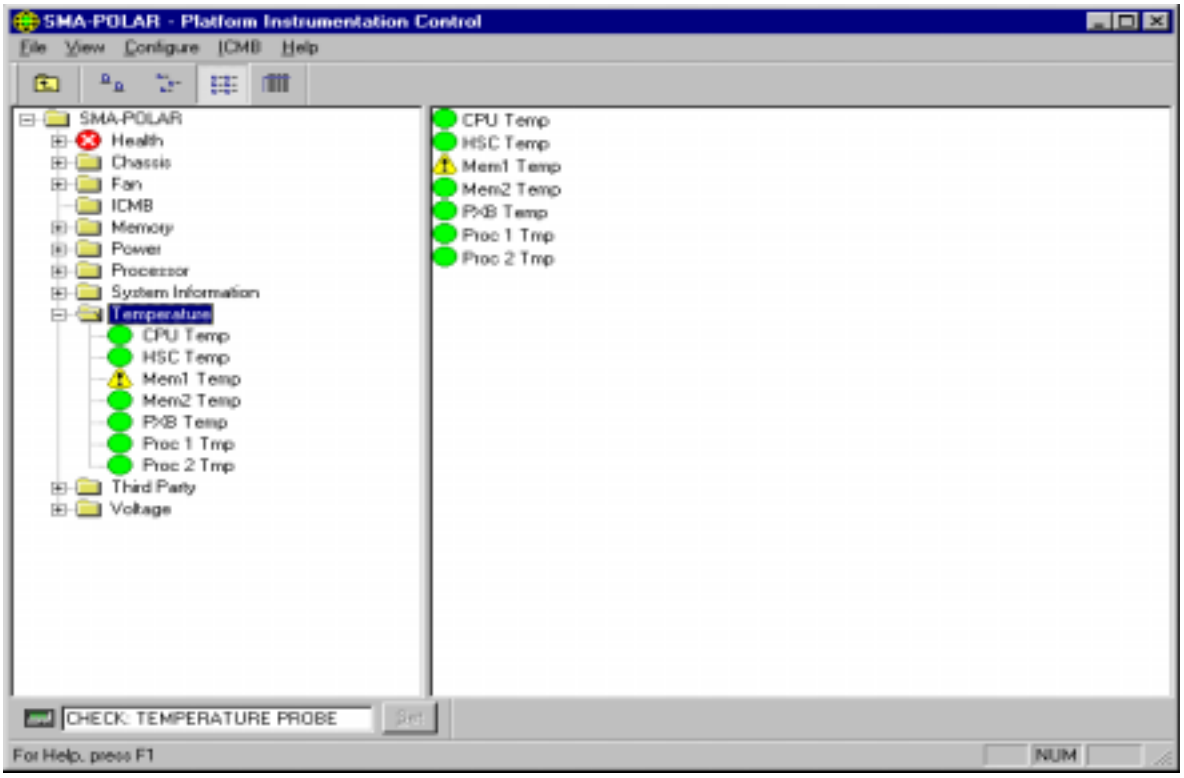

Figure 36-11. Arrange Icons by Name, List Icon View

When “Arrange by Status” is selected, the Navigation and Presentation Panes sort grouped sensor information by health status as follows: Critical sensors first, Non-critical sensors next, followed by Normal sensors. See Figure 36-12.

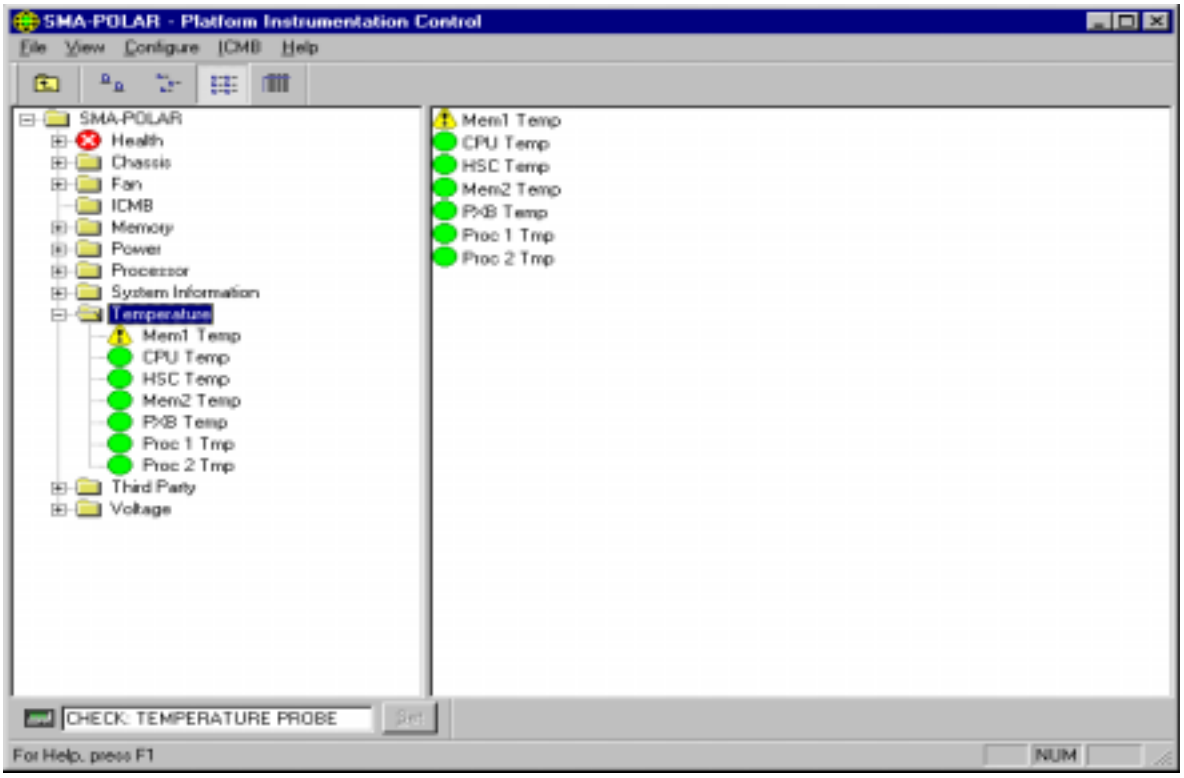

Figure 36-12. Arrange Icons by Status, List Icon View

36.5 LCD Display

Figure 36-13. LCD Display Pane

The LCD Display pane is displayed if the managed server supports an LCD. It may be seen at the bottom of the Navigation Pane, above the Status Bar. The LCD Display pane displays the server LCD contents. If the server hardware does not support an LCD, the corresponding LCD pane and will be disabled, as will the LCD Display option under Main Menu / View.

The LCD Display pane is displayed by default if the server supports an LCD. The pane can be hidden by toggling the LCD Display option accessed from Main Menu / View. It can also be hidden by right clicking with the mouse over the LCD Display pane and selecting the Hide menu option.

If the server does not support an LCD or the if LCD display is hidden, the main screen appears as follows:

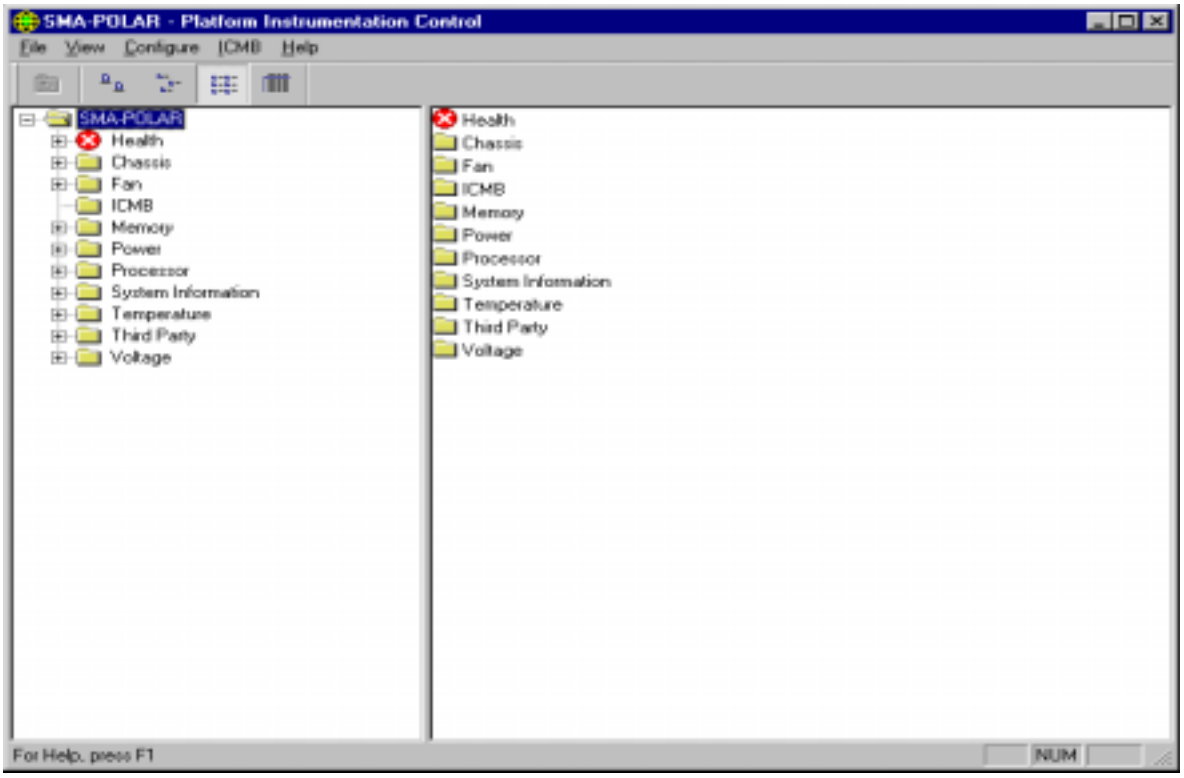

Figure 36-14. Managed Server without LCD, or LCD Hidden

36.6 Status Bar

Figure 36-15. Status Bar

The Status Bar is displayed at the bottom of the main screen and displays messages about system activity. The Status Bar is displayed by default, but can be hidden by toggling the Status Bar option, located under Main Menu / View. The Status Bar can also be hidden by right clicking with the mouse over the Status Bar and selecting the Hide menu option.

Initialization progress of the PIC GUI is visible in the status bar as multiple vertical bars that are displayed from left to right until initialization is complete. The status bar then changes to “Ready”.

When the status bar is hidden, the main dialog appears as follows:

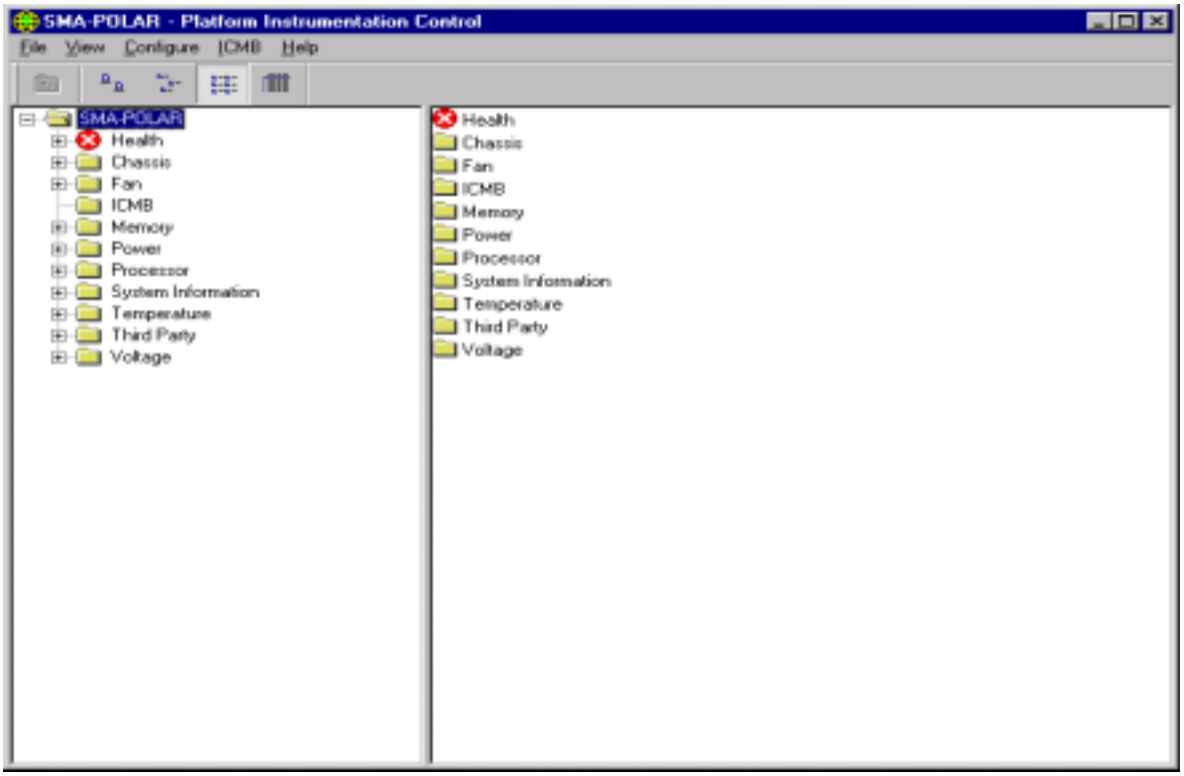

Figure 36-16. PIC Main Dialog, Status Bar Hidden

36.7 Popup Menus

Several popup menus are available within the PIC application. The sections below describe these popup menus in more detail.

36.7.1 Presentation Pane Popup Menu

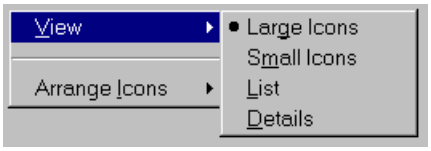

Figure 36-17. Presentation Pane Popup Menu

The Presentation Pane popup menu appears when the user right clicks in the Presentation Pane. The following options are available from this menu:

- **View**
  View allows the user to change between large icons, small icons, list view, or detail view. This functionality is also available from Main Menu / View:
- **Arrange Icons**
  Arrange Icons allows the user to arrange the list of item icons by name or by status. This functionality is also available from Main Menu / View.

36.7.2 Toolbar Popup Menu

Figure 36-18. Toolbar Popup Menu

The Toolbar popup menu appears when the user right clicks in the Toolbar. The **Hide** popup hides the toolbar. This functionality is also available from Main Menu / View.

Once hidden, the Toolbar can be restored by selecting the Toolbar option from Main Menu / View.

36.7.3 LCD Popup Menu

Figure 36-19. LCD Popup Menu

The LCD popup menu appears when the user right clicks on the LCD. The **Hide** popup hides the LCD display. This functionality is also available from Main Menu / View.

Once hidden, the LCD display can be restored by selecting the LCD Display option from Main Menu / View.

Note: The LCD options are only available on systems that support an LCD.

36.7.4 Status Bar Popup Menu

Figure 36-20. Status Bar Popup Menu

The Status Bar popup menu appears when the user right clicks on the Status Bar. The **Hide** popup hides the Status Bar. This functionality is also available from Main Menu / View.

Once hidden, the Status Bar can be restored by selecting the Status Bar option from Main Menu / View.

37 Individual Sensor / Server Information

When an individual sensor or server component is selected from the tree in the Navigation Pane, the data is displayed in one or more tab pages in the Presentation Pane.

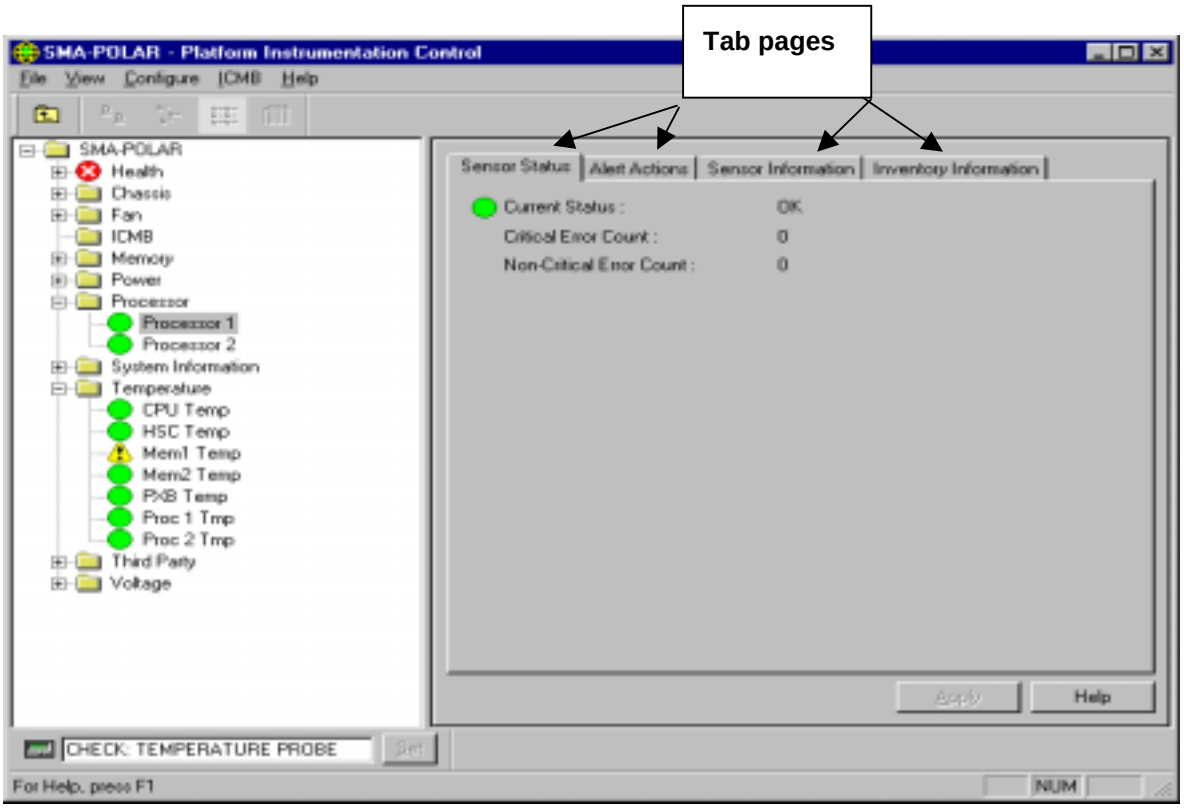

Figure 37-1. Tab Pages in Presentation Pane

For sensor objects selected in the Navigation Pane (e.g. Temperature, Fan, Voltage sensors), up to four tab pages are displayed:

1. Sensor Settings or Sensor Status – displays health status, current readings, error counts and threshold values (if supported).
2. Alert Actions – displays user configurable alert event actions. Includes audio/visual and power control actions. If LANDesk® Server Manager components are available on the managed console and server, then AMS events actions are also displayed.
3. Sensor Information – displays static sensor information such as normal readings, tolerances, ranges, etc. Note: not all types of sensors support the Sensor Information tab page.
4. Inventory Information – displays Field Replaceable Unit (FRU) information such as manufacturer, model, serial number, etc. Note: not all types of sensors support the Inventory Information tab page.

A user can changes a threshold value and then switch between tab pages without pressing the Apply button to save the changes. The changes will be saved as long as the user presses Apply before selecting a different sensor. If the user attempts to select another sensor without pressing the Apply button, the user will be prompted to save the changes before PIC will display information about the newly selected sensor.

For server components, such as Operating System, System BIOS, and System Event Log, only one tab page is displayed. The data displayed is specific to the sensor component selected and the name of the tab page will match the component name.

The following sections provide an overview of the tab pages available.

37.1 Sensor Settings Tab Page

The Sensor Settings tab page displays the health of the sensor, the current value or state, any associated error counts, and lets the user modify any supported threshold values for that sensor. The Sensor Settings tab page is the default tab page displayed in the Presentation Pane for sensors that support this feature. The Sensor Settings tab page is displayed for the following sensor types:

- Fan
- Temperature
- Voltage

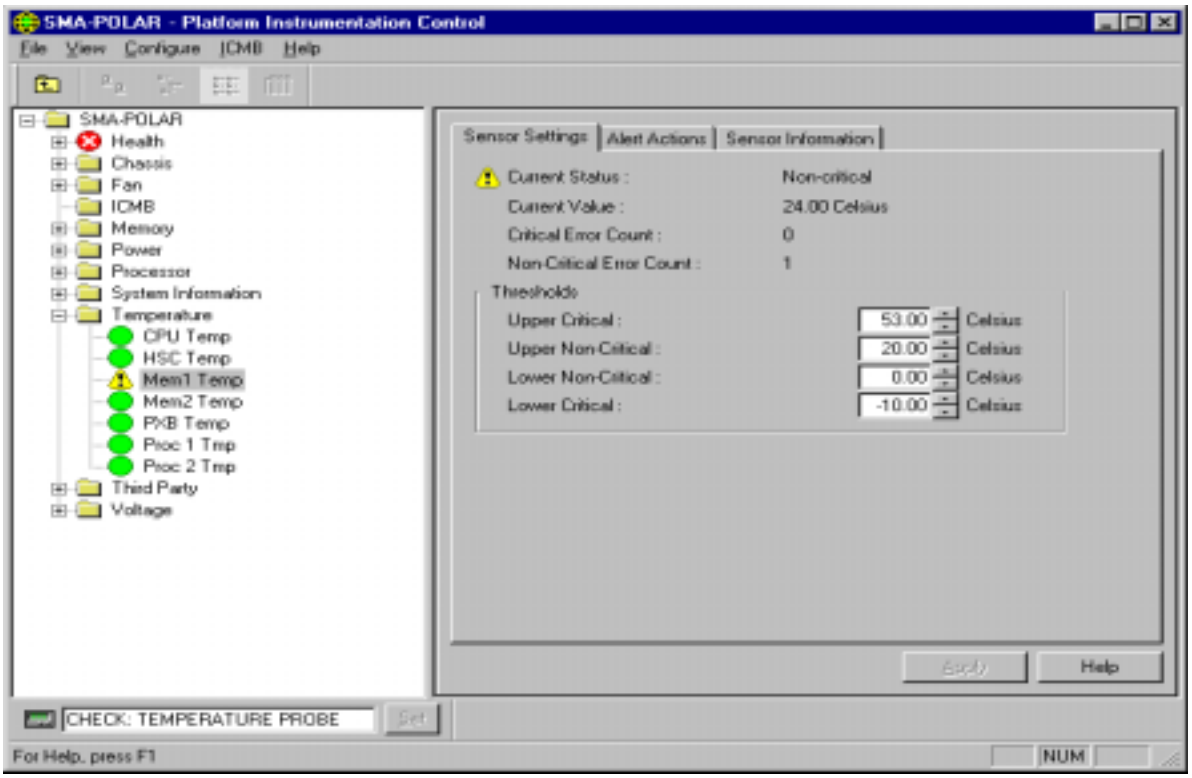

Figure 37-2. Sensor Settings Tab Page

Depending on the individual sensor displayed, some thresholds may be unsupported and appear as disabled (grayed out) in the control. The status bitmap on the upper left corner of the tab page provides a graphical view of the current sensor status. A red circle with a white X means “Critical”, a yellow caution sign means “Non-Critical”, a green circle means “OK”, and a blue question mark means “Unknown”.

The Apply button is enabled when a threshold value has been changed. PIC validates user entries for threshold values once the Apply button is pressed. Threshold values must conform to the following rule: MIN <= Lower Critical <= Lower Non Critical < Upper Non Critical <= Upper Critical <= MAX. For each sensor, there are minimum (MIN) and a maximum (MAX) threshold values. If a sensor does not have a MIN or a MAX value defined, MIN and MAX is taken as the range of a machine integer (which may vary from one server to another).

For Temperature sensors, the display unit can be changed from Celsius to Fahrenheit by using the Main Menu / View / Options.

Error counts on the Sensor Settings tab page are read-only fields. Users can not modify them through PIC.

37.1.1 Threshold Values Rounded Off

When setting thresholds, the values entered might not be the exact values set by the software. Hardware rounding causes this behavior. The user must redisplay the Sensor Settings tab page to find the actual value set by the software.

37.1.2 Avoiding a Reboot-Fail Retry Loop

User-defined threshold values and other user-defined configuration attributes are written to disk (persistent storage) so they are available when the server reboots. These “remembered” values replace the PIC default values when PIC initializes.

When the user changes a threshold value or an alert action in PIC, s/he can create an environment in which an event is immediately generated. An example is setting the Upper Non-critical Threshold value below the current sensor reading. If the configured event actions on this threshold included a Shutdown or Power Control action as described earlier, the server would trigger the Shutdown or Power Control action and could enter a reboot-fail-reboot-fail cycle using the new threshold value.

To help avoid this situation, PIC updates the server in two steps:

1. Any change is valid immediately in the active instrumentation, but PIC waits five minutes before writing user changes to disk.
2. If the change causes the server to reboot, the previous value is restored from disk when the server reboots. PIC then uses and displays the previous value, thus avoiding the immediate reboot-fail-reboot-fail cycle.

Any change made will be successfully written to disk as long as the baseboard instrumentation continues running for five minutes after the change is saved.

37.2 Sensor Status Tab Page

The Sensor Status tab page displays the health of the sensor, the current value or state, and any associated error counts. The Sensor Status tab page is displayed for the following sensor types:

- Chassis
- Memory Array
- Memory Device
- Power Supply
- Power Unit
- Processor
- System Slots

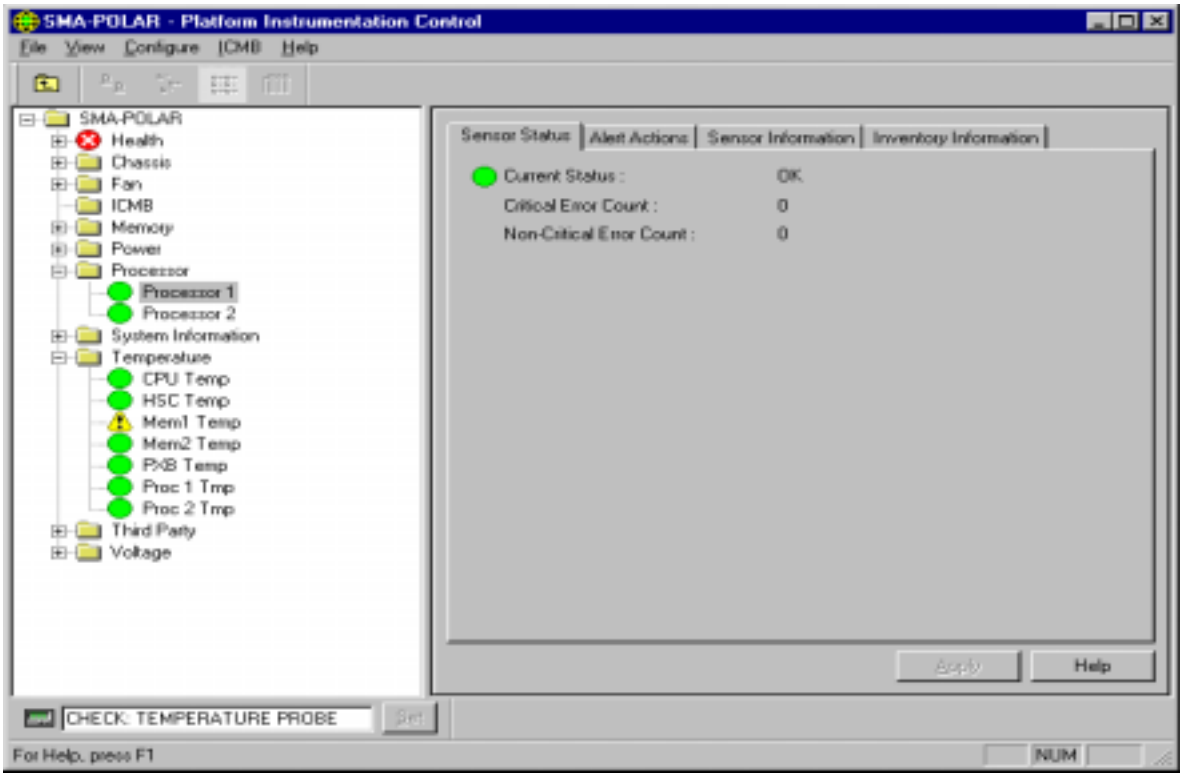

Figure 37-3. Sensor Status Tab Page

37.3 Alert Actions Tab Page

On the Alert Actions tab page, users can select actions that will take place when a sensor exceeds a threshold or changes state. Several options exist.

Local actions:

- Audio/visual notifications (more than one may be selected)
- Shutdown/power control actions (more than one may be selected)

Network actions:

- AMS2 actions (if LANDesk Server Manager is installed on the server and console).

Generally, audio/visual notifications and AMS2 alerts are for non-critical thresholds. Shutdown and power control actions are for critical thresholds. The Alert Actions tab page is displayed for the following sensor types:

- Chassis
- Fan
- Memory Array
- Power Supply
- Power Unit
- Processor
- System Slots
- Temperature
- Third Party Instrumentation
- Voltage

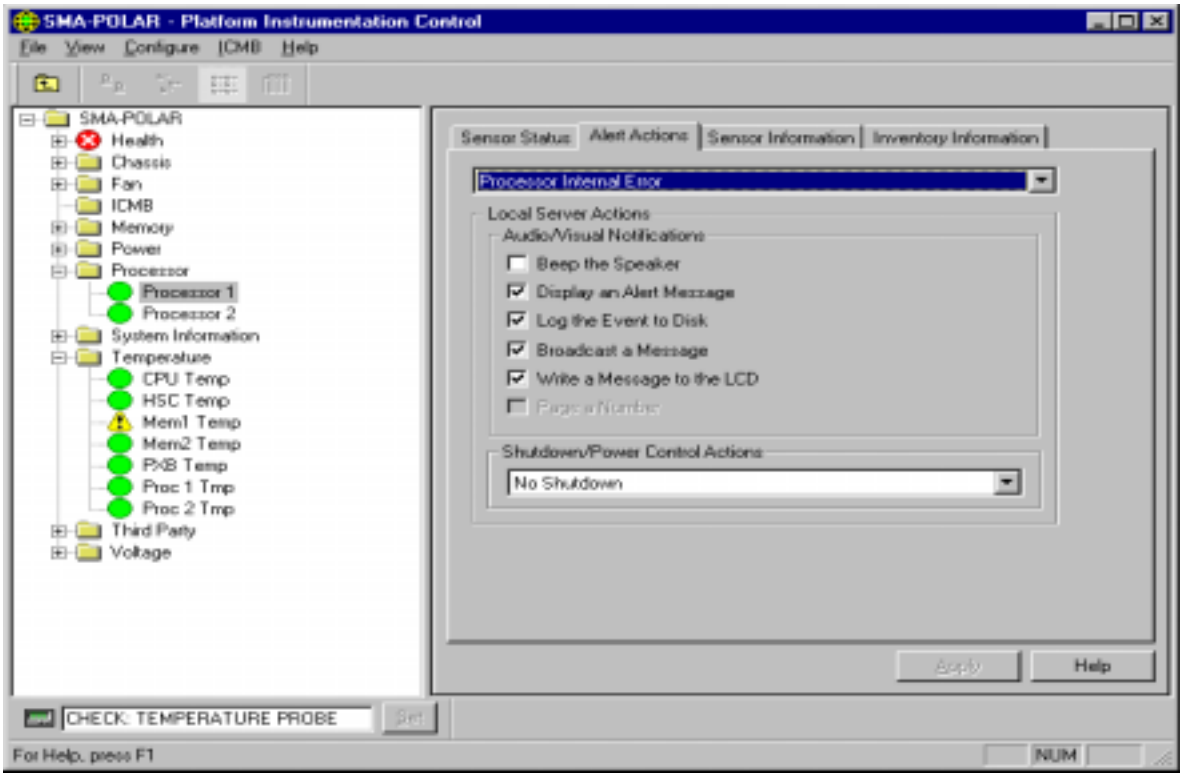

Figure 37-4. Alert Actions Tab Page

For more information on AMS2 and its alert actions, see “Configuring AMS2 Alert Actions” in the Intel LANDesk Server Manager Administrator’s Guide.

CAUTION
If the OS is disabled by a non-critical event action (such as configuring an OS shutdown action for a voltage surge), then critical actions will not be carried out because the OS has been shut down. It is best to use warnings (such as a speaker beep, a broadcast, etc.) for non-critical conditions.

The user configurable actions are defined in the tables below.

Table 37-1. Audio and Visual Notifications

Action	Description
Emit a beep from the managed server’s speaker	Speaker emits a beep.
Display an alert message on the managed server	Default action for non-critical and critical indications. The message box stays up until acknowledged. On UnixWare and Solaris, the alert message is displayed as a text message on the server console.
Log the event to disk	Default action for all indications. This option records the event in the standard system error log. On NetWare, ISC records the event in the System Log, which you can view with NetWare’s Syscon utility. On Windows NT, ISC records the event in the System Event Log, which you can view with the Windows NT Event Viewer. On UnixWare, events are logged in the system log file: /etc/.osm. On Solaris the messages are logged to /var/adm/messages.

Action	Description
Broadcast a message	Default action for critical indications. On NetWare, the message goes to all users currently logged into the managed server with Administrator or Supervisor privileges. On Windows NT, the message goes to all the users currently logged into the managed server. Note: Windows 95/98 cannot receive network broadcast messages from Windows NT. If you configure a broadcast message and it is triggered on a Windows NT server, the message will not be received by any Windows 95/98 systems. On UnixWare and Solaris, a text message is sent to all users currently logged onto the UNIX server.
Write a message to the managed server's LCD	Default action for all indications. If the LCD is not available on the managed server, this option is grayed out and disabled.
Page a Number	A page is sent to a specified pager, with the telephone number of the server, an ID number, or other numerical information.

Table 37-2. Shutdown and Power Control Actions

Action	Description
No shutdown	Default action for all indications. Select this option if you do not want to shutdown or reset the server when an event occurs.
Shutdown the OS	The user should select this option to shut down the OS gracefully (controlled, closing files and applications). On NetWare, the server is returned to DOS. On Windows NT, the server is set to a state ready for manual power-off or reset. On UnixWare and Solaris, standard shutdown is completed and system prompts for reboot or power off.
Shutdown the OS and power off	The user should select this option to shutdown the OS gracefully and turn off the system power.
Shutdown the OS and hardware reset	The user should select this option to shutdown the OS gracefully and reset the server via hardware.
Immediate power off	The user should select this option to immediately power down the server. This action is an immediate power-off without a shutdown of the OS; it might corrupt files.
Immediate hardware reset	The user should select this option to immediately reset the server via hardware. This action is an immediate hard reset without a shutdown of the OS; it might corrupt files.
Immediate NMI	The user should select this option to cause a hardware Non-Maskable Interrupt (NMI). If this feature is not supported on the managed server, this option is disabled / grayed out .

37.3.1 Avoiding a Power On/Off Loop

Improperly setting event actions can cause the server to enter a state that prevents the server from booting correctly. This can occur in the following scenario:

1. An event occurs. Example: a high-temperature threshold is exceeded.
2. While the condition causing the event still exists, the user sets a Shutdown/Power Control Action, like Immediate Power Off, to respond to this event.
3. Because the threshold has already been exceeded, no event is triggered to cause the Immediate Power Off action to occur.
4. If the user reboots the system and the event condition has not been corrected (in this example, the temperature is still over threshold), the system detects the temperature condition, triggers the event, and the corresponding action is taken. In this example action, Immediate Power Off, the system is automatically and immediately powered off.

When the system is powered up, an infinite loop of power-up and power-down begins. To break this cycle, the user has two options:

1. Clear the event condition (cool down the system in this example).
2. Create a file named C:\LRA.NOT (or insert a diskette with file \LRA.NOT in A: drive) before the OS boots. The existence of this file will disable the software component that responds to the event. The contents of the file are not important. This file can be created by booting DOS. The user must then delete this file after the problem is fixed to allow the software to operate normally. On UnixWare systems, the user either creates a LRA.NOT file in the root directory or uses the diskette described above.

37.4 Sensor Information Tab Page

The Sensor Information tab page displays static sensor information such as normal readings, tolerances, ranges, etc. for the sensor. The values displayed in the Sensor Information tab page are read-only, and the user can not modify them through PIC. The Sensor Information tab page is displayed for the following sensor types:

- Fan
- Memory Array
- Memory Device
- PCI HotPlug Device
- Power Supply
- Processor
- System Slots
- Temperature
- Voltage

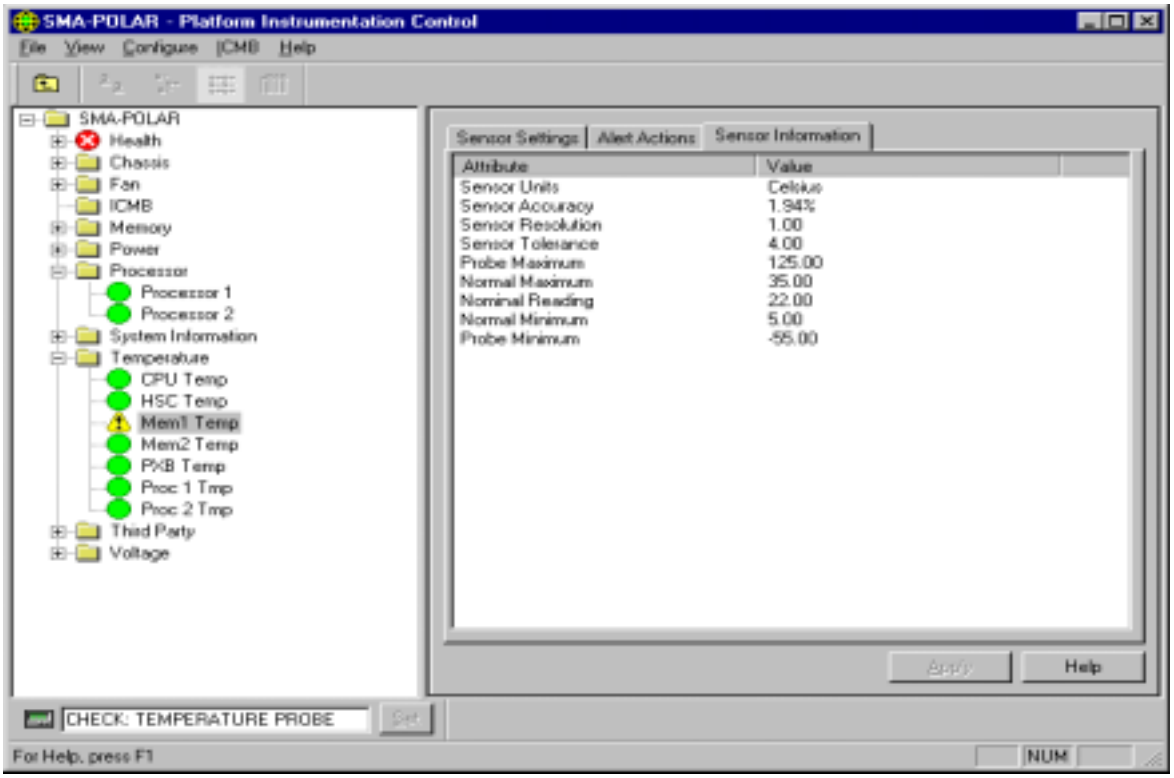

Figure 37-5. Sensor Information Tab Page

Note: For Temperature sensors, the display unit is either degrees Celsius or degrees Fahrenheit. For Voltage sensors, the display unit is Volts.

37.5 Inventory Information Tab Page

The Inventory Information tab page displays Field Replaceable Unit (FRU) information such as manufacturer, model, serial number, etc. for the sensor. The values displayed in the Inventory Information tab page are read-only, and you can not modify them through PIC. The Inventory Information tab page is displayed for the following sensor types:

- Chassis
- Field Replaceable Unit
- Memory Array
- Processor

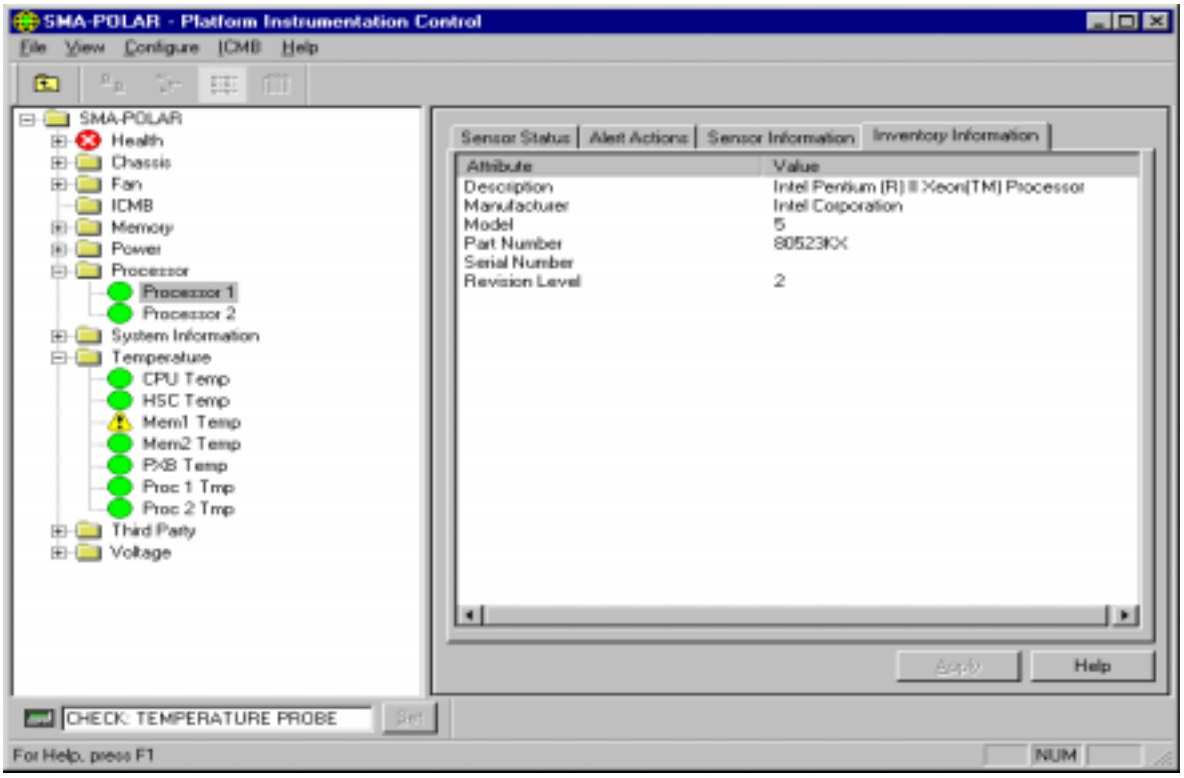

Figure 37-6. Inventory Information Tab Page

38 PIC Dialogs

From the Main Menu, users can display several customization/configuration dialogs or perform several different tasks while managing the server.

38.1 Options Dialog

The Options dialog is available from the Main Menu / View / Options menu selection.

PIC has several configurable options. The user can set the PIC console refresh rate, thus determining how frequently PIC is updated with current information for those sensors or servers where information is gathered through polling. The user can also enable or disable polling entirely and specify whether the temperature values display in degrees Celsius or degrees Fahrenheit.

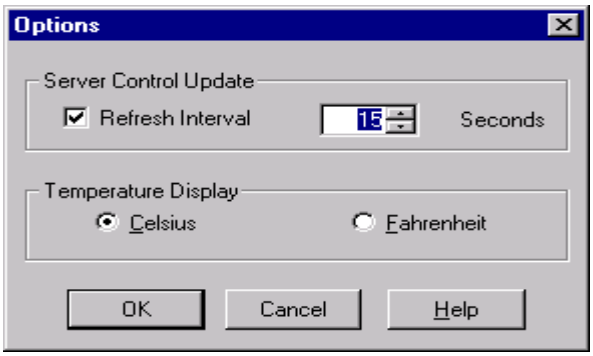

Figure 38-1. Options Dialog

PIC installs with the following defaults:

- PIC console refresh interval: 15 seconds
- Temperature display format: Celsius
- Watchdog feature: Off
- Watchdog timer: Two minutes
- Sensor threshold values as defined in the SDR file

The user should be aware when configuring the console refresh interval that a frequent refresh interval will impact system performance on both the console and the managed server. This is because on some servers PIC polls for the health status of each monitored sensor. Selecting a less frequent console refresh interval provides a reasonable information update, while minimizing the overhead on system performance.

The console refresh interval does not impact the rate at which the server system responds to event notifications (e.g., threshold crossings), only how quickly PIC displays updates with server information. A value of 15 seconds or greater for console refresh value provides a reasonable compromise.

38.2 Restoring Factory Defaults Dialog

To restore default PIC settings for threshold values, console refresh interval, and the watchdog feature the following steps should be used:

1. On the PIC Main Menu Bar, select the Main Menu / Configure / Restore Factory Defaults menu selection.
2. Click <OK> on the confirmation dialog.

Note: Event actions that have been configured and the temperature display format are not affected by the Restore Factory Default option.

Default threshold values are stored in Sensor Data Records (SDR) in nonvolatile storage on the server board. These values are determined and configured during manufacturing and are therefore not documented in this manual.

CAUTION:
Indications may be generated if the restoration of the default threshold value crosses the current sensor value. For example:

- User defined threshold limit 13.5 V
- Current sensor value 13.0 V
- Default threshold value 12.5 V

When the user selects the Restore Default Settings action, threshold restore may cause a threshold crossing. In the above example, PIC would detect a threshold crossing and generate an indication. The actions associated with that indication would occur.

To avoid the possibility of unwanted indications when restoring default settings, Intel recommends the following: For each sensor where indications are not wanted, the user should adjust the user-defined threshold value. The current sensor value should NOT be between the user-defined threshold value and the default threshold value. Once this adjustment is made, the user can select the Restore Default Settings action.

38.3 Watchdog Timer Dialog

Each motherboard supported by PIC has a watchdog timer implemented in the hardware. This timer is disabled by default. When enabled, the timer continually decrements to test the response of the server operating system. Under normal operating conditions, the timer will be periodically reset by the PIC server instrumentation software so it will not reach a value of zero. If the OS hangs, the timer will count down to zero.

If the timer reaches zero, an OS hang is indicated and the watchdog timer will reset the system. The default timer value is two minutes with minimum and maximum allowable settings of two to sixty minutes.

The Watchdog Timer dialog is available from the Main Menu / Configure / Watchdog Timeout Value menu selection.

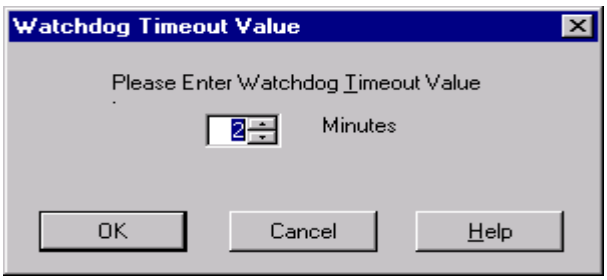

Figure 38-2. PIC Watchdog Timer Dialog

38.4 Paging Configuration Dialog

Sending a page is an alert action that can be configured for any sensor event if paging is supported on the managed server. The paging function is implemented by the Baseboard Management Controller (BMC) and uses a modem on the managed server. Although PIC supports paging as an event action, PIC does not provide a user interface to configure the system modem. PIC does provide a dialog to configure the pager number, repeat counts and other items relevant to the paging event action. This paging configuration is global to the server and is therefore not sensor specific.

The Paging Configuration dialog is available from the Main Menu / Configure / Paging Configuration menu selection. If paging is not supported on the managed server, this menu option will be grayed out.

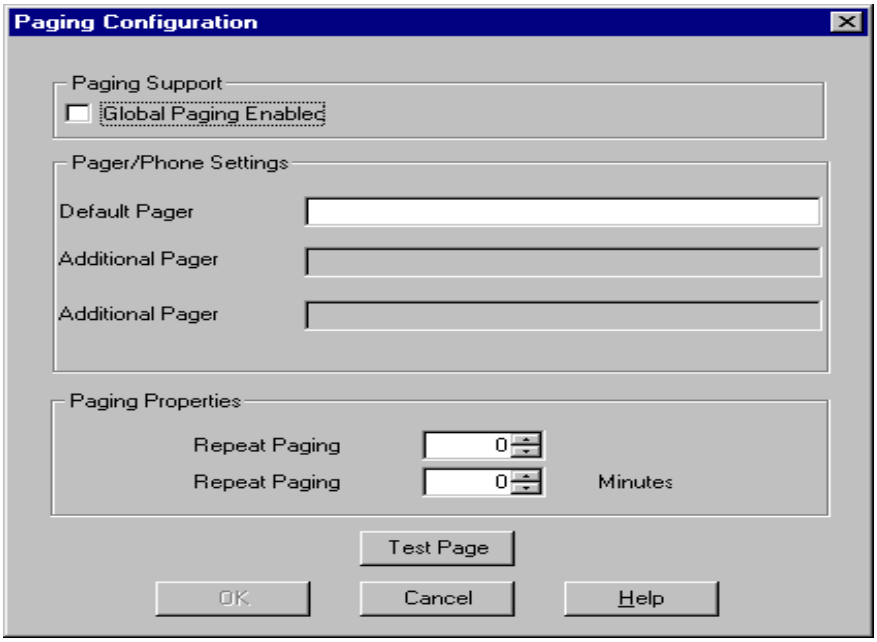

Figure 38-3. Paging Configuration

The Paging Configuration dialog allows the user to configure the following paging information :

- Paging Support — The Global Paging Enabled check box allows the user to enable or disable paging as a configurable event action for all PIC sensors. By default, global paging is enabled in PIC unless paging has been disabled on the managed server through the BMC. If global paging is enabled, then the user can configure paging as an event action for individual sensor events on the Alert Actions tab page.
- Pager/Phone Settings — The Default Pager Number is the default number used to issue any page request. The Additional Pager Numbers, if configured, will also be used for any paging event These are free format edit fields. The user must enter the full pager number the way it would be dialed including:
  - Modem dial commands
  - Paging service phone number, including initial numbers to access an outside dial tone for inter-company dialing
  - Paging service passcode (if required)
  - System Identification Number
  - Termination characters

  For example, the page string might be: `ATDT18005551234,123456#,5031234567#` This includes, in order of appearance:

  - Modem dial command
  - Paging service phone number
  - Pause (,)
  - Passcode
  - Pause (,)
  - System identification phone number
  - Closing # sign

  Since the pager number information may vary on many factors (e.g. modem commands, service number, inter-company, local call, long distance call, international call, etc.), PIC does not provide any validation on the user input. The Test Page function should be used to validate the information entered.

  Note: The Test Page function is supported only for the default pager number.
- Paging Properties — The Repeat Paging feature allows administrators to be notified multiple times for any paging event. The user can configure the number of times and at what frequently a page is generated. If more than one pager number is configured, then each pager number will be contacted the specified number of times. The paging interval is the time between when the pagers were last contacted and when the page is re-issued.

  The default paging count is one with a maximum value of three. The default paging interval is ten minutes, with a maximum value of sixty minutes.
- Test Page — Allows the user to generate and validate a page request based on the Default Pager information. **Note:** This feature is not supported for the Additional Pager information.

38.5 ICMB Configuration Dialog

The Intelligent Chassis Management Bus (ICMB) dialog allows the user to configure ICMB options. The ICMB feature allows multiple remote devices to be interconnected and management information shared among them. For example, a managed server could be configured to be an ICMB primary server and report management information on other ICMB devices connected to it. With ICMB, PIC can manage the power state of remote ICMB devices, and view the SEL and FRU information about those devices.

Through the PIC software, the user can switch the view of the primary managed server to one of the ICMB-managed devices and view the available information on that device without losing the connection with the primary server. The user can also change the view back to the primary server or any other ICMB-managed device at any time.

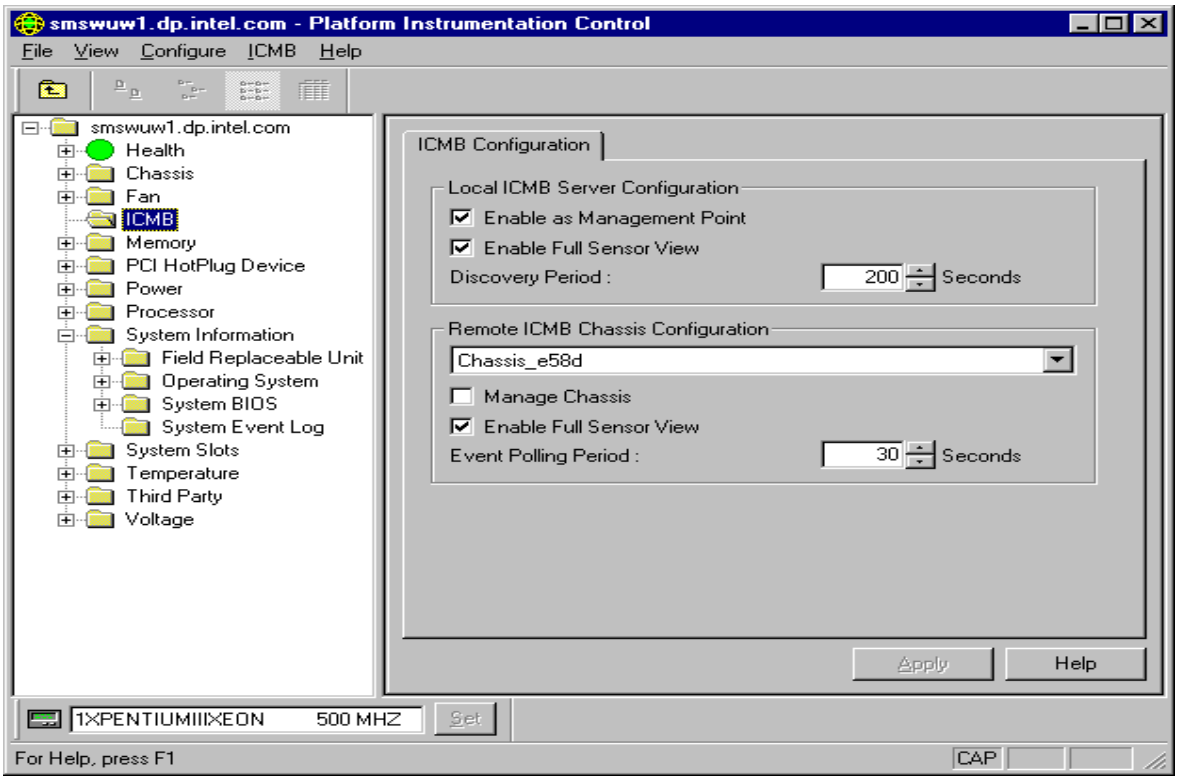

Figure 38-4. ICMB Configuration Dialog

Through the PIC software, the user can configure the ICMB management features of the primary managed server and the remote ICMB managed devices. An ICMB dialog let user configure local and remote ICMB servers as follows:

- Local ICMB Server Configuration — With this option it is possible to enable the local server as a management point, enable the full sensor view of remote devices, and change the discovery period for remote devices.
- Remote ICMB Chassis Configuration — With this option it is possible to configure each remote device discovered via ICMB. The user can decide whether to manage the remote device, enable full sensor view for the remote device, and set the event polling rate for the remote device.

38.6 ICMB Remote Server(s) Dialog

Once the primary server has been configured to be the management point via ICMB, the user can switch the PIC view from the primary managed server to one of the ICMB managed servers.

The ICMB Remote Server(s) dialog is available from the Main Menu / ICMB / View Managed Server(s) menu selection. If ICMB is not enabled on the managed server, this menu option will be grayed out.

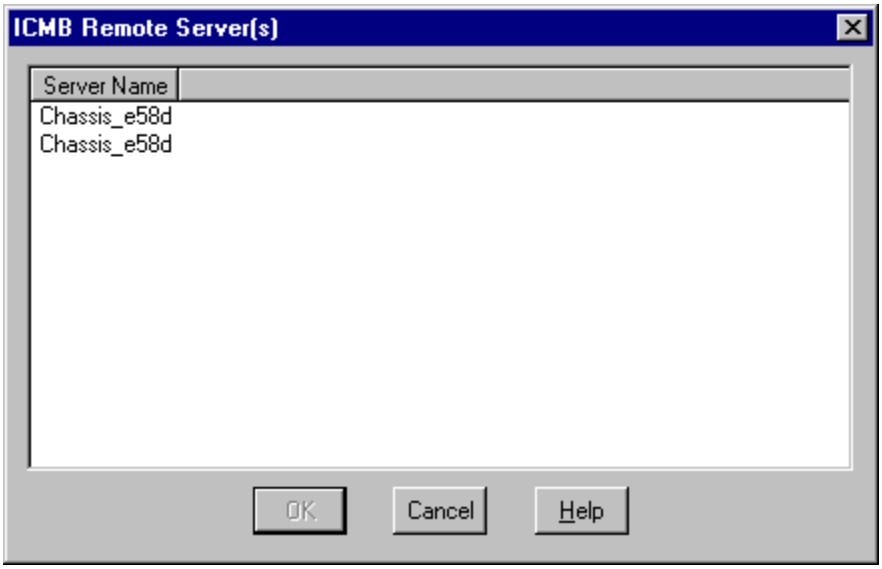

Figure 38-5. ICMB Remote Server(s) Selection Dialog

This dialog will display a list of all the servers currently being managed via ICMB. The user can change the PIC view to one of the ICMB managed servers by double-clicking on the server name or by selecting the name and pressing the OK button.

When an ICMB managed server is selected, the PIC main dialog is redrawn with the selected server information. The available information via ICMB is a subset of the information available when managing the server directly via PIC. Through ICMB, the following server information is available:

- Health Information
- Chassis Information
- Field Replaceable Unit (FRU) Information
- System Event Log (SEL)

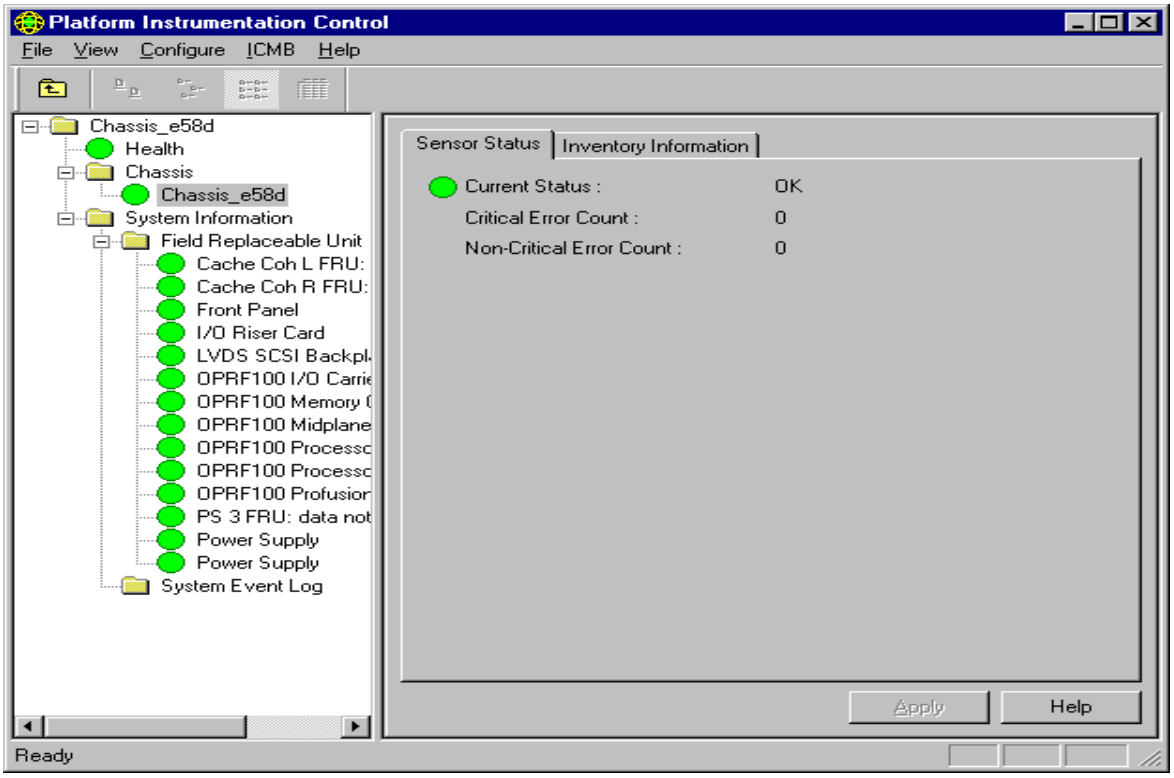

Figure 38-6. PIC Main Dialog, Managing a Remote Server via ICMB

The user can switch between ICMB managed servers and the primary managed server using the Main Menu / ICMB / View Managing Server and the Main Menu / ICMB / View Managed Server(s) menu selections.

39 Sensor Controls

The sensor controls are ActiveX* controls that plug into the PIC container in the Presentation Pane.

Each sensor has one or more tab pages representing the sensor information. The Sensor Settings, Sensor Status or Sensor Information tab pages vary based on the type of sensor or information displayed. The Sensor Settings and Sensor Status tab pages have the most variances for the following reasons:

- Some sensors include only critical error counts, not non-critical
- Some sensors support only one threshold value
- Some sensors support two threshold values
- Some sensors support all four threshold values
- Some sensors have non-editable threshold values
- Some sensors have Range-based thresholds for which a variety of values can be set. Example uses: for temperatures, voltages, and RPM-sensing fans.
- Some sensors have State-based thresholds that have fixed values like OK, Critical, Secure, Redundant. Example uses: for rotation-sensing fan, chassis door, and power unit.

Note: The number of sensors and sensor types vary based on the managed server type.

The user can see individual sensor information in the Presentation Pane by selecting the corresponding sensor node from the navigation tree.

39.1 Chassis

The Chassis control displays intrusion and inventory information for the system chassis on the managed server. For chassis sensors, three tab pages are available in the Presentation Pane:

- Sensor Status
- Alert Actions
- Inventory Information.

Note: Not all servers support the Chassis sensors.

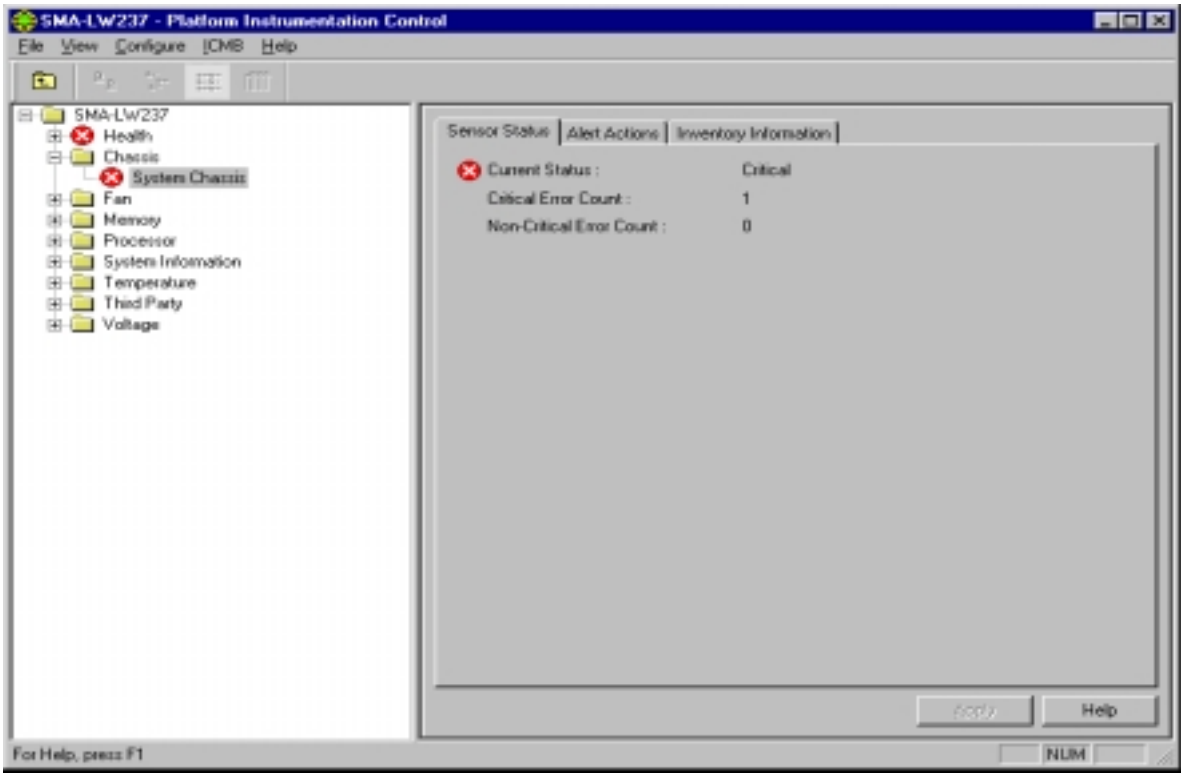

Figure 39-1. Chassis Sensor Status

On the Sensor Status tab page, the Current Status can have the following values:

- Ok, Critical, Unknown

On the Alert Action tab page, the user can configure event actions for the following state changes:

- Chassis Vulnerable
- Chassis Secured

The Sensor Information tab page displays the following chassis sensor attributes:

- Description – A description of this chassis.
- Manufacturer – The name of the company manufacturing or providing this chassis.
- Model – The manufacturer's model number for this chassis.
- Part Number – A part number by which a replacement part can be ordered.
- Serial Number – The manufacturer's serial number for this chassis.
- Revision Level – The revision level of this chassis.

39.2 Fan

The Fan control displays information for all fan sensors on the managed server. For fan sensors, three tab pages are available in the Presentation Pane:

- Sensor Settings
- Alert Actions
- Sensor Information.

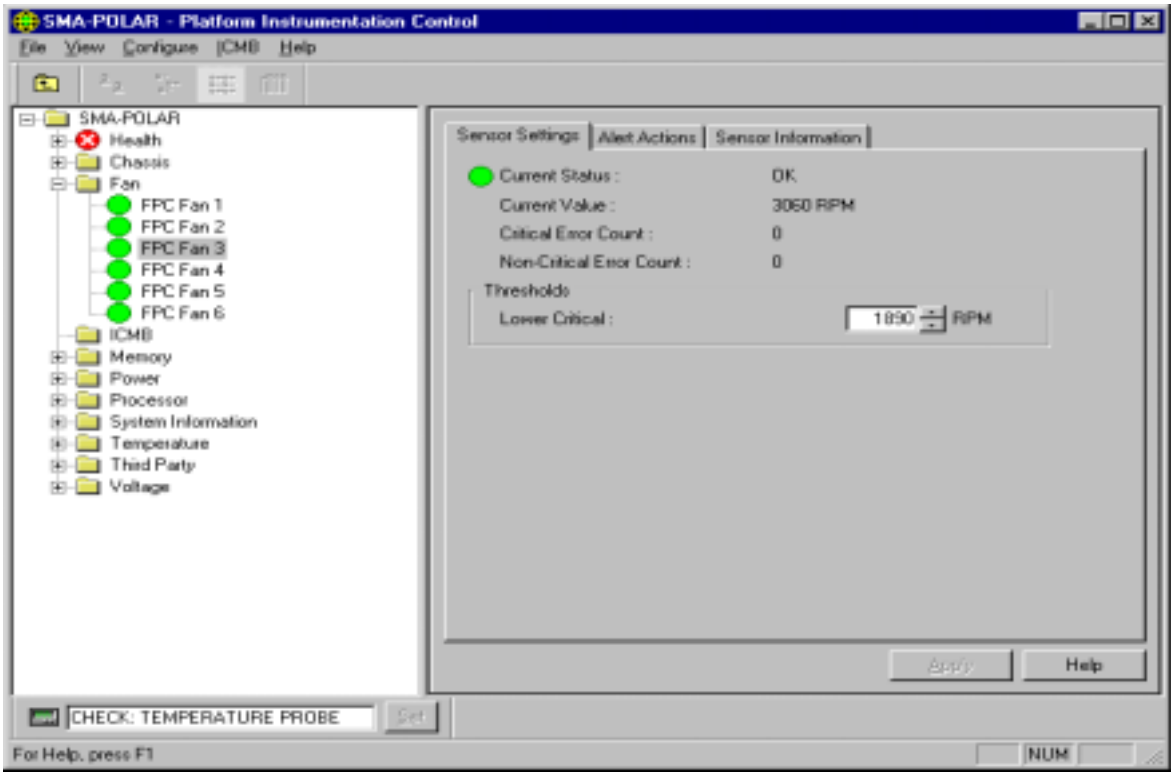

Figure 39-2. Fan Sensor Settings

On the Sensor Settings tab page, the Current Status can have the following values:

- Ok, Critical, Unknown

Sensor values are displayed in Revolutions per Minute (RPM). The fan control will display the actual fan RPM value for systems that support this feature. For the systems that support non-RPM sensing fans, the threshold setting has a value of zero and is read-only.

On the Alert Action tab page, the user can configure event actions for the following threshold state changes:

- Cooling Device Failure
- Cooling Device OK

The Sensor Information tab page displays the following fan sensor attributes:

- Sensor Units – the fan display unit which is RPM, CFM or OK/Fatal. Ok/Fatal is only supported on non-RPM sensing Fans.

- Sensor Accuracy – The accuracy for the reading from this fan probe, in plus/minus hundredths of a percent.
- Sensor Tolerance – The tolerance for the reading from this fan probe, in plus/minus Sensor Units.
- Probe Maximum – The maximum reading supported by this probe.
- Normal Maximum – The normal maximum reading monitored by this probe.
- Nominal Reading – The nominal reading monitored by this probe.
- Normal Minimum – The normal minimum reading monitored by this probe.
- Probe Minimum – The minimum reading supported by this probe.

39.3 Memory Array

The Memory Array control displays information for all memory array sensors on the managed server. A memory array is a group or bank of memory devices. For memory array sensors, four tab pages are available in the Presentation Pane:

- Sensor Status
- Alert Actions
- Sensor Information
- Inventory Information

Note: Not all servers support the Memory Array sensors.

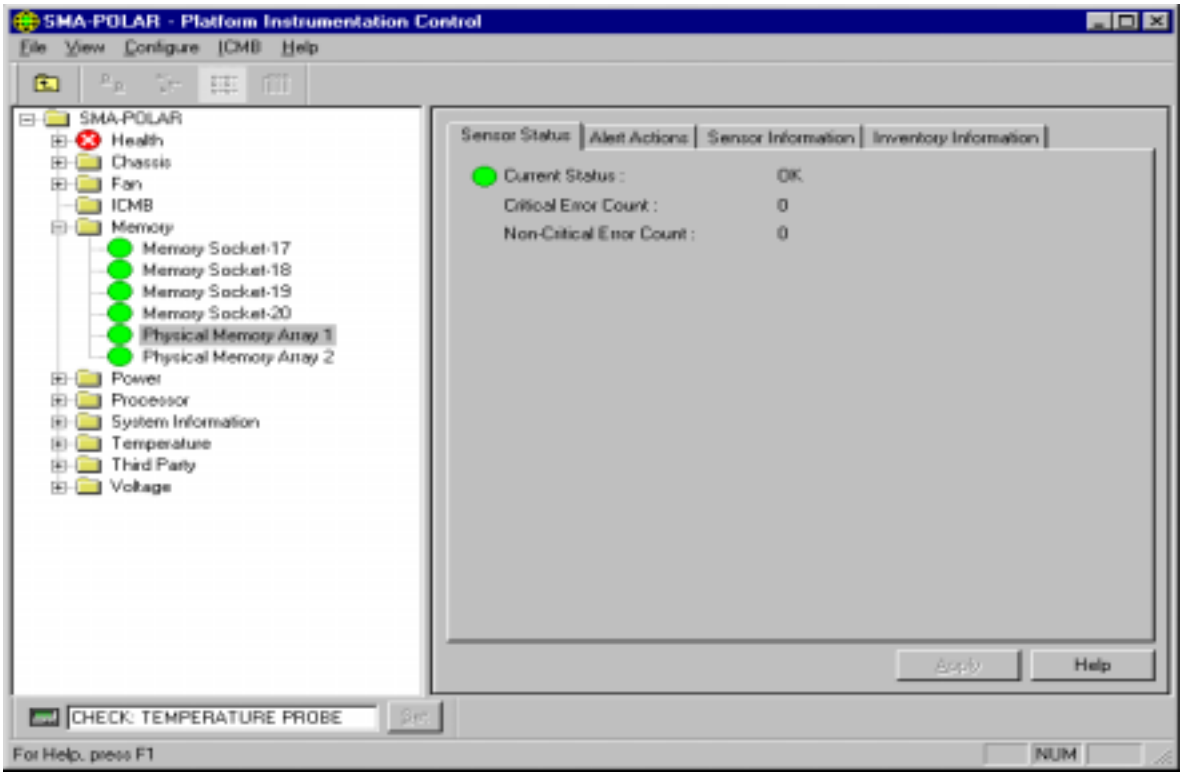

Figure 39-3. Memory Array Sensor Status

On the Sensor Status tab page, Current Status can have the following values:

- Ok, Non-Critical, Critical, Unknown

On the Alert Action tab page, the user can configure event actions for the following state changes:

- Single Bit Memory Error
- Multi Bit Memory Error (from previous boot)

The Sensor Information tab page displays the following memory array sensor attributes:

- Memory Array Location – The physical location of the Memory Array, whether on the system board or an add-on board.
- Memory Array Usage – What this memory array is used for.
- Number of Sockets – The number of slots or sockets available for memory devices in this memory array.
- Number of Sockets Used – The number of slots or sockets in use by memory devices in this memory array.
- Memory Error Correction – The main hardware error correction or detection method supported by this memory array.
- Memory Array Error Type – The type of error that is associated with the current status value.
- Last Error Update – System state during which the last error status was collected.

The Inventory Information tab page displays the following memory array sensor attributes:

- Description – A description of this memory array.
- Manufacturer – The name of the company manufacturing or providing this memory array.
- Model – The manufacturer's model number for this memory array.
- Part Number – A part number by which a replacement part can be ordered.
- Serial Number – The manufacturer's serial number for this memory array.
- Revision Level – The revision level of this memory array.

39.4 Memory Device

The Memory Device control displays information for all memory device sensors on the managed server. A memory device is a SIMM or DIMM. For memory device sensors, two tab pages are available in the Presentation Pane:

- Sensor Status
- Sensor Information

Note: Not all servers support the Memory Device sensors.

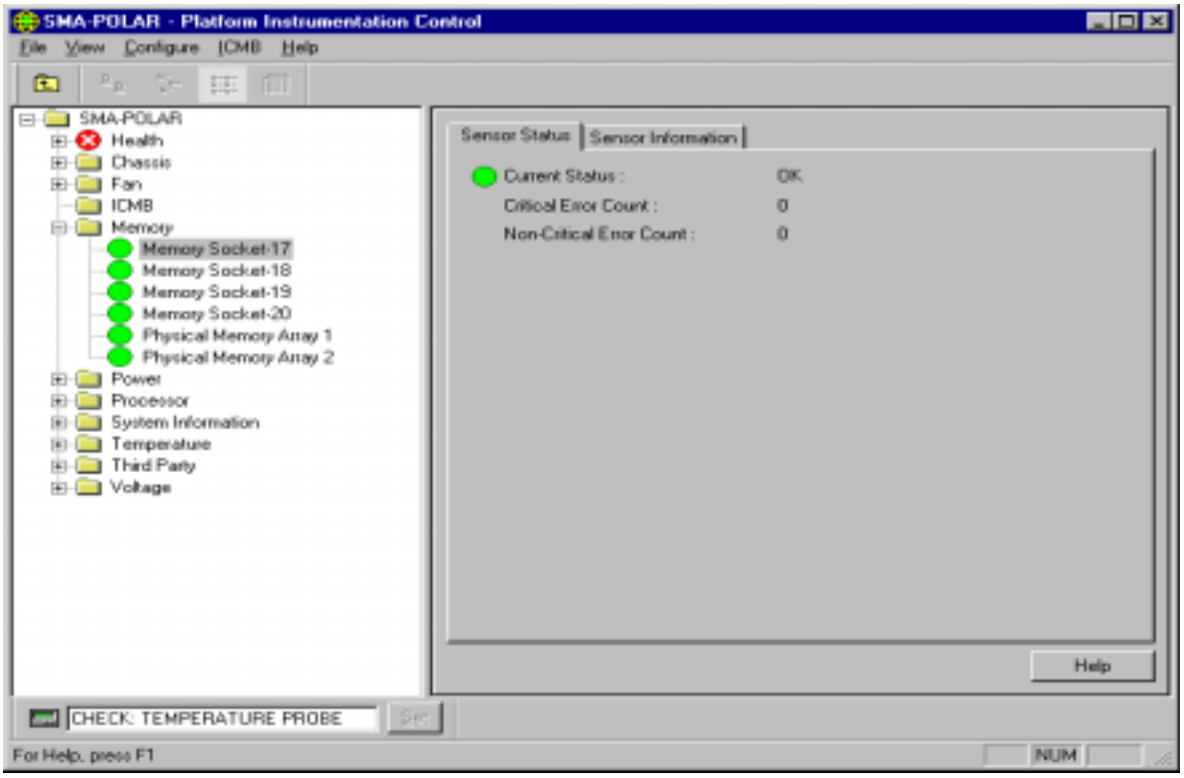

Figure 39-4. Memory Device Sensor Status

On the Sensor Status tab page, Current Status can have the following values:

- Ok, Non-Critical, Critical, Unknown

The Sensor Information tab page displays the following memory array sensor attributes:

- Memory Device Size – The size of the memory device, in Bytes.
- Memory Device Form Factor – Implementation form factor for this memory device.
- Memory Device Total Width – Total width of this memory device, including check or error correction bits, in bits. If there are no error correction bits, the value in this attribute should match that specified in Memory Device Data Width.
- Memory Device Data Width – Data width of this memory device, in bits. A data width of 0 and a Total Width of 8 would indicate that the device is solely being used to provide eight error correction bits.
- Memory Type – Type of memory used in this memory device.
- Memory Type Detail – Additional detail on the memory device type.
- Memory Device Error Type – The type of error that is associated with the current status value.
- Last Error Update – System state during which the last error status was collected.

39.5 PCI HotPlug Device

The PCI HotPlug Device control displays information for each PCI Hot Plug device that is plugged into one of the PHP slots on the managed system.

Note: When a PCI device does not exist in the slot or when the power to a given slot is off, the corresponding device entry is still shown in the tree under the PCI HotPlug Device group in the Navigation Pane. The corresponding Sensor Information tab page displays the information for Manufacturer, Device Type and Device Revision as "unknown".

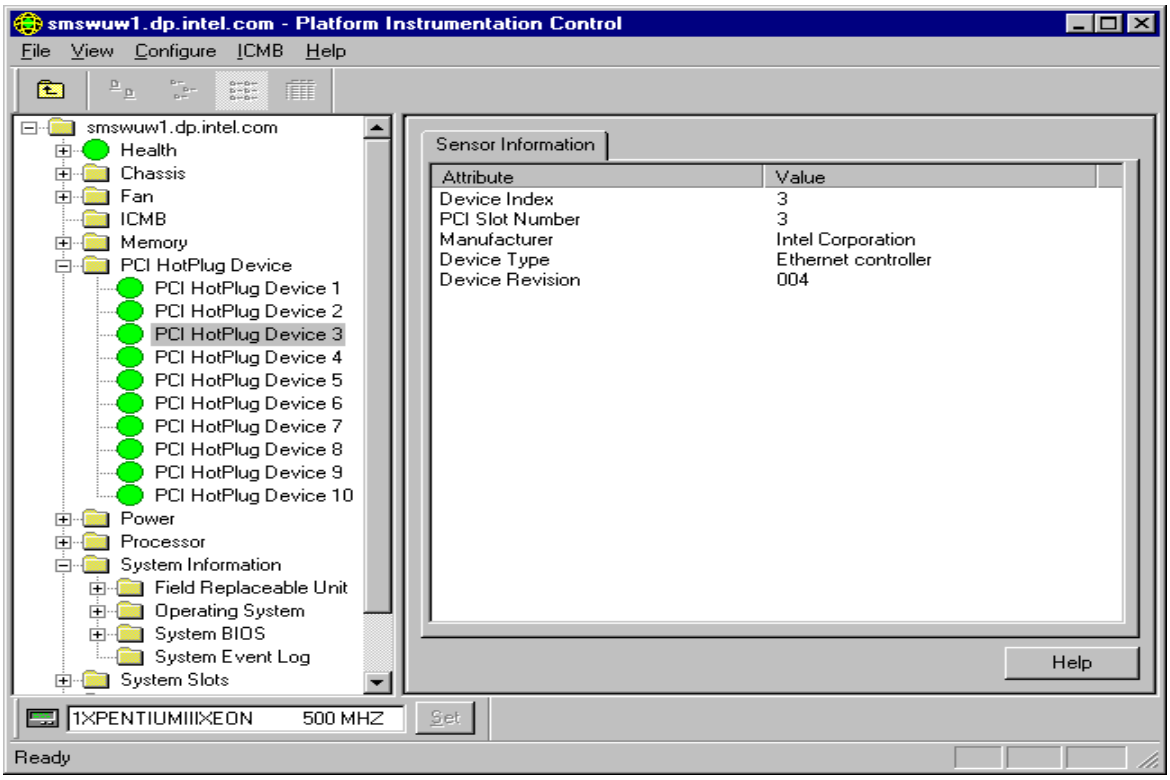

Figure 39-5. PCI HotPlug Device Sensor Information

The Sensor Information tab page displays the following information:

- Device Index – An index into the devices for PHP system slots.
- PCI Slot Number – The PHP slot number in which this device is occupying.
- Manufacturer – Manufacturer of the device that is currently occupying the PHP slot.
- Device Type – Displays what type of device is currently occupying the PHP slot.
- Device Revision – Revision ID of the device that is currently occupying the PHP slot.

39.6 Power Supply

The Power Supply control displays information for all power supply sensors on the managed server. For power supply sensors, three tab pages are available in the Presentation Pane:

- Sensor Status
- Alert Actions
- Sensor Information

Note: Not all servers support the Power Supply sensors.

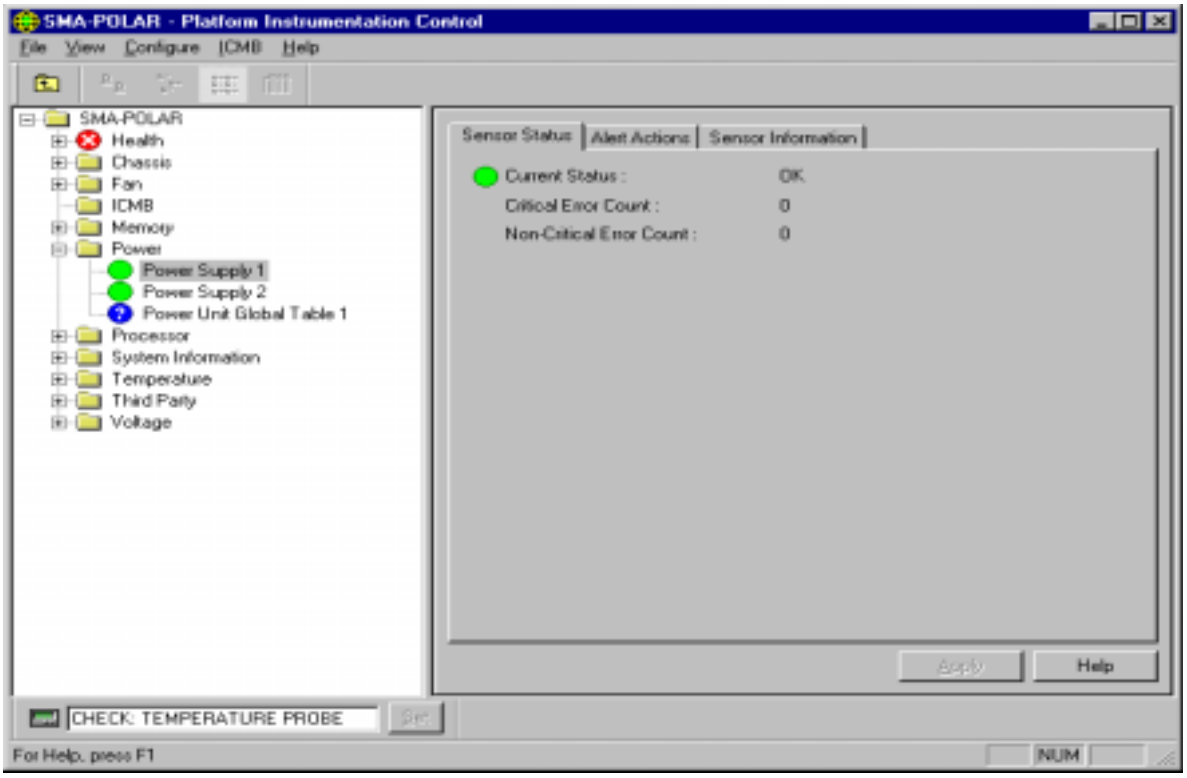

Figure 39-6. Power Supply Sensor Status

On the Sensor Status tab page, Current Status can have the following values:

- Ok, Non-Critical, Critical, Unknown

On the Alert Action tab page, the user can configure event actions for the following state changes:

- Power Supply Failed
- Power Supply OK
- Power Supply Likely to Fail

The Sensor Information tab page displays the following power supply sensor attributes:

- Power Supply Type – This attribute describes the type of power supply, e.g. Linear, Switching, Battery.
- Total Output Power – The total output power of this power supply.

39.7 Power Unit

The Power Unit control displays the power redundancy status on the managed server. For power unit sensors, two tab pages are available in the Presentation Pane:

- Sensor Status
- Alert Actions

Note: Not all servers support the Power Unit sensors.

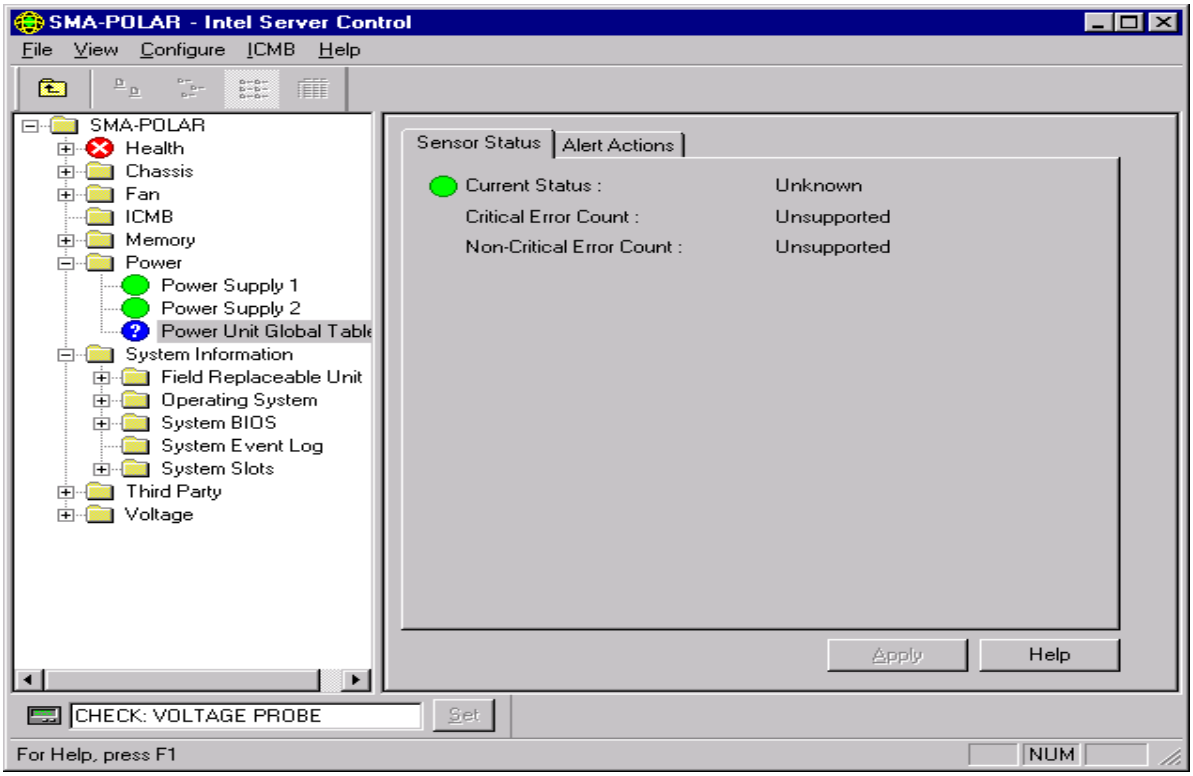

Figure 39-7. Power Unit Sensor Status

On the Sensor Status tab page, Current Status can have the following values:

- Ok, Non-Critical, Critical, Unknown

On the Alert Action tab page, the user can configure event actions for the following state changes:

- Power Unit Redundancy Lost
- Power Unit Fully Redundant
- Power Unit Redundancy Degraded
- Power Unit VA Shutdown Condition Cleared
- Power Unit VA Shutdown Limit Exceeded

39.8 Processor

The Processor control displays information for all processor sensors on the managed server. For processor sensors, four tab pages are available in the Presentation Pane:

- Sensor Status
- Alert Actions
- Sensor Information
- Inventory Information

Note: Not all servers support the Processor sensors.

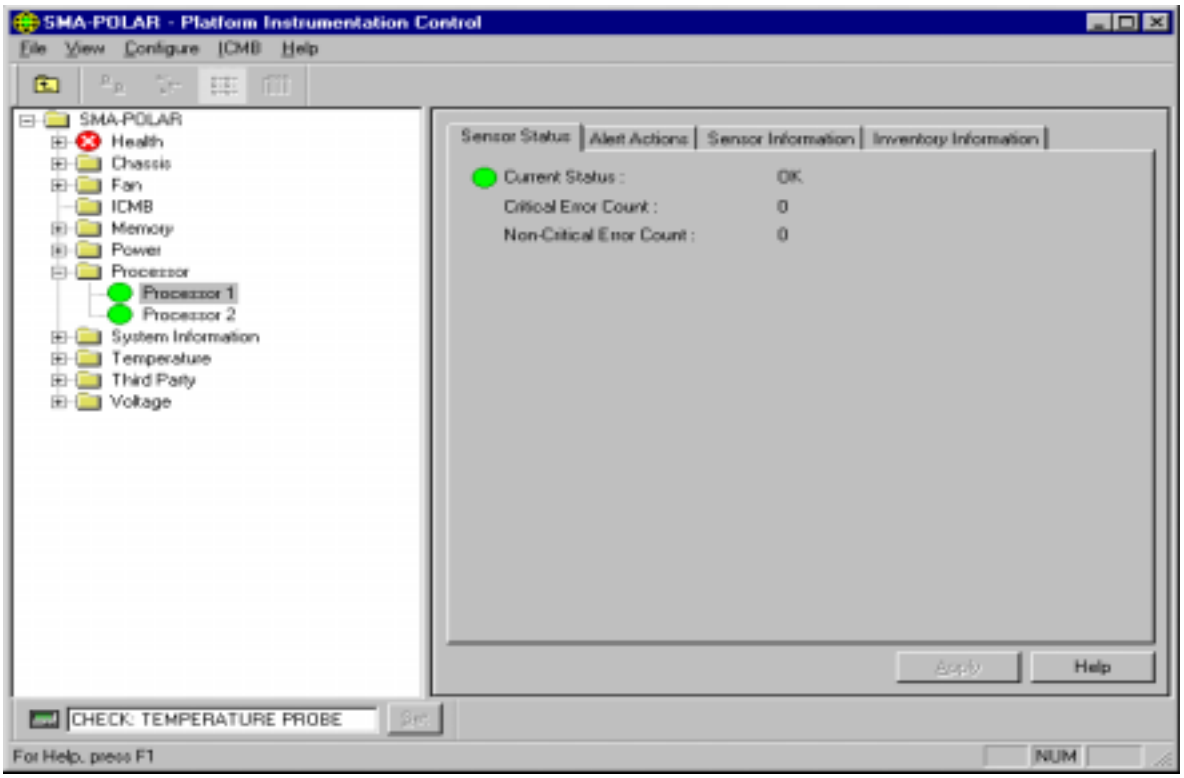

Figure 39-8. Processor Sensor Status

On the Sensor Status tab page, Current Status can have the following values:

- Ok, Non-Critical, Critical, Unknown

On the Alert Action tab page, the user can configure event actions for the following state changes:

- Processor Internal Error
- Processor Thermal Trip
- Processor FRB-3 Error
- Processor Disabled Error

The Sensor Information tab page displays the following processor sensor attributes:

- Processor Type – The type of processor currently in the system.
- Processor Family – The family of processors to which this processor belongs.
- Processor Upgrade – The method by which this processor can be upgraded, if upgrades are supported.
- Processor Maximum Speed – The maximum speed (in MHz) of this processor.
- Processor Current Speed – The current speed (in MHz) of this processor.

The Inventory Information tab page displays the following processor sensor attributes:

- Description – A description of this processor.
- Manufacturer – The name of the company manufacturing or providing this processor.
- Model – The manufacturer's model number for this processor.
- Part Number – A part number by which a replacement part can be ordered.
- Serial Number – The manufacturer's serial number for this processor.
- Revision Level – The revision level of this processor.

39.9 System Information

System Information is a logical grouping of system related components. It includes:

- Field Replaceable Unit (FRU) information
- Operating System information
- System BIOS information
- System Event Log information
- System Slot information

This information is discussed in the following sections.

39.9.1 Field Replaceable Unit (FRU)

The FRU control displays a list of FRU attributes for all FRU devices on the managed system.

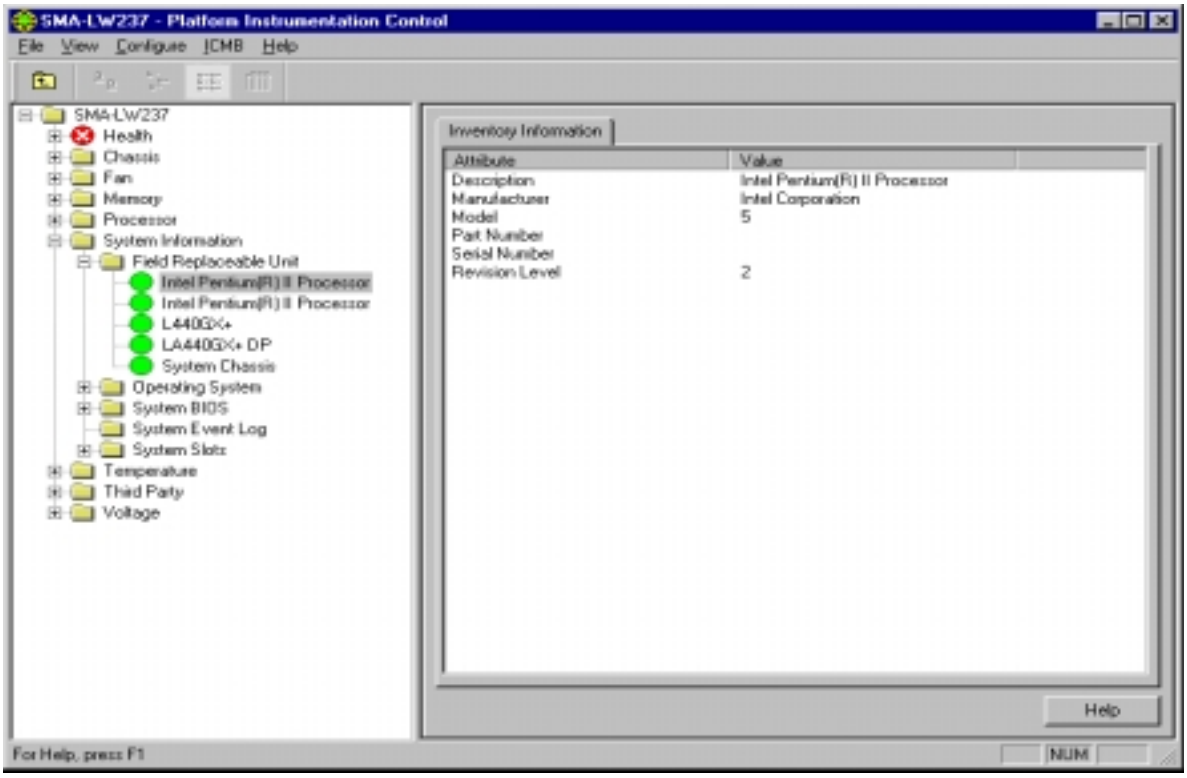

Figure 39-9. Field Replaceable Unit (FRU) Inventory Information

The Inventory Information tab page displays the following FRU attributes:

- Description – A description of this FRU device.
- Manufacturer – The name of the company manufacturing or providing this FRU device.
- Model – The manufacturer's model number for this FRU device.
- Part Number – A part number by which a replacement part can be ordered.
- Serial Number – The manufacturer's serial number for this FRU device.
- Revision Level – The revision level of this FRU device.

39.9.2 Operating System

The Operating System (OS) control displays a list of operating system attributes for all operating systems installed on the managed system.

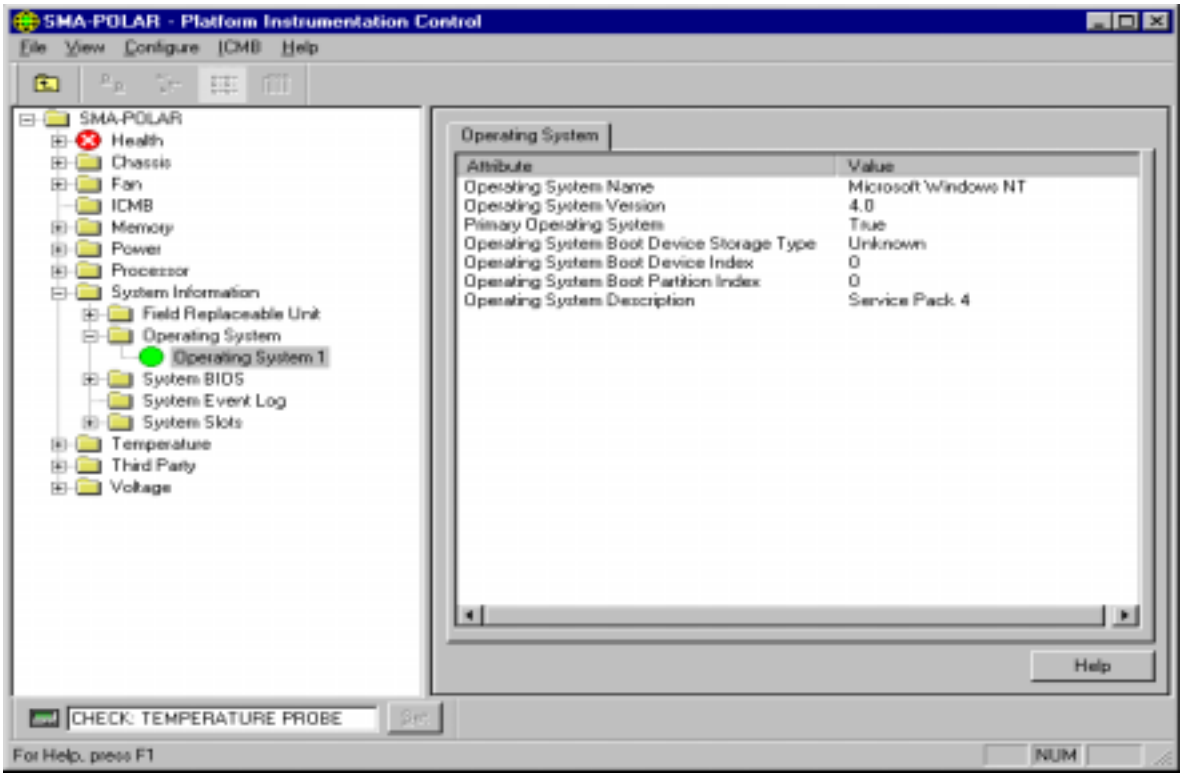

Figure 39-10. Operating System Information

The Operating System tab page displays the following information:

- Operating System Name – The name of this operating system.
- Operating System Version – The version number of this operating system.
- Primary Operating System – If True, then this is the primary operating system on this server.
- Operating System Boot Device Storage Type – An index into the Disks Table to indicate the device from which this operating system was booted. To fully access the Disks Table, this index must be combined with the attribute Boot Device Index.
- Operating System Boot Device Index – An index into the Disks Table.
- Operating System Boot Partition Index – An index into the Partition table indicating the partition from which this operating system booted.
- Operating System Description – A description of this operating system.

39.9.3 System BIOS

The System BIOS control displays a list of BIOS attributes for all system BIOSs installed on the managed system.

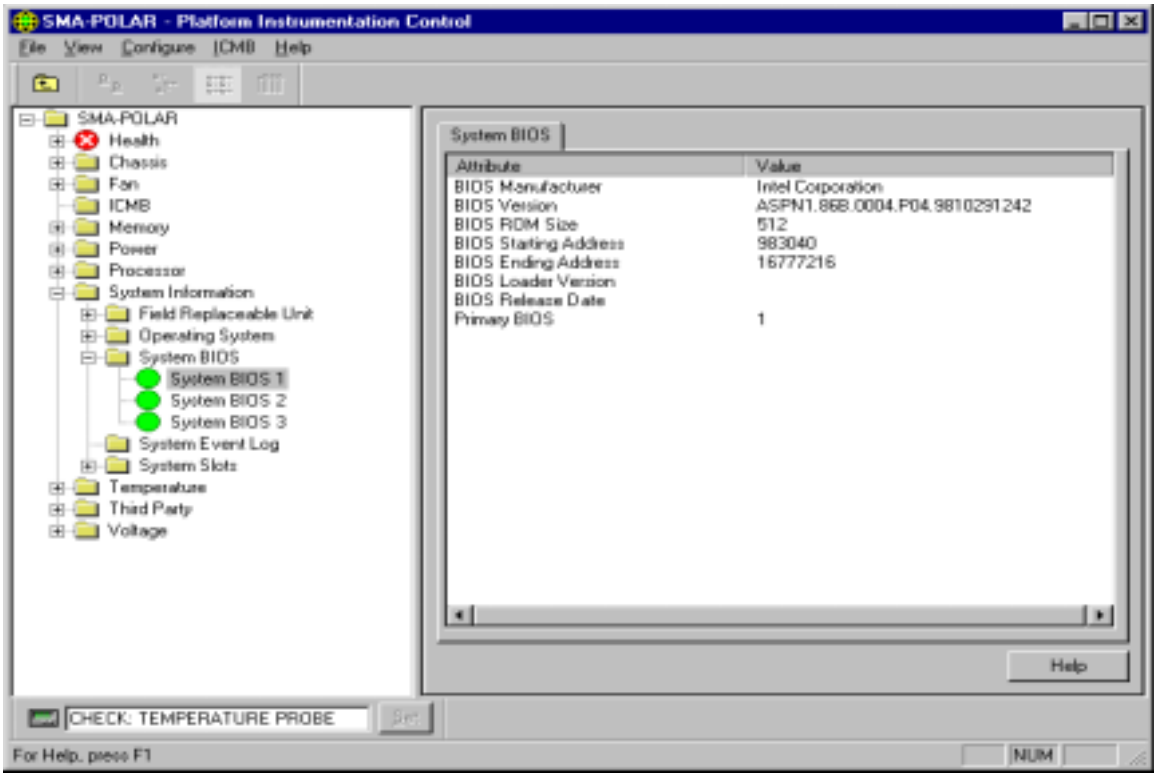

Figure 39-11. System BIOS Information

The System BIOS tab page displays the following information:

- BIOS Manufacturer – The name of the company that wrote this system BIOS.
- BIOS Version – The version number or version string of this BIOS.
- BIOS ROM Size – The physical size of this BIOS ROM device in kilobytes.
- BIOS Starting Address – The starting physical address for the memory which the BIOS occupies.
- BIOS Ending Address – The ending physical address for the memory which the BIOS occupies.
- BIOS Loader Version – The BIOS flash loader version number or string.
- BIOS Release Date – The BIOS release date.
- Primary BIOS – If true, this is the primary System BIOS.

39.9.4 System Event Log (SEL)

The SEL control displays a list of BIOS attributes on the managed system. The BIOS list shows the manufacturer, version, and other BIOS attributes.

The SEL control allows the user to view the contents of the managed server's system event log.

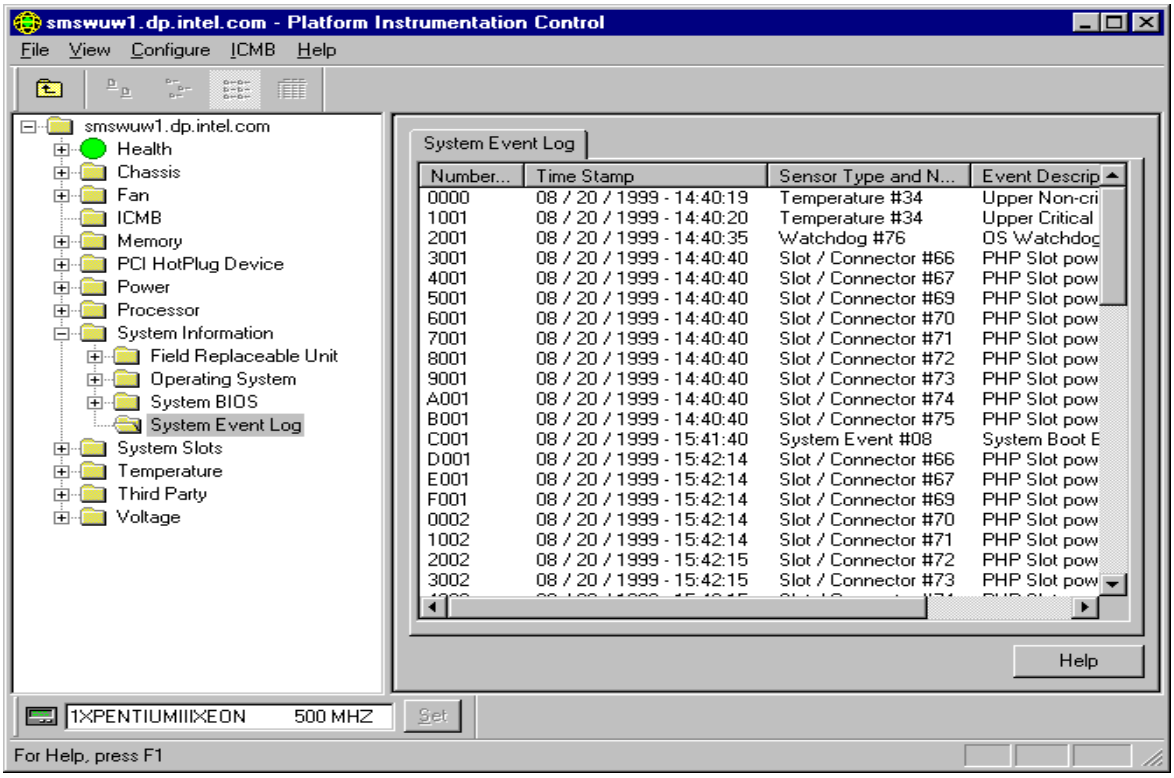

Figure 39-12. System Event Log Information

The SEL tab page displays the following information for each record in the system event log:

- Number of Events – a numbered listing to uniquely identify each record. Numbers may vary each time SEL is displayed.
- Timestamp – Date and Time record was recorded. If the record was generated prior to the BIOS loading, the timestamp has a value of “Pre-Init Timestamp”.
- Sensor Type and Number – Unique identification of event originator.
- Event Description – Description of event.
- Generator ID – The component or sensor that generated the event (e.g. BIOS, SMI Handler).

39.10 System Slots

The System Slots control displays information for all system slot sensors on the managed server. System Slots are categorized into two groups:

- PCI Hot Plug (PHP) slots
- All other non-PHP system slots

Slot names containing “PCI 64bit” identify PCI Hot Plug or PHP slots. For PHP type slots, there are three tab pages available in the Presentation Pane: Sensor Status, and Alert Action, and Sensor Information. For non-PHP slots, only the Sensor Information tab page is available.

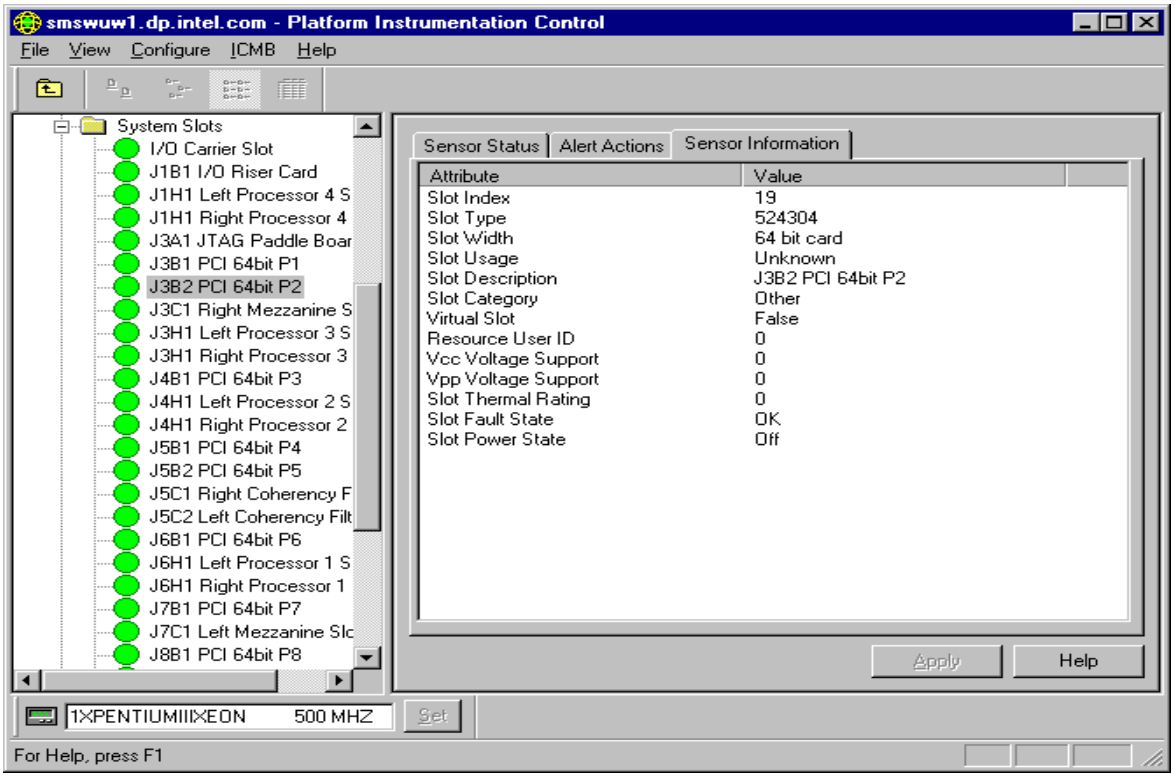

Figure 39-13. PHP System Slots Sensor Information

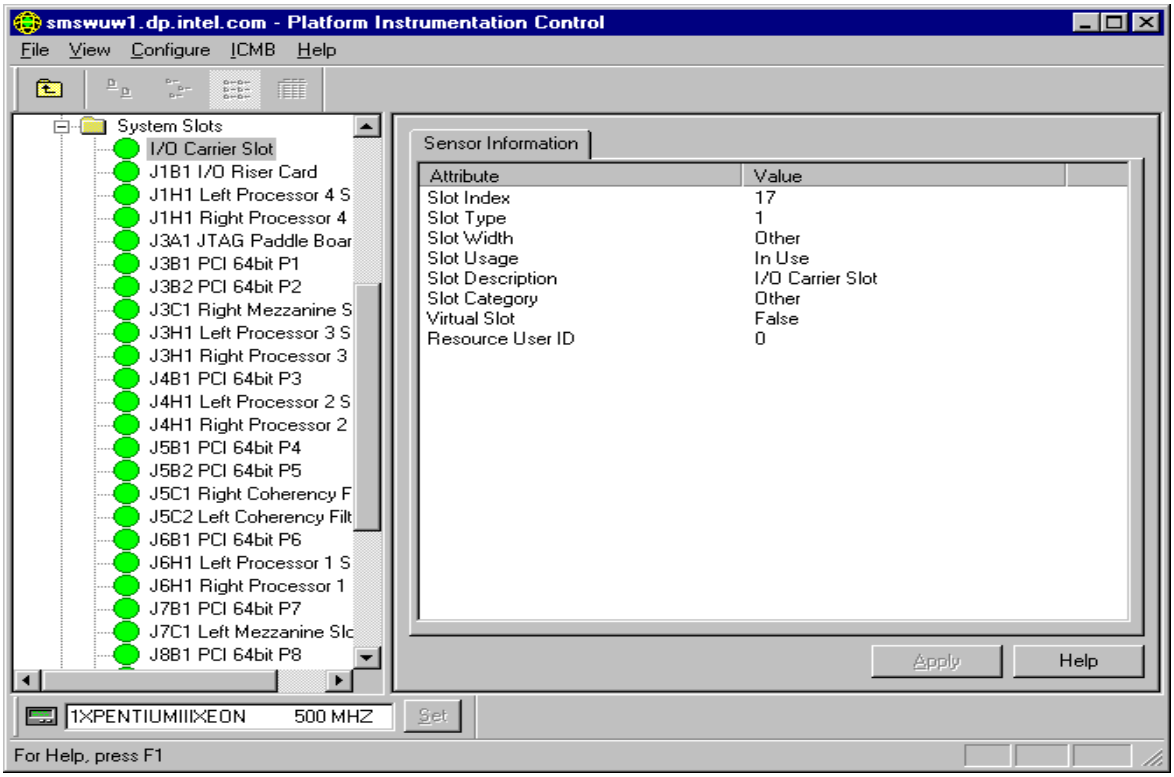

Figure 39-14. Non-PHP System Slots Sensor Information

On the Sensor Status tab page, Current Status can have the following values for PHP slots:

- Ok, Critical, Unknown

On the Alert Action tab page, the user can configure event actions for the following threshold state changes:

- Slot Status change to OK
- Slot Status change to Critical
- Slot Powered On
- Slot Powered Off

The Sensor Information tab page displays the following information for each slot (PHP or non-PHP):

- Slot Index – An index into the system slot table.
- Slot Type – The bus type supported in this slot.
- Slot Width – The maximum bus width of card in this slot.
- Slot Usage – Slot in use indicator (Available/In Use).
- Slot Description – A description of the card currently in the slot.
- Slot Category – Which category of physical slot is this table entry defining?
- Virtual Slot – Indicate whether this is a ‘virtual slot”.
- Resource User ID – Locates the rows in the System Resource table used for this slot.
- Vcc Voltage Support – Device Vcc Mixed Voltage support.
- Vpp Voltage Support – Device Vpp Mixed Voltage support.
- Slot Thermal Rating – The maximum thermal dissipation of the slot in milliwatts.
- Slot Fault State – The current error state for the PHP system slot. (Ok/Failed – Apply to PHP slot only)
- Slot Power State – The current power state of the PHP system slot. (On/Off – Apply to PHP slot only)

39.11 Temperature

The Temperature control displays information for all temperature sensors on the managed server. For temperature sensors, three tab pages are available in the Presentation Pane:

- Sensor Settings
- Alert Actions
- Sensor Information

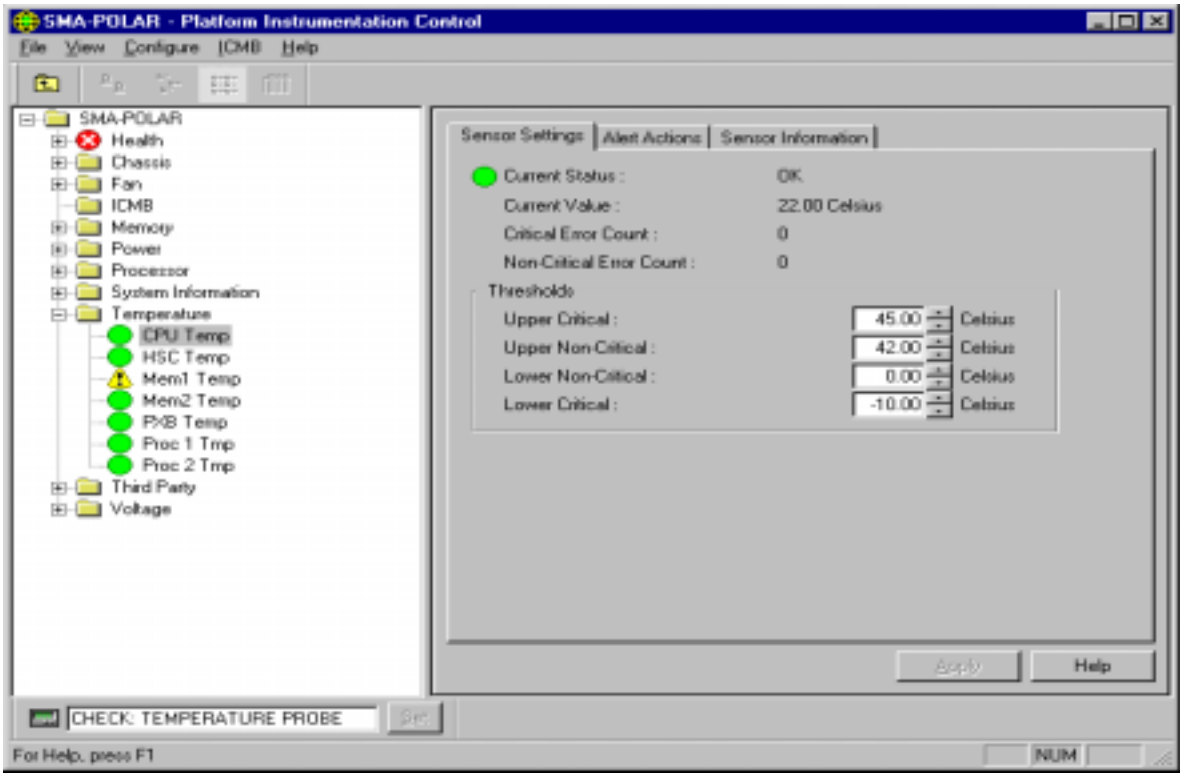

Figure 39-15. Temperature Sensor Settings

On the Sensor Settings tab page, the Current Status can have the following values:

- Ok, Non-Critical, Critical, Unknown

Depending on the individual temperature sensor and the server platform, some thresholds are unsupported and will appear disabled (grayed out) in the control. The user can display temperature information in Celsius or Fahrenheit. The display format can be changed by selecting the Main Menu / View / Options menu selection. The default temperature display format is Celsius.

On the Alert Action tab page, the user can configure event actions for the following threshold state changes:

- Temperature – Status Changed to OK
- Temperature – Status Changed to Upper Critical
- Temperature – Status Changed to Lower Critical
- Temperature – Status Changed from OK to Upper Non-Critical
- Temperature – Status Changed from OK to Lower Non-Critical
- Temperature – Status Changed from Critical to Upper Non-Critical
- Temperature – Status Changed from Critical to Lower Non-Critical

The Sensor Information tab page displays the following temperature sensor attributes:

- Sensor Units – the temperature display unit in either Celsius or Fahrenheit. The default is Celsius.

- Sensor Accuracy – The accuracy for the reading from this temperature probe, in plus/minus hundredths of a percent.
- Sensor Resolution – The resolution for the reading from this temperature probe.
- Sensor Tolerance – The tolerance for the reading from this temperature probe, in plus/minus Sensor Units.
- Probe Maximum – The maximum temperature level specified to be readable by this probe.
- Normal Maximum – The normal maximum temperature reading of the temperature monitored by this probe.
- Nominal Reading – The nominal temperature reading of the temperature monitored by this probe.
- Normal Minimum – The normal minimum temperature reading of the temperature monitored by this probe.
- Probe Minimum – The minimum temperature level specified to be readable by this probe.

39.12 Third Party Instrumentation

The Third Party control displays event configuration information for supported third party instrumentation on the managed server. For third party instrumentation, one tab page is available in the Presentation Pane: Alert Actions. Note: not all servers support all third party instrumentation.

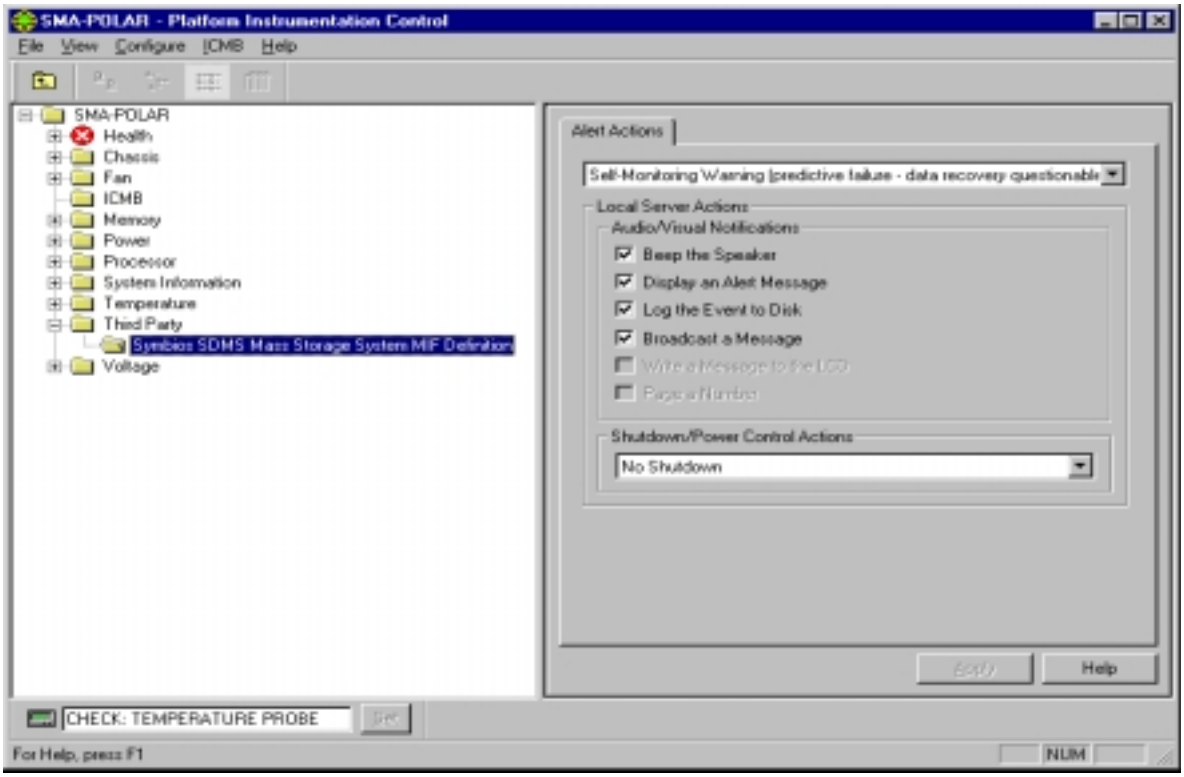

Figure 39-16. Third Party Alert Actions

The following versions of Third Party instrumentation is supported by PIC:

- Adaptec* SCSI
- Adapatec CI/O Standard Group MIF
- Symbios* SDMS Mass Storage System MIF

- Symbios DMI 2.0 MIF Definition
- Intel® EtherExpress™ PRO/100B LAN Adapter
- Intel Ethernet LAN Adapter(s)

On the Alert Action tab page, the user can configure event actions for the following Adaptec SCSI events:

- Host Adapter – Discovered
- Host Adapter – Changed
- Host Adapter – Failed
- Host Adapter – Recovered
- Logical Unit – Discovered
- Logical Unit – Changed
- Logical Unit – Failed
- Logical Unit – Recovered
- Logical Unit – Failure Predicted

On the Alert Action tab page, the user can configure event actions for the following Adapatec CI/O Standard Group MIF events:

- Storage device state information
- Storage device recovered error – Bad block repaired
- Storage device member marked down
- Storage controller state information
- Storage controller SMART event
- Storage controller status unacceptable
- Volume set state information
- Volume set recovered error
- Volume set Array status – offline
- ARO spare not functional
- Enclosure state information

On the Alert Action tab page, you can configure event actions for the following Symbios SDMS Mass Storage System MIF events:

- Device Error (not responding)
- Device Warning (predicted failure (S.M.A.R.T.)
- Controller Error (not responding)
- New Storage controller detected
- New device detected
- Existing controller changed
- Existing device changed

On the Alert Action tab page, you can configure event actions for the following Symbios DMI 2.0 MIF Definition events:

- Device Error (not responding)

- Device Warning (predicted failure (S.M.A.R.T.)
- Controller Error (not responding)
- New Storage controller detected
- New device detected
- Existing controller changed
- Existing device changed

On the Alert Action tab page, you can configure event actions for the Intel EtherExpress PRO/100B LAN Adapter events:

- Transmit Errors crossing thresholds
- Receive Errors crossing thresholds
- Host Errors crossing thresholds
- Wire Errors crossing thresholds

On the Alert Action tab page, the user can configure event actions for the following Intel Ethernet LAN Adapter(s) events:

- Cable unplugged / No LAN activity
- Adapter initialization failure
- The Primary Adapter is switching over and the Secondary Adapter took over
- The Primary adapter became active
- Secondary Adapter is deactivated from the team
- The last Adapter has lost link. Network connection has been lost
- Preferred Primary Adapter has been detected
- The team only has one active adapter
- The Secondary adapter has re-joined the team
- Preferred Primary Adapter has taken over
- Network Connection restored

39.13 Voltage

The Voltage control displays information for all voltage sensors on the managed server. For voltage sensors, three tab pages are available in the Presentation Pane:

- Sensor Settings
- Alert Actions
- Sensor Information

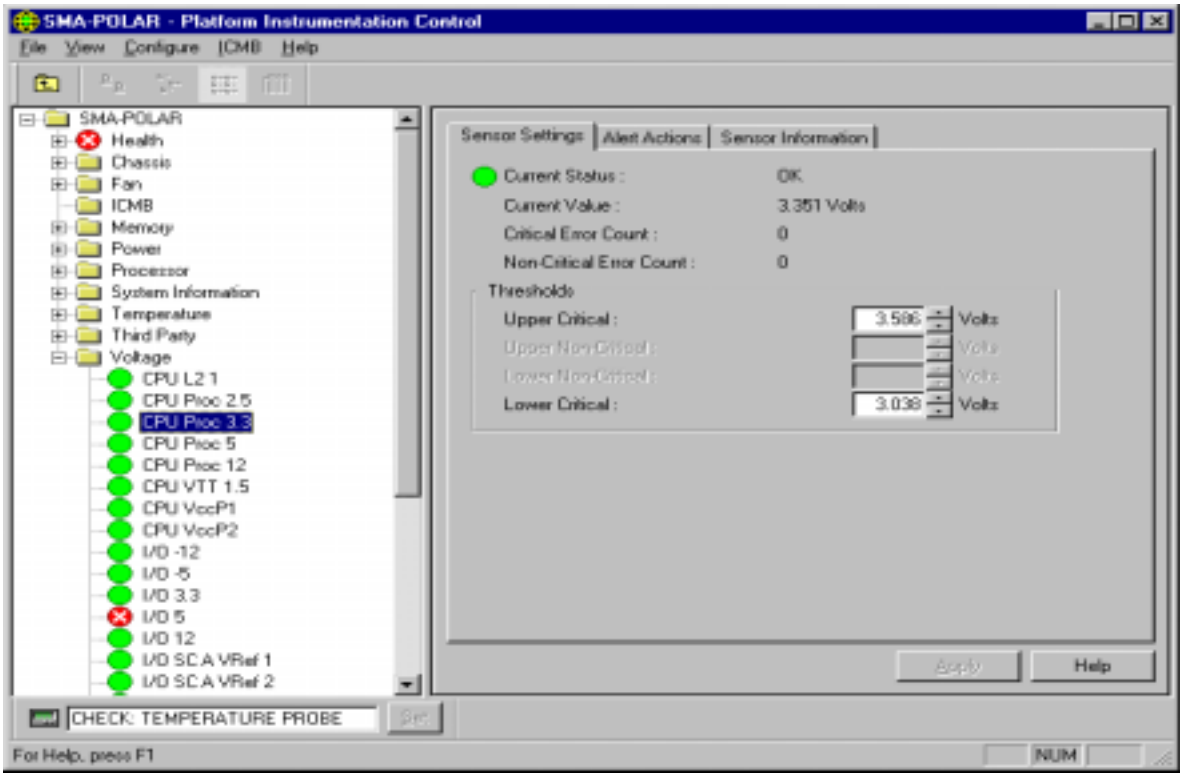

Figure 39-17. Voltage Sensor Settings

On the Sensor Settings tab page, the Current Status can have the following values:

- Ok, Non-Critical, Critical, Unknown

Depending on the individual voltage sensor and the server platform, some thresholds are unsupported and will appear disabled (grayed out) in the control. All values are displayed in “Volts”.

On the Alert Action tab page, the user can configure event actions for the following threshold state changes:

- Voltage – Status Changed to OK
- Voltage – Status Changed to Upper Critical
- Voltage – Status Changed to Lower Critical
- Voltage – Status Changed from OK to Upper Non-Critical
- Voltage – Status Changed from OK to Lower Non-Critical
- Voltage – Status Changed from Critical to Upper Non-Critical
- Voltage – Status Changed from Critical to Lower Non-Critical

The Sensor Information tab page displays the following voltage sensor attributes:

- Sensor Units – the voltage display unit which is Volts.
- Sensor Accuracy – The accuracy for the reading from this voltage probe, in plus/minus hundredths of a percent.
- Sensor Resolution – The resolution for the reading from this voltage probe.
- Sensor Tolerance – The tolerance for the reading from this voltage probe, in plus/minus Volts.

- Probe Maximum – The maximum voltage level specified to be readable by this probe.
- Normal Maximum – The normal maximum voltage level of the voltage monitored by this probe.
- Nominal Reading – The nominal voltage level of the voltage monitored by this probe.
- Normal Minimum – The normal minimum voltage level of the voltage monitored by this probe.
- Probe Minimum – The minimum voltage level specified to be readable by this probe.

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Section 9: ICMB

ICMB Contents

ICMB Figures

Section 9 contains no figures

ICMB Tables

Section 9 contains no tables

40 Introduction to ICMB

The Intelligent Chassis Management Bus (ICMB) provides a means by which an intelligent device on the IPMB (Intelligent Platform Management Bus) in a chassis communicates with the intelligent device on the IPMB in another chassis. The ICMB protocol is used for inter-chassis communications. This is possible because the server provides two 6-pin connectors to enable multiple servers to be daisy chained together.

The ICMB provides additional troubleshooting and status capabilities by providing information that can be used to predict and identify failures on multiple servers. The ICMB is used to provide remote power control and status information on servers that cannot be normally obtained through in-band channels. This may be because the information is not provided through those channels or because the in-band channels are not available, such as when the chassis is powered down. The ICMB, as with other instrumentation described in this document, is accessed by Intel® Server Control.

ICMB provides the ability to communicate information such as:

- Chassis management functions
- System Event Logs (SEL)
- Chassis power control
- FRU part numbers and serial numbers

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Section 10: Platform Event Paging

Platform Event Paging Contents

Platform Event Paging Figures

Platform Event Paging Tables

Section 10 contains no tables

41 Introduction to Platform Event Paging

Platform Event Paging is built into the Intel® Server Control platform management technology. This feature allows the platform to proactively alert the system administrator of critical system failures and state changes, independent of the state of the operating system or server management software.

Platform Event Paging uses an external modem that is connected to the system on-board Direct Platform Control port COM 2 serial connector. This configuration allows the platform to contact a numeric paging service using the external modem.

When the system administrator is notified by an alert or a page, s/he can use the ISC software to remotely view server health/status, system logs, and current configuration. The administrator can also reconfigure, reset or power off / on the server; or execute off-line diagnostics to further analyze the condition of the server. The available functionality depends on the availability of the ISC tools (PIC, DPC etc.) based on the current state of the server.

42 Page Configuration

The BMC maintains an event filter table that is used to select the events that will trigger a page. Platform Event Filtering provides a flexible, general mechanism that enables the BMC to perform selectable actions triggered by a configurable set of platform events. The BMC initiates pages when an event matches one of the filters. System event entries are predefined to match up with the events that are enabled or disabled in BIOS Setup. See Figure 42-1.

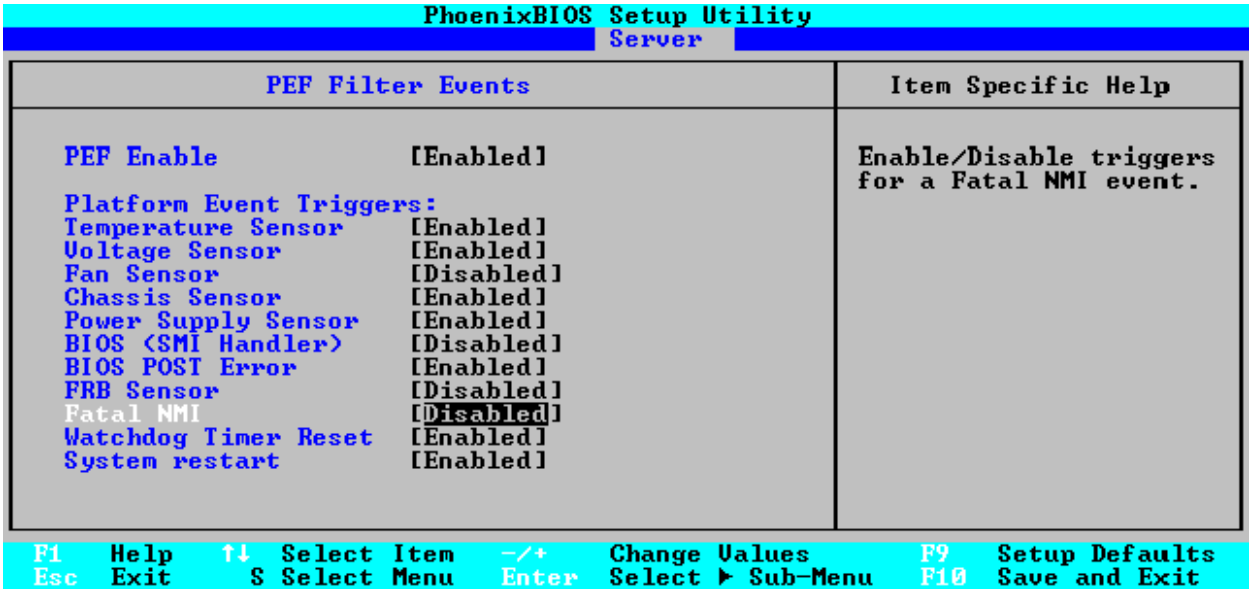

Figure 42-1: System Event Entries for PEP Events

BIOS setup provides a user interface to configure the paging string and event filters. The paging string contains the information to connect to the pager and the message to send. The PIC provides a user interface to configure the same paging string (as part of the Local Response Agent paging configuration).

Pages can be configured for the following events:

- Temperature Sensor out of range
- Voltage Sensor out of range
- Chassis Intrusion [Security Violation]
- Power Supply Fault
- BIOS: Uncorrectable ECC error
- BIOS: POST Error Code
- FRB Failures (**Note**: The page will be repeated for each successive FRB time-out until the log limit is reached.)
- Fatal NMI (NMI from a source other than Front Panel NMI or an Uncorrectable ECC Error)
- Watchdog Timer reset, power down, or power cycle
- System restart (reboot)
- Fan failures

Platform Event Paging has the ability to generate pages during pre-boot and post-boot states. All that is required for it to function is that the BMC is functional and there is power to the system.

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Section 11: Install and Uninstall

Install and Uninstall Contents

Install and Uninstall Figures

Section 11 contains no figures

Install and Uninstall Tables

Section 11 contains no tables

43 Introduction to Install & Uninstall

This section describes the installation environment for ISC in those instances when Intel® Server Control (ISC), Desktop Management Interface (DMI) 2.0 SP, Explorer browser, and the Managed Object Toolkit (MOT) are installed.

ISC provides its own installation and de-installation routines. During installation, all ISC ActiveX* controls are registered, icons are created, and files are copied. If the de-installation process is used, the opposite occurs – controls are unregistered, and icons and files are deleted.

Note: The user must have administrative or equivalent rights to install ISC onto a server for NetWare*, Windows* NT*, and UnixWare*.

The ISC installation supports the following objectives:

- Auto-detects the presence of a Management Console:
- LANDesk® Server Manager 6.0
- HP* OpenView* Network Node Manager 5.02 (Windows NT version)
- CA Unicenter* TNG* Framework 2.01 (Windows NT version)
- Install ISC software based on the detected Management Console
- Install DMI 2.0 Service Providers (Win32*, NetWare, UnixWare)
- Install DMI 2.0 Browser (Explorer)
- Install Managed Object Toolkit (MOT)
- Install ISC Stand-alone
- ISC also supports Extensibility, Customization. ISC's installation framework doesn't have any specific knowledge about the applications that it is installing. In order to be installed by the framework, owners of individual components (e.g. Client SSU, PIC, PI and/or OEMs) must create configuration files describing the necessary steps to install that component on a system. OEMs will be able to fully customize the ISC installation by modifying the configuration files provided and by inserting their own configuration files. Also, they will be allowed to customize the look and feel of the installation interface.
- ISC supports the same interfaces across supported OSs. In the past, each supported OS had its own installation structure. In order for a component to be installed on several OSs (e.g. PI), its owner needed specific knowledge about the behavior of each installation process and in many cases had to modify the source code. The installation framework simplifies the process by using configuration files with the same format across OSs. However, component owners will need to provide a set of configuration files for each OS because they require different installation steps (e.g. No registry on NetWare or UnixWare).
- ISC supports the remote installation of console / server components. ISC's installation framework can install Win32 components (consoles or server) on local or remote systems. NetWare or UnixWare components *must* be installed remotely, but the installer will need access to the NetWare / UnixWare server to start the Local Setup process. This is not required on Win32 systems where the Local Setup process will be started remotely from the installation console.

44 Supported Operating Systems

The Installation Console will support Windows 9X and Windows NT 4.0 and up. Remote target systems can be Windows NT 4.0, NetWare 4.x or 5.x and UnixWare 7.x.

45 Internationalization

The installation console will determine the local machine language and will load the appropriate resources files. If there are no resources associated with the current language, US English resources are loaded by default.

46 Recommended Files & Registry Tree Structures

46.1 Source Files

Although there are no restrictions on where applications installed by ISC should place their binaries, it is recommended that all files be copied into *%ISCPATH%\bin* (on Win32 platforms). That directory will be added to the system path.

46.2 Windows Registry

The Intel Server Control Windows Registry tree structure will have the following format:

```
HKEY_LOCAL_MACHINE
 \SOFTWARE
     \Intel
          \Server Control
               \Console
               \Server
```

All ISC console and server applications should create registry entries under their respective branch (`\Console` or `\Server`).

Example:

```
HKEY_LOCAL_MACHINE
 \SOFTWARE
     \Intel
          \Server Control
               \Console
                    \DPC
                    …
                    \Phone Book
                    …
                    \PIC
                    …
                    \StandAlone
                    …
                    \Client SSU
                    …
               \Server
                    \PI
                    …
```

Intel® Server Control v2.x TPS

Section 12: Installation Framework

Installation Framework Contents

Installation Framework Figures

Installation Framework Tables

Section 12 contains no tables

47 Introduction to the Installation Framework

The Intel® Server Control software can be installed using either a silent installation or a user-activated installation. This section describes both installation processes.

48 Silent Installation

The Intel Server Control installation framework can be executed without a user interface or user interaction. The user supplies a configuration text file identifying the systems on which to install ISC components. The following command line parameters are used to execute the silent install (not all are mandatory).

Parameter	Optional / Required	Description
/silent:	*Required*	The path to the silent configuration file. This can either be a full path or just the file name if the file is located in the same directory as the setup program.
/username:	*Optional*	This is the user name used to grant administrative rights to local or remote systems. This parameter can be overwritten in the silent configuration file.
/password:	Optional	This is the user password associated with the user name. This parameter can be overwritten in the silent configuration file.
/log:	Optional	This is the path to a log file that will contain the results of the installation process.

Four examples of command line execution follow. The final example is wrapping onto two lines, but would be entered on the system in a single line.

```
Setup.exe /slient:silent.txt
Setup.exe /slient:c:\iscinstall\silent1.txt
Setup.exe /silent:silent.txt /username:eric /password:iscinstall
Setup.exe /silent:c:\isc\silent.txt /username:eric /password:iscinstall
/log:c:\temp\logfile.log
```

48.1 Silent Install Configuration File

The user created silent install configuration file must contain a `[Version]` section and a `[Destinations]` section, as follows:

```
[Version]
Signature="   "
Provider="    "

[Destinations ]
destination1, [Username], [Password]
destination2, [Username], [Password]
…
```

Where the [Destination] parameters are as follows:

Parameter	Optional / Required	Description
[destination:]	Required	Remote/local system name. Must use the Universal Name Convention (UNC see example). When installing on the local system the system name can be replaced by the keyword **Local.**
[UserName]	Optional	User name used to grant administrative rights to the setup application on the remote\local system. If this value is not defined, the setup program will use the value passed by command line parameter /username.
[Password]	Optional[1]	Password associated with the UserName parameter.

Note:

[Password] is required if the [UserName] parameter is set.

The following is an example of a silent install configuration file that will attempt to install ISC onto the local system and also on the systems \\S820PN2 and \\S840HM2.

```
[Version]
Signature="$Windows NT$"
Provider="Intel Corp, ESG"

[Destinations]
\\SP820PN2, sueyoung, @password
\\SP840HM2, MyUser, password2
Local, administrator, password10
```

The following informational screen will be displayed to during a silent installation.

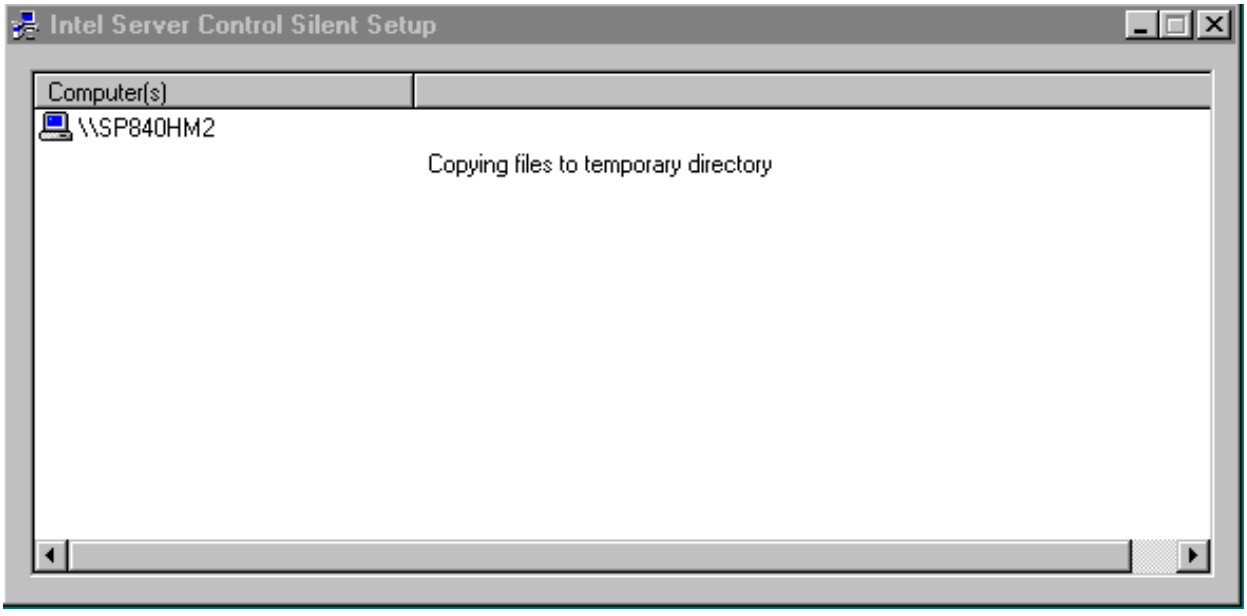

Figure 48-1: Silent Install Informational Screen

49 User-Activated Default Installation Interface

49.1 Starting the Application

Upon starting the ISC Installation application, the user is asked to choose between options to install / upgrade or to uninstall ISC.

Figure 49-1: Install / Upgrade or Uninstall Dialog

A screen is displayed that shows a progress bar to inform the user that the ISC installation was launched. During the dialog, the setup program reads the configurations files and checks them for syntax and logic. If errors are found an error message will be displayed to the user and the ISC setup will exit.

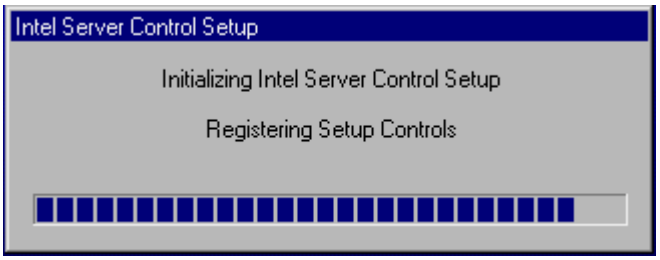

Figure 49-2: ISC Launch Progress Bar

49.2 ISC Install

When the user selects the choice to install ISC, the following screen appears to welcome the user to Intel Server Control installation.

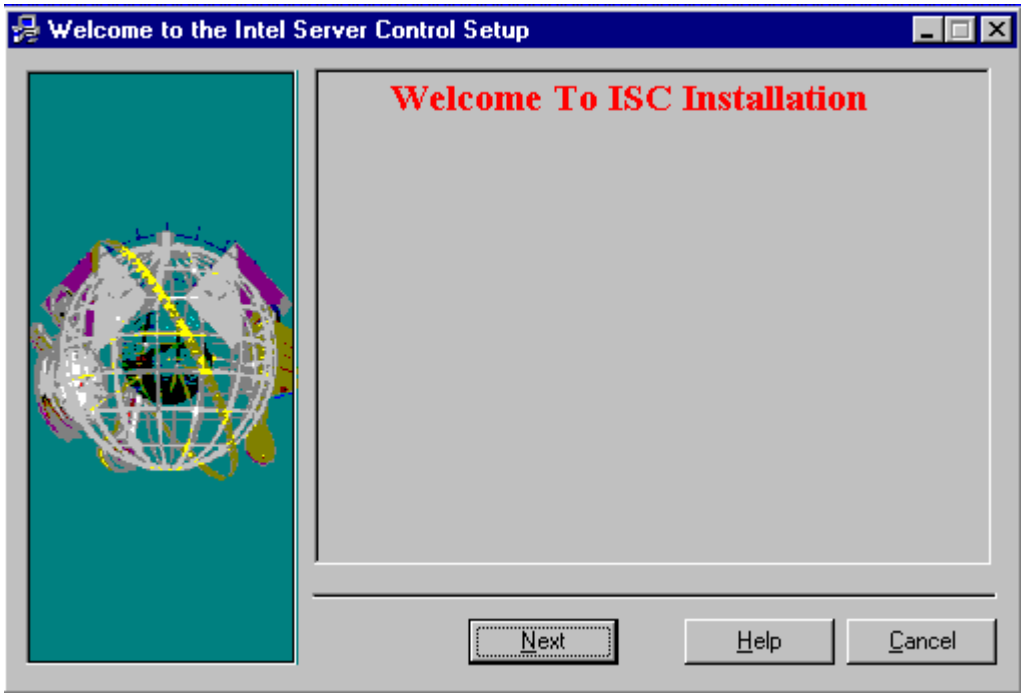

Figure 49-3: ISC Welcome Screen

Upon selecting Next, the user sees a screen showing the license/copyright agreements.

Figure 49-4: License Agreement

The next screen displays a blank network map from which the user can start the selection of the destination systems for the installation. The Add button is used to display the network and to add a computer to the destination list.

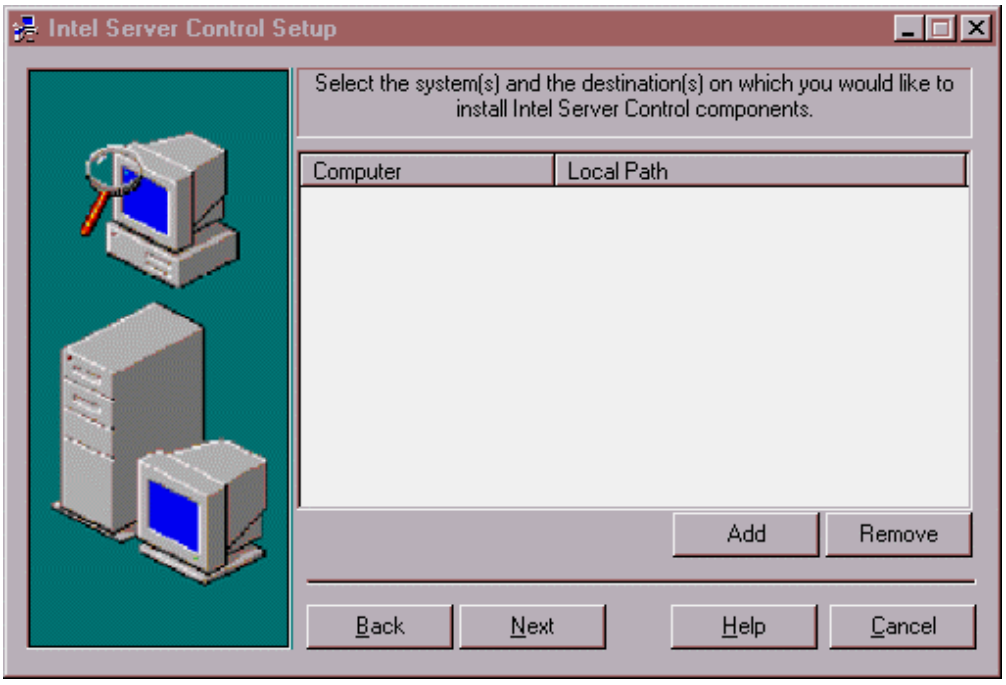

Figure 49-5: Network Map Screen

The user selects a system from the list and presses the >> button to add it to the destination list. Systems can be removed from the destination list by using the << button.

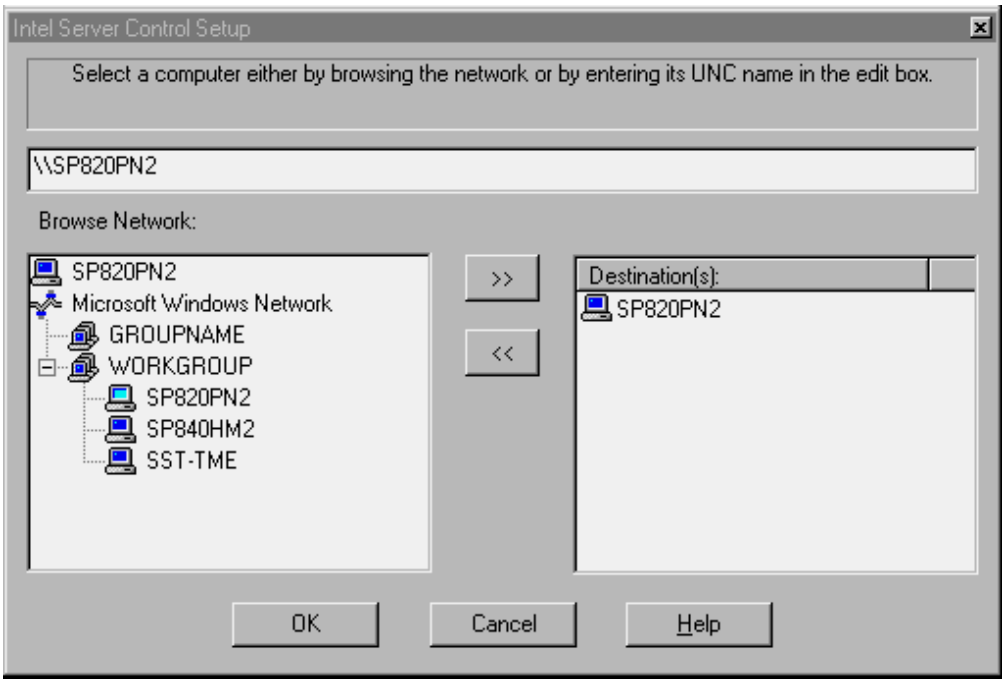

Figure 49-6: System Selection Screen

Multiple systems can be selected for the installation process. All selected systems will be displayed in the Destination window. The user can either browse the network tree or manually enter a system name, using the UNC format, in the edit box in order to select a computer for installation. Clicking OK after the systems have been selected opens a screen that shows the systems and the default path name for installation.

The default directory on the destination computers are:

- WIN32 “Program Files\Intel\Server Control”
- NetWare “system”
- UnixWare “/ISC/PI”.

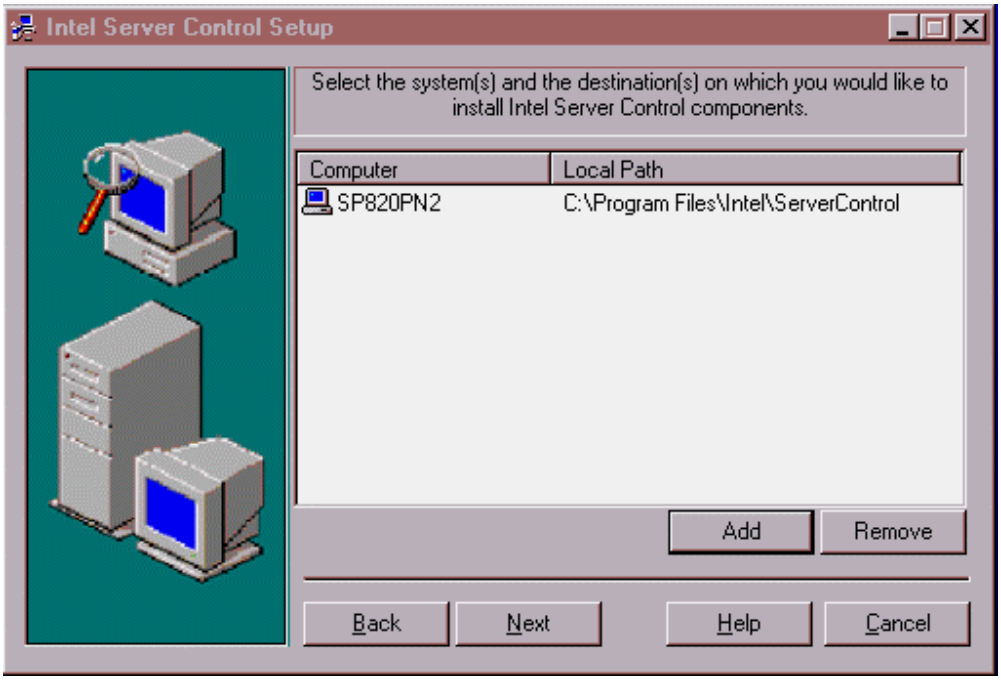

Figure 49-7: Installation Path Screen

The user can modify the destination directory by right clicking the selected system and entering a new path. The user can edit the path for Win32 and UnixWare platforms, but not for NetWare. The following is the Edit Path screen that appears if the user right-clicks a system to change the path.

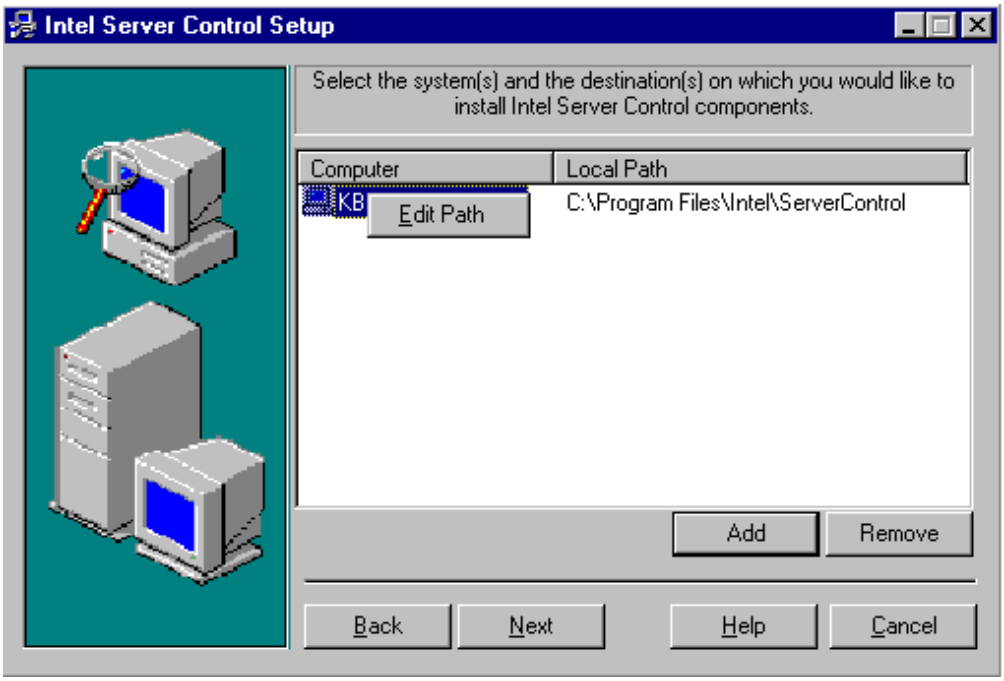

Figure 49-8: Opening the Edit Path Dialog

After selecting "Edit Path" the user can modify the installation path on the destination computer:

Figure 49-9: Path Dialog Box

After the system selection is complete, the user is prompted for a user name and password that has administrative rights on the selected system.

Note: On Windows 98, the setup program will use the currently logged on username and will only allow the installer to specify the password.

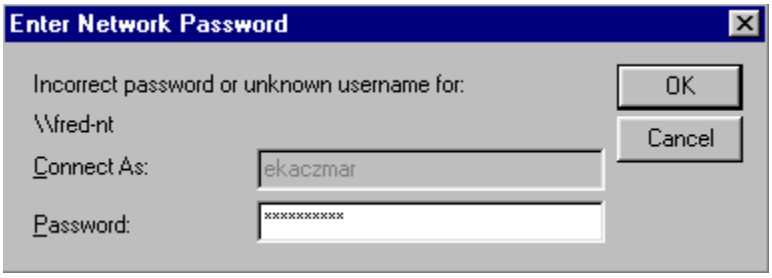

Figure 49-10: Password Entry Dialog

Next, the user is presented a screen that displays a list of all the Intel Server Control applications available for installation.

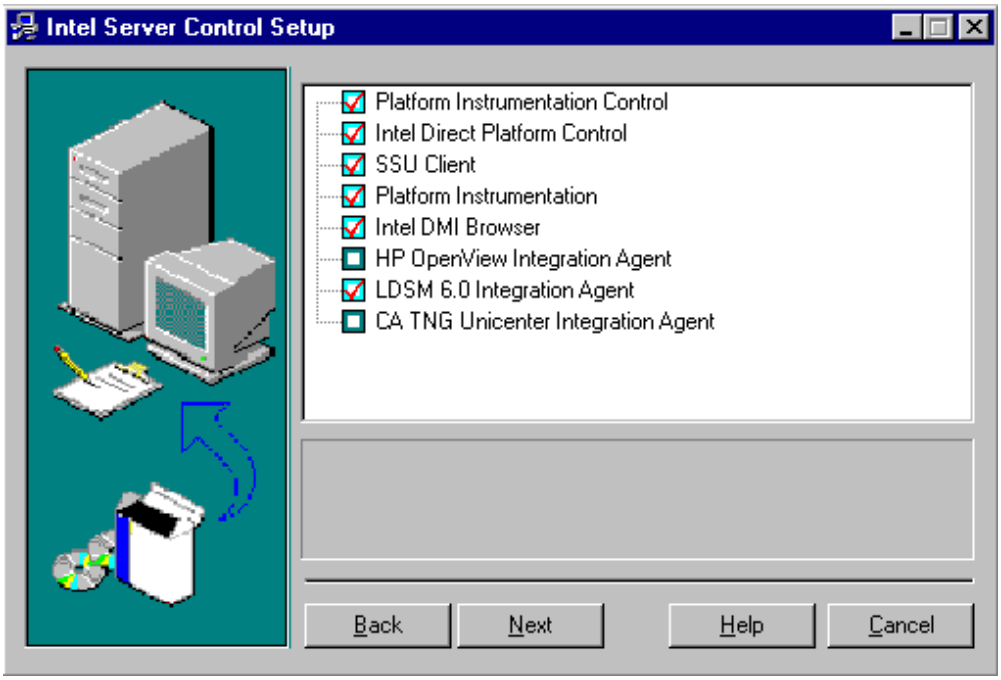

Figure 49-11: Features Selection Screen

The user can select the features that should be installed on the target computers. However, even if a feature is selected for installation, it will be installed only if its condition is verified. A list of installed features will be kept in the ISC root directory on the target system in the Installed.log file.

Features can be selected and deselected by clicking on the icon associated with a feature. The feature description will be displayed when a feature is highlighted.

The features that are selected will be designated using two different icon images. If a feature is selected, it will be designated with a full color checked box. The features that are not selected will be designated with an empty unchecked box.

Intel Server Control 2.x will install the following client/server applications:

- **Platform Instrumentation Control (PIC)**: This is supported on Windows98 (with DCOM98 previously installed), Win2K and Windows NT 4.0 SP4 and greater. If selected this feature will also install Intel Server Control StandAlone Console.
- **Direct Platform Control (DPC)**: This is supported on Windows98 (with DCOM98 previously installed), Win2K and Windows NT 4.0 SP4 and greater. If selected this feature will also install Intel Server Control StandAlone Console
- **Client SSU Control**
- **DMI Browser**: This is supported on Windows98 (with DCOM98 previously installed), Win2K and Windows NT 4.0 SP4 and greater. If selected this feature will also install Intel Server Control StandAlone Console.
- **Platform Instrumentation**: This is supported on Win2K, Windows NT 4.0 SP4 and greater, NW 4.11 & 5.x, UnixWare 7.x. Installing this feature will also install the DMI Service Layer.
- **HP OV integration agent**: This feature will only installed if the HP OpenView console is present on the selected systems. If this feature is installed, all ISC console tools (PIC, DPC, Client SSU or DMI Browser) will be integrated into the HP OpenView console.
- **CA Tng Unicenter integration agent**: This feature will only installed if the CA Tng Unicenter console is present on the selected systems. If this feature is installed, all ISC console tools (PIC, DPC, Client SSU or DMI Browser) will be integrated into the CA Tng Unicenter console.
- **Intel LDSM integration agent**: This feature will only installed if the Intel LDSM console is present on the selected systems. If this feature is installed, all ISC console tools (PIC, DPC, Client SSU or DMI Browser) will be integrated into the Intel LDSM console.
- **LDSM and LRA Security**: This feature will be used to enable or disable the security mechanism that will be implemented for LDSM and LRA used in ISC 3.x.

The user is presented a display that lists the features and computers selected for installation. Pressing the Accept button will start the installation.

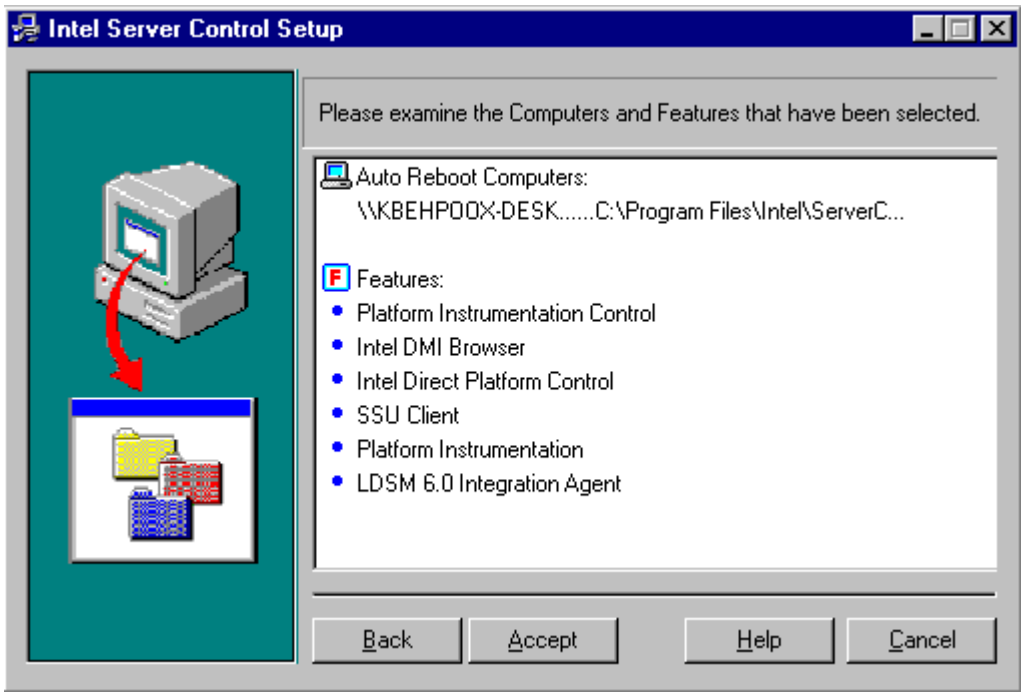

Figure 49-12: Install Confirmation Screen

As the files are transferred to their destination, the user sees a progress screen.

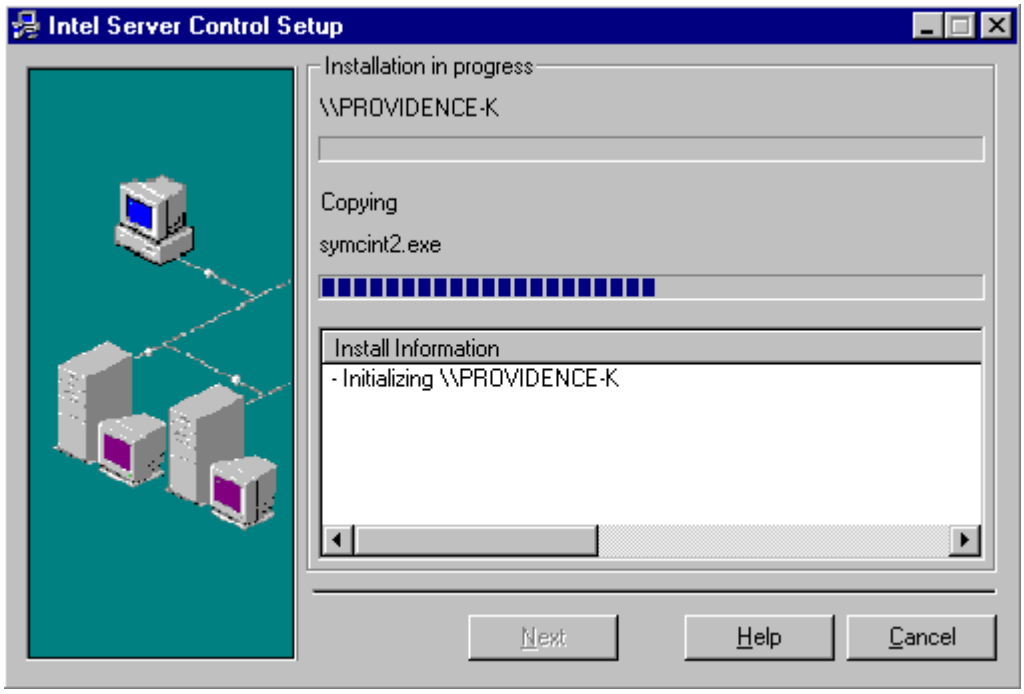

Figure 49-13: Installation Progress Screen

Upon completion of the installation, a screen is displayed that informs the user that all the steps were performed successfully. It will also display a list of remote computers that can be rebooted remotely and a list of computers that require a manual reboot.

Finally, this screen will inform the user on where he/she will be able to find the log files on the remote computers. Those log files will contain information on the installation status.

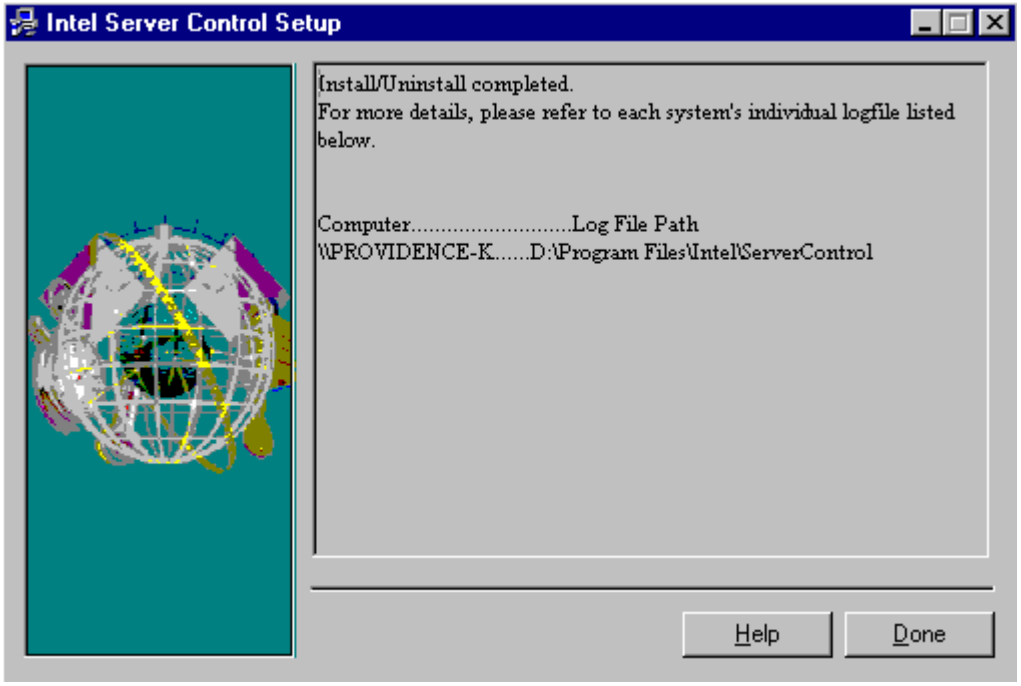

Figure 49-14: Installation Complete Screen

The LocalSetup process generates a log file on the local machine. This is a text file titled Logfile.log. The log file will contain the following information about the installation:

- List of features installed successfully
- List of installed components
- List of copied\replaced files
- Any error messages

49.3 ISC Uninstall

49.3.1 Uninstall all ISC's Features on a Local Win32 System

To uninstall ISC from the local machine use the Control Panel to select Add/Remove Programs. Select Intel Server Control Version x.x in the list box. This selection will uninstall all ISC features.

49.3.2 Uninstall ISC from a Remote Win32 System

To uninstall ISC from a remote console or server launch setup.exe from the ISC CD image. Select Uninstall Server Control, as displayed here:

Figure 49-15: Beginning ISC Remote Uninstall

A screen is displayed to welcoming the user to ISC uninstall program.

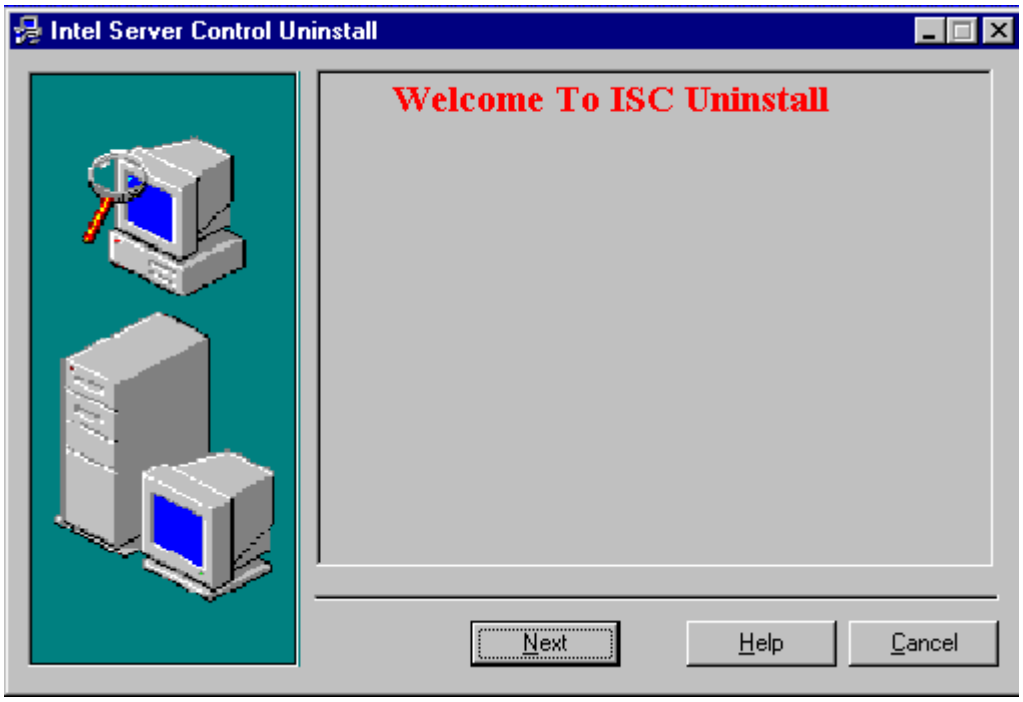

Figure 49-16: ISC Uninstall Welcome Screen

The user selects the system from which ISC should be removed. Either a local or remote system can be selected. You can select a remote or the local system. ISC can be uninstalled from only one system at a time.

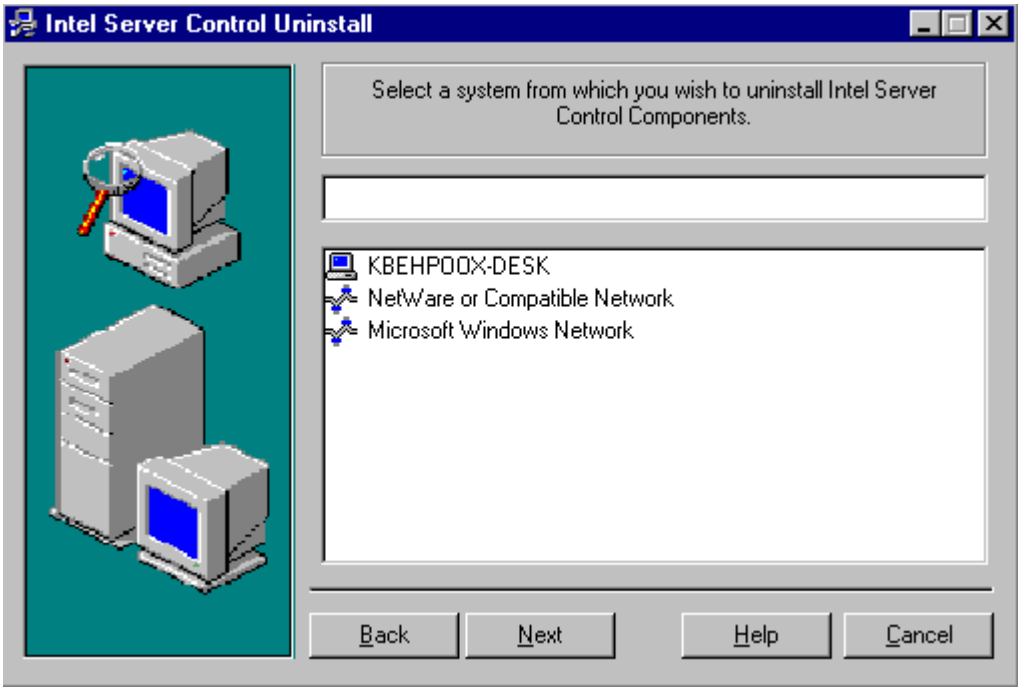

Figure 49-17: Uninstall System Selection Screen

A list of installed features on that system will be displayed from which the user can select the feature(s) to uninstall.

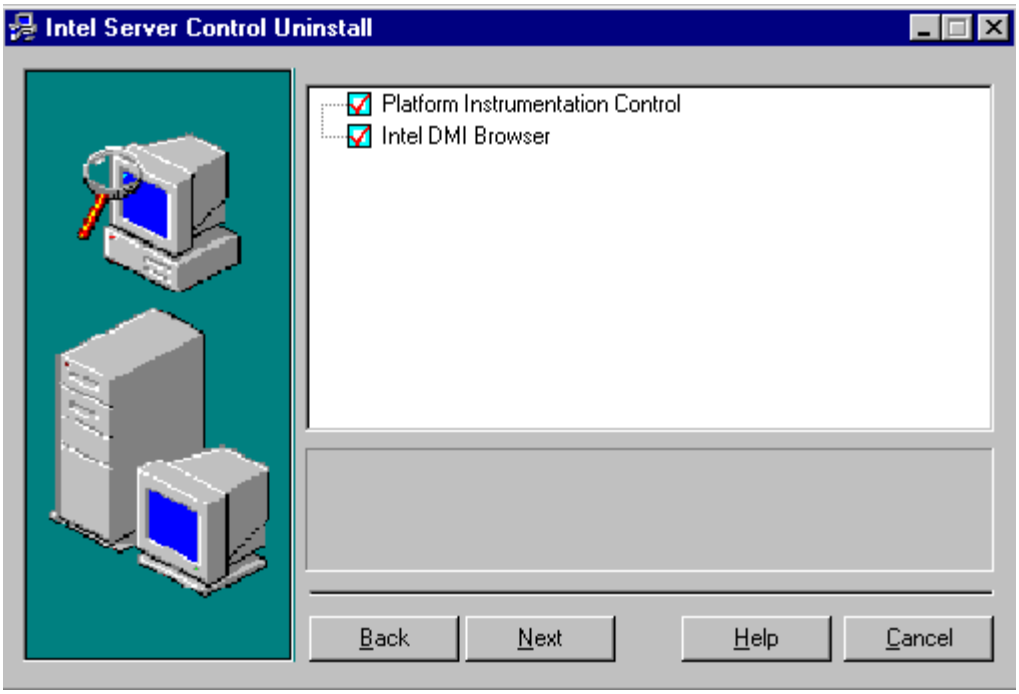

Figure 49-18: Uninstall Component Selection Screen

The user is shown a confirmation screen to verify the items that s/he would like to uninstall.

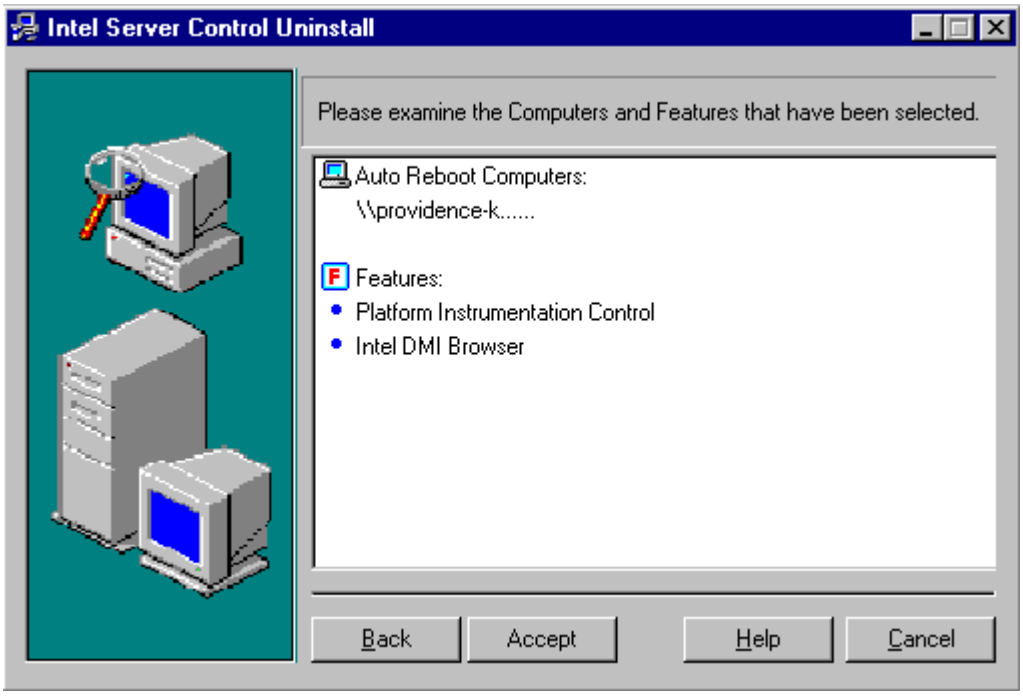

Figure 49-19: Uninstall Confirmation Screen

The uninstall program is then initiated and launched (automatically for Win32 systems and manually for NetWare and UnixWare).

49.4 ISC Upgrade

If a previous installation of ISC tools is detected on a target system, the system will be upgraded during the install session. If the user wants a fresh install, the uninstall should be run first and then install run.

49.4.1 Upgrading the Existing Installation

- **Adding new tools to currently installed ISC.**
  The user can add new tools to the currently installed set of ISC tools. Destination directories cannot be selected. Instead the current ISC root directory is used.
- **Upgrading already installed tools.**
  During file replacement, the following guidelines will be used:
  - Files of the exact same size and date are assumed to be current, and therefore are not replaced.
  - A later date file will overwrite a destination file of an earlier date automatically.
  - If a destination file on a Win32 machine is in use; the file will be replaced after the next system reboot. It will be stored in a temporary directory on the user's hard drive until the reboot.

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Intel® Server Control v2.x TPS

Section 13: Customization

Customization Contents

Customization Figures

Customization Tables

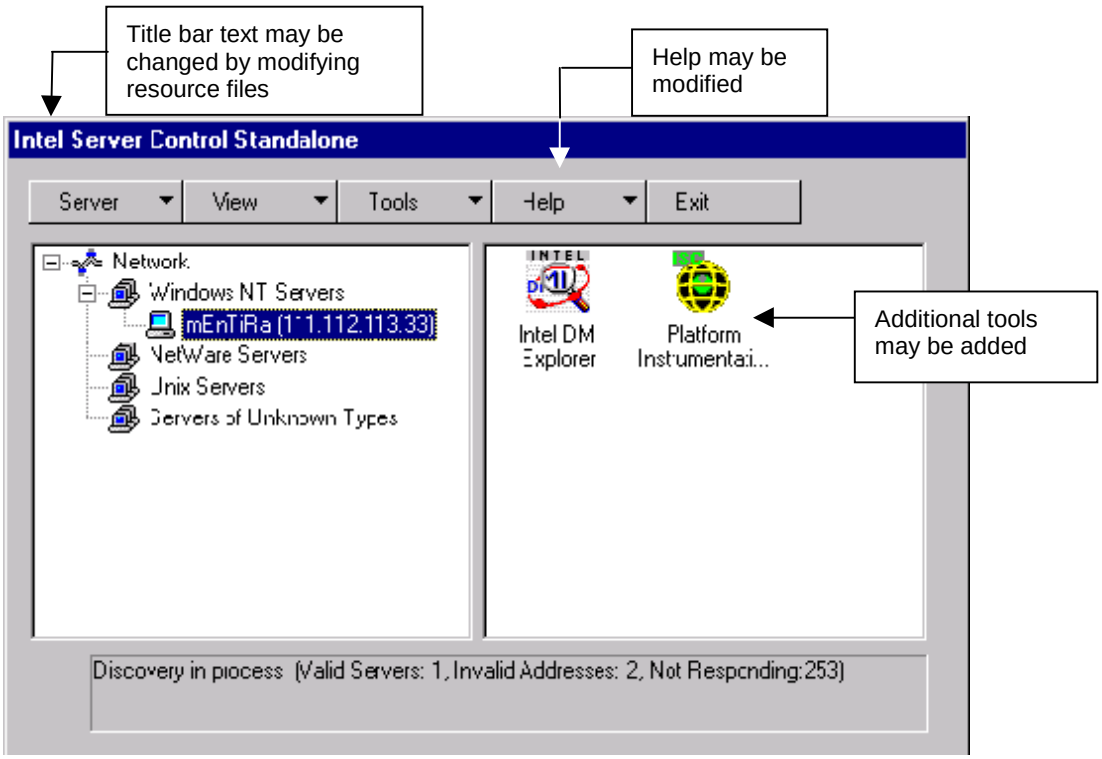
50 Introduction to Customization

ISC has been design to allow OEMs to customize the Standalone Console, Platform Instrumentation Control, and System Setup Utilities (CSSU / SSU).

51 Stand-alone Customization

The areas of the Standalone Console that may be modified include:

- Title Bar
- Help File
- Icons
- Addition of Tools



52 PIC Customization

PIC has been design to allow OEMs to customize the PIC GUI. The areas of the PIC that may be modified include:

- Title Bar text
- Title Bar icon
- Launch icon
- Help File
- Addition of IPMI instrumentation
- Addition of third party applets
- Change default alert actions

52.1 Modification of GUI Titles

GUI titles are modified by editing .lrc files. By default, the .lrc files are not compiled into standard C++ binaries, but remain as editable text files. LRC (Language Resource) files are located in the C:\Program Files\Intel\ServerControl\bin directory.

The following chart lists editable LRC files.

Table 52-1: LRC Files that may be edited

File	Description
ENUControls.lrc	Power Control, Console Redirection, Service Partition
ENUDPCConsole.lrc	Phone Book, connection status
ENUDPCFRUManager.lrc	FRU Manager
ENUDPCSDR.lrc	String resources file for SDR Manager
ENUEMPMgr.lrc	Version Information → Don't change since it isn't visible.
ENUISCPIC.lrc	PIC titles, pop-ups, bitmaps, GUI.
ENULSCore.lrc	PIC Core
ENUSharedResource.lrc	PIC Shared Resources

52.1.1 Prerequisites for GUI Title modification

The following are required to modify the GUI Title

- Microsoft Visual* C++ 6.1.
- Windows NT Workstation 4.0, service pack 3

52.1.2 GUI Title Modification procedure

1. Determine which .lrc file is to be modified. The example here uses the enuiscpic.lrc file.
2. Start the Microsoft Visual C++ editor.
3. Open the .lrc (enuiscpic.lrc is shown in figure 3-1) file – from the File menu choose Open and select the filename.
4. Open the file as a Resource instead of the default Auto. This will allow you to make modifications.
5. A list of bitmaps, text boxes, and title screens is displayed.

6. Right click and select properties for the title bar to be modified. It may be necessary to view more than one title bar properties screen to determine the correct one to modify.
7. Edit the caption only.

   Warning: Do not change the ID. If the ID is changed, the associated executable or Dynamic Logical Link (dll) will not function properly. The executable references the ID numbers.
8. Save the changes and test the modification in Visual C++.
9. Continue with any other modifications desired.

The following figure provides an example of how different LRC elements may be modified.

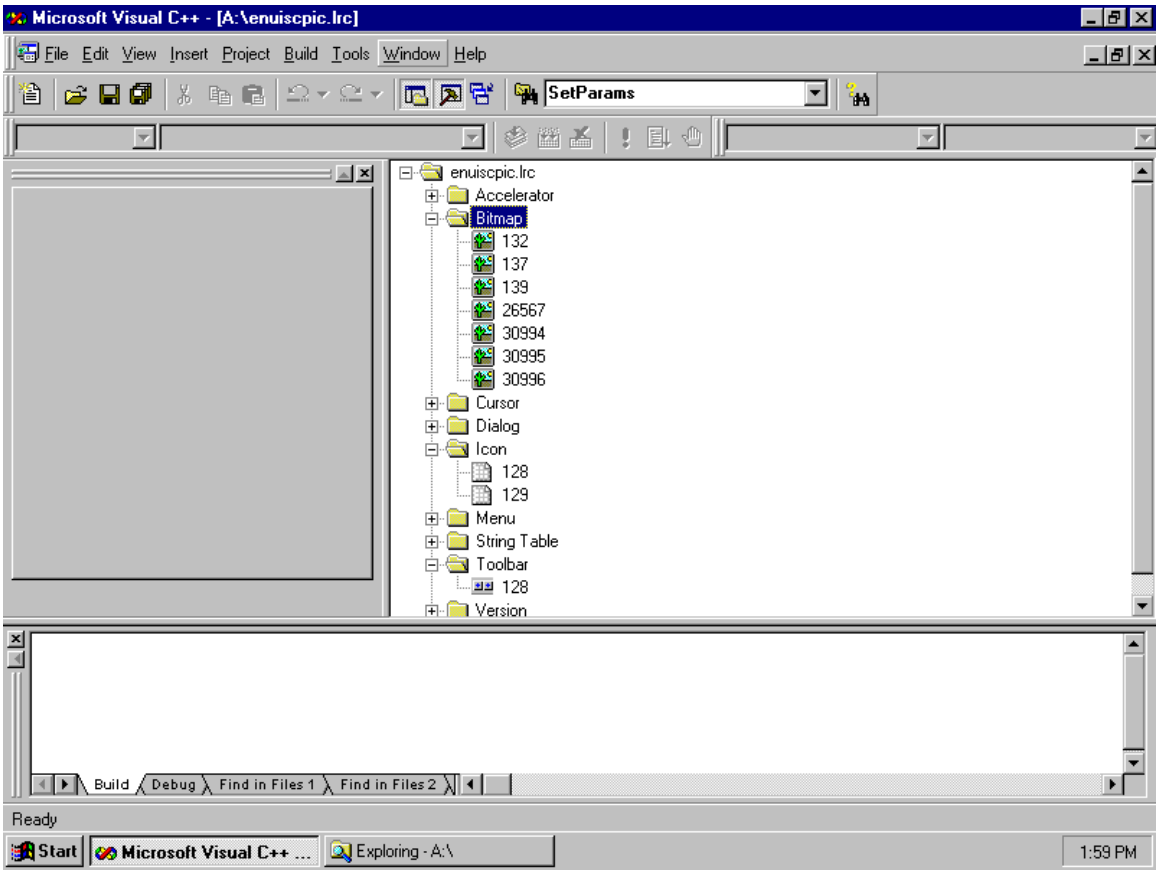


Figure 52-1: Editing the PIC English LRC enuiscpic.lrc file

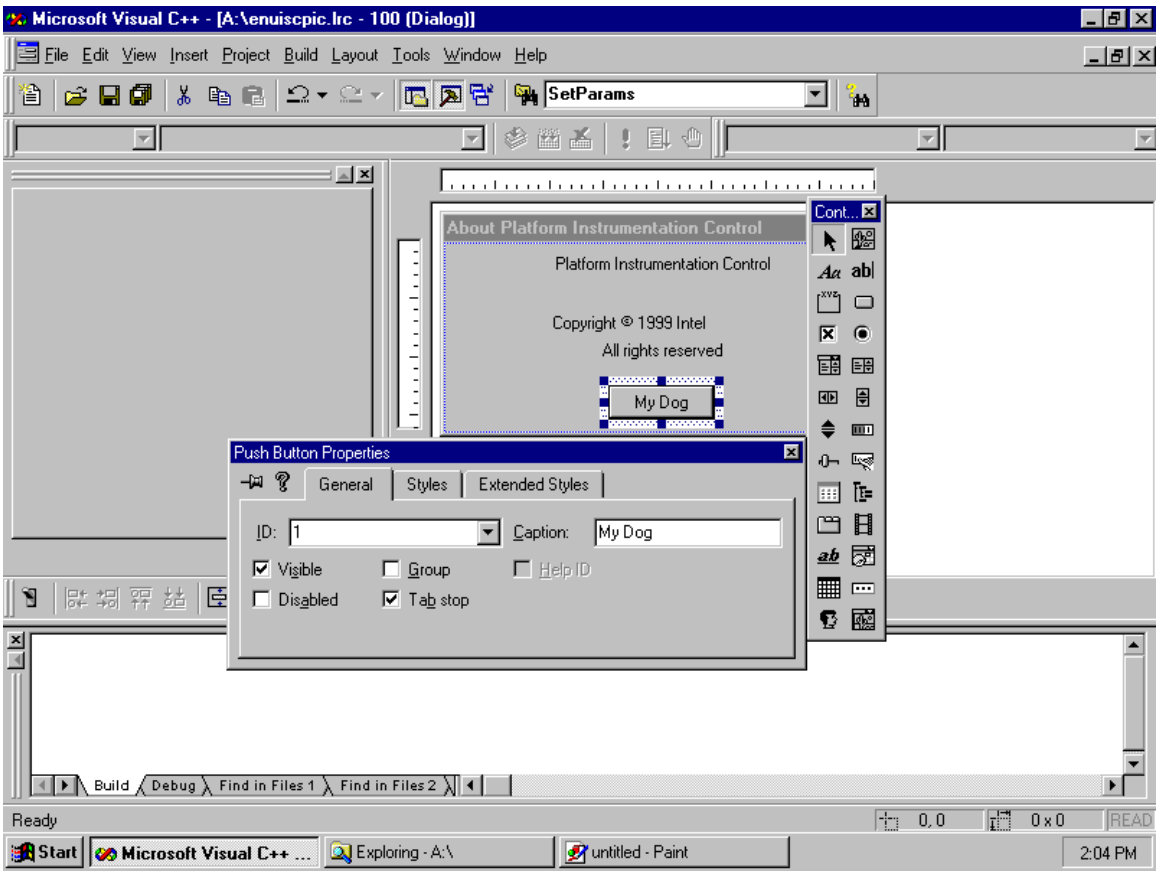


Figure 52-2: Changing Caption Titles

52.2 Bitmap Customization

It may be necessary to modify the bitmaps to fit the needs of customers. Modifying existing bitmaps will allow you to present the PIC in a different manner. LRC (Language Resource) files are located in the C:\Program Files\Intel\ServerControl\bin directory.

52.2.2 Prerequisites for Bitmap Customization

The following are required to customize the bitmaps

- NT 4.0 Workstation with Service Pack 3 or higher installed
- Microsoft Visual C++ 6.1

52.2.3 Bitmap Customization Procedure

The following procedure describes how to modify bitmaps within .lrc files. Installation of the PIC can occur by altering the bitmaps on the installation cd.

1. Determine which .lrc file is to be modified. The example here uses the enuiscpic.lrc file.
2. Start the Microsoft Visual C++ editor.
3. Open the .lrc file: from the File menu, choose Open and then select the filename.
4. Open the file as a Resource instead of the default Auto. This will allow you to make modifications.

5. A list of bitmaps, text boxes, and title screens is displayed.
6. Right click and select properties for the bitmap which you want to modify. It may be necessary to view more than one title bar properties screen to determine the correct one to modify.
7. Edit the icon with the bitmap editor. Notice that only the id and language are modifiable.

Warning: Do not change the ID. If the ID is changed, the associated executable or Dynamic Logical Link (dll) will not function properly. The executable references the ID numbers.

8. Save the changes and test the modification in Visual C++.
9. Continue with any other modifications desired.

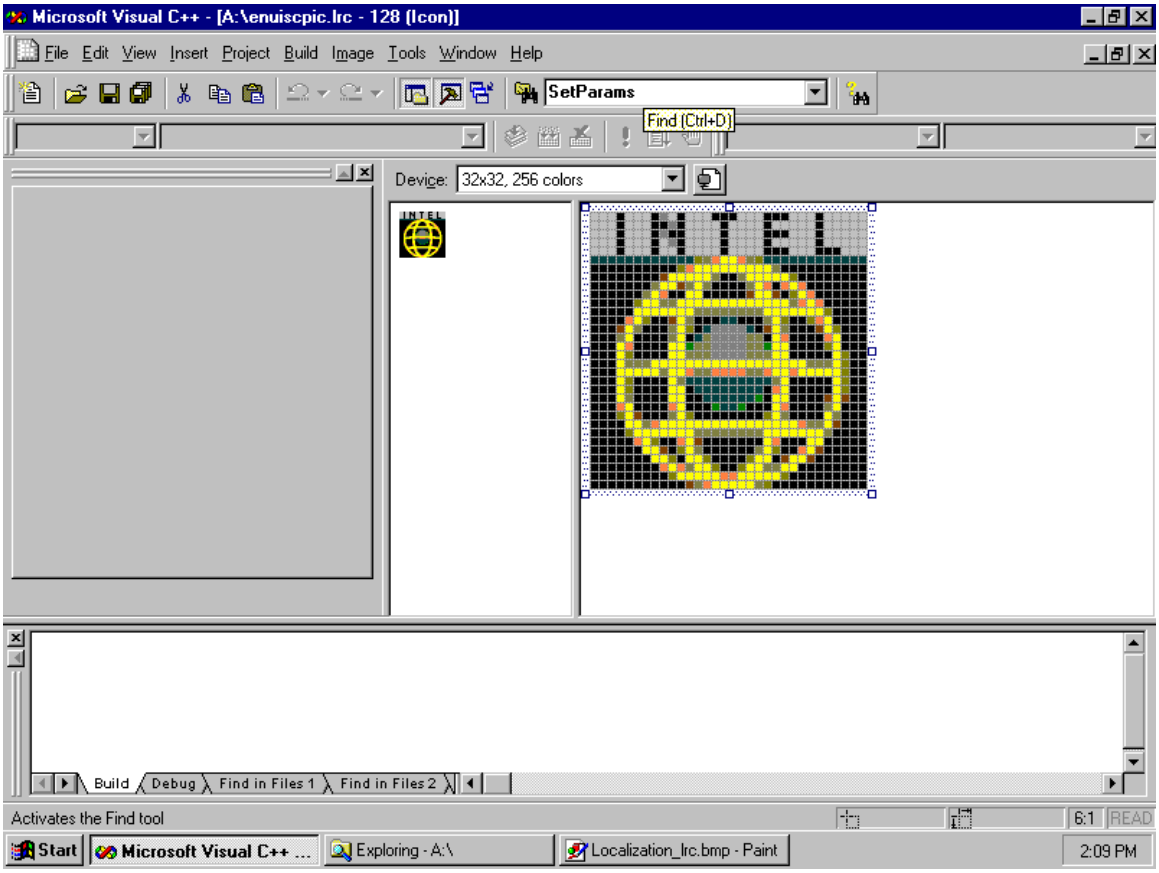


Figure 52-3: Modifying Bitmap Icons

52.3 Help File Modification

It may be necessary to update the help files after customizing other elements, such as when 3rd party icons or additional sensors are added to the PIC GUI. The following sections provide examples of help file customizations.

Note: This section does not cover context instances such as Pop-up help files accessed from right-clicking the mouse. Such context switches are not OEM customizable.

52.3.1 Help File Modification Prerequisites

The following are required to modify the help files:

- RoboHELP7.0* from BlueSky Software or another Win32 help based tool.

  Warning: Editing encrypted text may be very difficult with manual tools like Notepad. Hence, it is recommended that a 3rd party tool (i.e. RoboHelp 7.0) perform Help modifications.
- Current project files from Intel. Typically Intel will provide .cnt (content), hpj (project), and rtf (rich-text) files as the composite of project files.
- Windows 3.1, 95, 98, NT 4, or NT 5, desktop.

52.3.2 Help File Modification Procedure

1. Launch RoboHELP.
2. Open the project file source code obtained from Intel.
3. Determine which area you want to add/modify.
4. Compile your changes.
5. Test & View the changes in the Help File.
6. Save your changes.
7. Archive changes into the appropriate version management tool (such as Merant's PVCS* Version Manager 6.5 or Rational's ClearCase*).

52.4 Add Additional IPMI Instrumentation

It may be necessary to make changes at the firmware level to show OEM proprietary information. For instance, an OEM may want to tie into the IMPI specification at the firmware level and change the Sensor Data Record (SDR). Intel has designed a Windows 32* compliant utility, SDR Create, that allows the OEM to edit SDR files. The SDR Create utility is available for download at OEM request. Previously, it was necessary to manually edit the files in DOS-mode.

For a detailed examples of possible SDR modifications please refer to the "Intelligent Platform Management Interface". This is available from ftp://download.intel.com/design/servers/ipmi/impii607.pdf.

52.5 Example SDR Create Procedure

1. Launch the SDR Create utility from program manager.
2. Open the SDR.
3. Modify the desired entries.
4. Test the changes.
5. Save and exit the SDR Create utility.

52.6 Addition of a 3rd-Party Applet

It may be necessary to add controls or an applet for a non-IPMI device.

The PIC installation copies the necessary files onto the console machine. It then registers the ActiveX* controls and makes the registry changes needed for console customization.

The registry modifications listed in the following procedures describe how to modify or add additional PIC options. If, for instance, an OEM wanted to add information on a specific network card they could modify the registry to do so. In additional, modifying the registry will allow the OEMs to create options for 3rd party integration.

3rd party integration can be displayed with PIC customization as an additional folder on the bottom left side of the PIC GUI. By default, OEMs see a displayed subset of only the "Alert Actions" folder. Other sensor information, such as the threshold modification folder, is not displayed. 3rd party customization is not limited to the 3rd party integration folder. OEMs can add additional sensor information coupled with the existing PIC GUI displays.

52.6.1 Registry Keys

All registry keys described below are defined under the PIC root key: HKEY_LOCAL_MACHINE\SOFTWARE\Intel\Server Control\Console\PIC. The registry can be edited by typing **`regedit32`** at the run prompt.

52.6.1.1 Class Names

PIC retrieves its DMI class names from the following registry values.

Subkey Name \Paths
Values Type REGSZ

Registry Subkey Name	DMI Class (as shipped)	Comments
IntelHealthComponent	Intel Corporation, Server Health	SHA component name
ICMBControl	Intel|ICMB Control|001	Reclaim Inactive Resources menu option
ServerHealthDetail	Intel|Server Health Detail|001	Health event detail
StatusDisplay	Intel|Status Display|basebrd001; Intel|Status Display|002	Semicolon-delimited list of class name(s) for LCD display. PIC queries these in order specified, uses the first which is present.
SystemControl	Intel|System Control|basebrd001	Used by menu options: ▪ Immediate Power Off Server ▪ Immediate Hardware Reset Server ▪ Enable Watchdog Timer ▪ Restore Factory Defaults
SystemHardwareSecurity	DMTF|System Hardware Security|001	Enable Front Panel Power & Reset menu option
PagingConfig	Intel|Paging Config|001	Paging Configuration dialog
LocalPagingConfig	Intel|Local Paging Config|001	Paging Configuration dialog
DisplayCustomization	Intel|Display Customization|001	Optional name of server-specific bitmap
Container	DMTF|Container|001	Identifies server model for bitmap and tree template selection

Table 52-2: DMI Class Registry Keys

Registry Value Name	Type	Value	Use
DefaultTree	string	Default	Name of default tree

52.6.1.2 Tree Templates

The structure and content of the instrumentation tree view displayed by PIC is defined entirely in the Windows* registry. PIC supports multiple, server-specific trees and attempts to use a tree associated with the server model, if one is defined. If a server model is not defined, PIC uses a default tree. Tree templates are defined under the registry subkey **\Trees**<tree name>

<tree name> is an arbitrary string that identifies the tree. If <tree name> matches the server model, PIC uses that tree for the server, otherwise PIC uses the tree named by the DefaultTree registry value.

Each node in a registry tree template has the following form:

<item name>
\Attrs = <item attributes>

<item name>***Groups**
<DMI $Class_n$> = <$ProgID_n$>

<item name>***Components**
\ResID = <component resource ID>

\ProgID = <ProgID>

<item name>****<subitem name>

…

Where the following subkey definitions apply:

***Groups**	Defines the DMI groups that the item contains, if any.
***Components**	Defines the DMI groups that the item contains, if any.
<subitem name>	Specifies a tree item that is contained by the current item. The subitem template is of the same form as the item template. Items may be nested to any depth.

And where the following value entry definitions apply:

<item name>	Specifies the text label displayed for the tree item.
<item attributes>	This double-word value specifies a set of bit flags that determines how PIC displays and processes the item. .
<DMI Class>	Specifies the name of the DMI class PIC enumerates to create the contents of a folder item. Any number of class names may be associated with a folder, though typically only one is.
<ProgID>	Specifies the programatic identifer of an ActiveX control. If *AttrNeverExpand* is specified, PIC displays the control when the user clicks on the folder; otherwise, PIC displays the control when the user clicks on any of the DMI rows contained by the folder.

Table 52-3: Tree Item Attributes

Attribute Name	Hex value	Meaning
AttrHealthContributor	00000001	PIC periodically polls the health of all DMI table rows contained by the item. PIC only polls servers, which do not support Server Health Alerts (SHA).
AttrThread	00000002	PIC creates a unique initialization thread to load this item's subtree. The thread terminates as soon as the subtree is loaded. This feature can improve application initialization time. If this attribute is not specified, PIC loads the subtree in the primary background thread, before processing the next item.
AttrAlways	00000004	PIC displays the item even if it is empty (has no children).
AttrHealthRoot	00000008	This item is the root of the health branch. There may only be one of these; PIC ignores any duplicate health branch definitions.
AttrNeverExpand	00000010	PIC should not query the server for this item. Typically, the associated ActiveX control will do so.
AttrExpandOnDemand	00000020	PIC will not query the server for this item during initialization, but will wait until the user expands the item in the tree view.

52.7 Default Alert Actions

Alert actions, caused by such events as excessive temperature, inadequate fan speed, or chassis intrusion, are used to warn end-users of a potentially harmful event. The default alert action will send a page, write an event to the servers event log, or cause the system speaker to beep. This is beneficial to those end users who do not always have time to monitor such details on their servers.

The events are processed by Management Information Format (MIF) information. The MIF file is a flat comma-separated database file that contains a MIF definition and rows that specify how the data can be manipulated. MIF files, and in particular the lra.mif, file are installed during the PIC installation. These files are fully editable. It is recommended that the OEM make modifications for their customers and then ship the modified MIF to the end-user.

Once in a MIF file, the LRA converts the data to a standard Simple Network Management Protocol (SNMP) Message Information Buffer (MIB) format. In this way, 3rd Party Integration tools, such as HPOpenView, LANDesk® Server Manager, and CA TNG Unicenter can then process these alerts in their proprietary formats.

52.7.1 Procedure for Updating Default Alert Actions

1. Launch a text editor from a Win32 OS.
2. Open the LRA.MIF file. This file is normally located in the C:\Program Files\Intel\ISC\bin directory.
3. Modify the rows that pertain to the alert action to be modified.
4. Test modification.
5. Save changes.

Figure 52-4 and Figure 52-5 provide snapshots of Notepad screens, showing views of the lra.mif definition of attributes that correspond to modifiable bits.

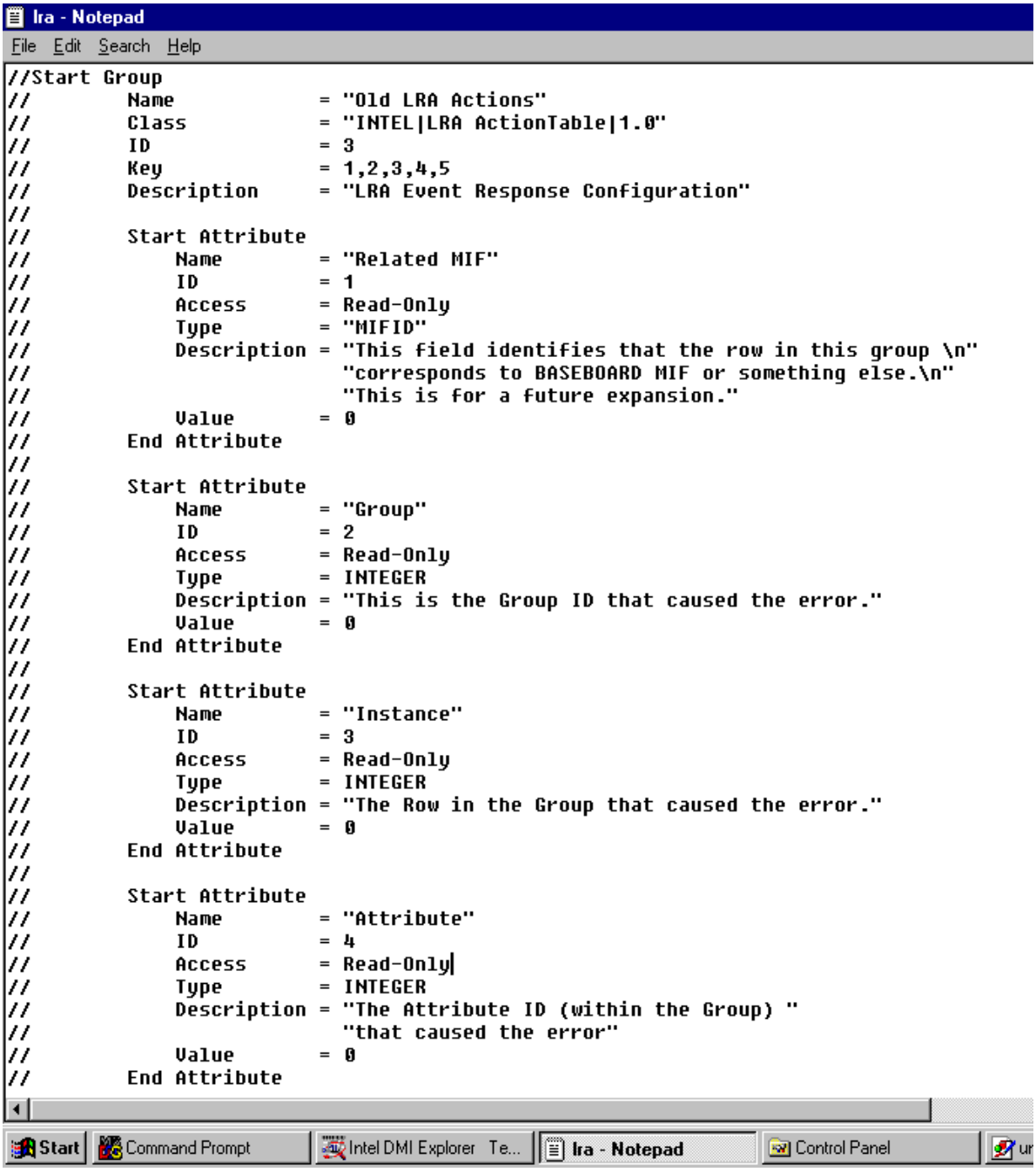


Figure 52-4: ***Top of LRA.MIF***

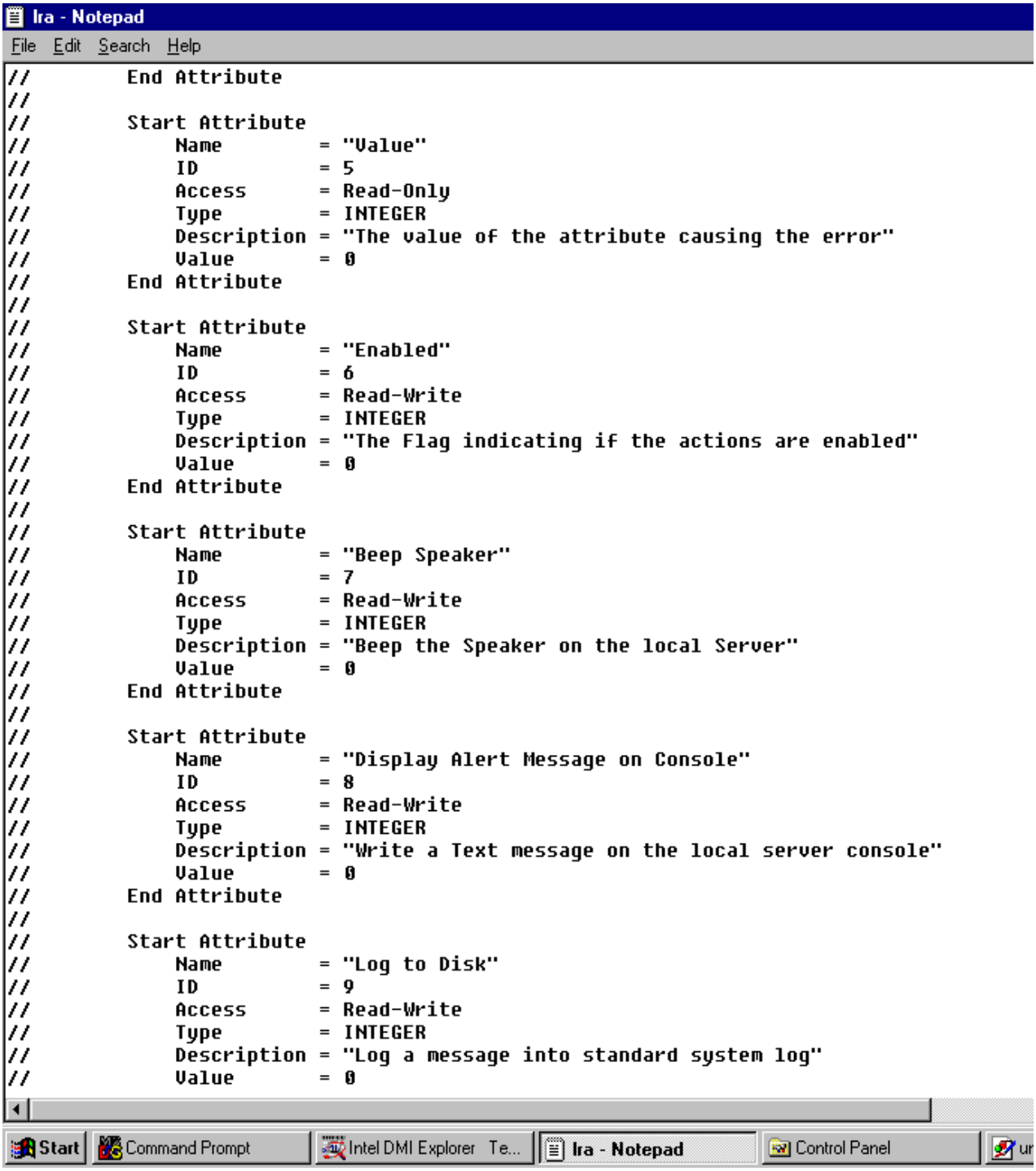


Figure 52-5: LRA.MIF file, middle section

Figure 52-6, below, displays the bottom portion of the LRA.MIF file. If an OEM wants to beep the speaker in the event that Temperature Sensor 1 crosses the defined threshold, the OEM would toggle the bit 7 to 1 (on).

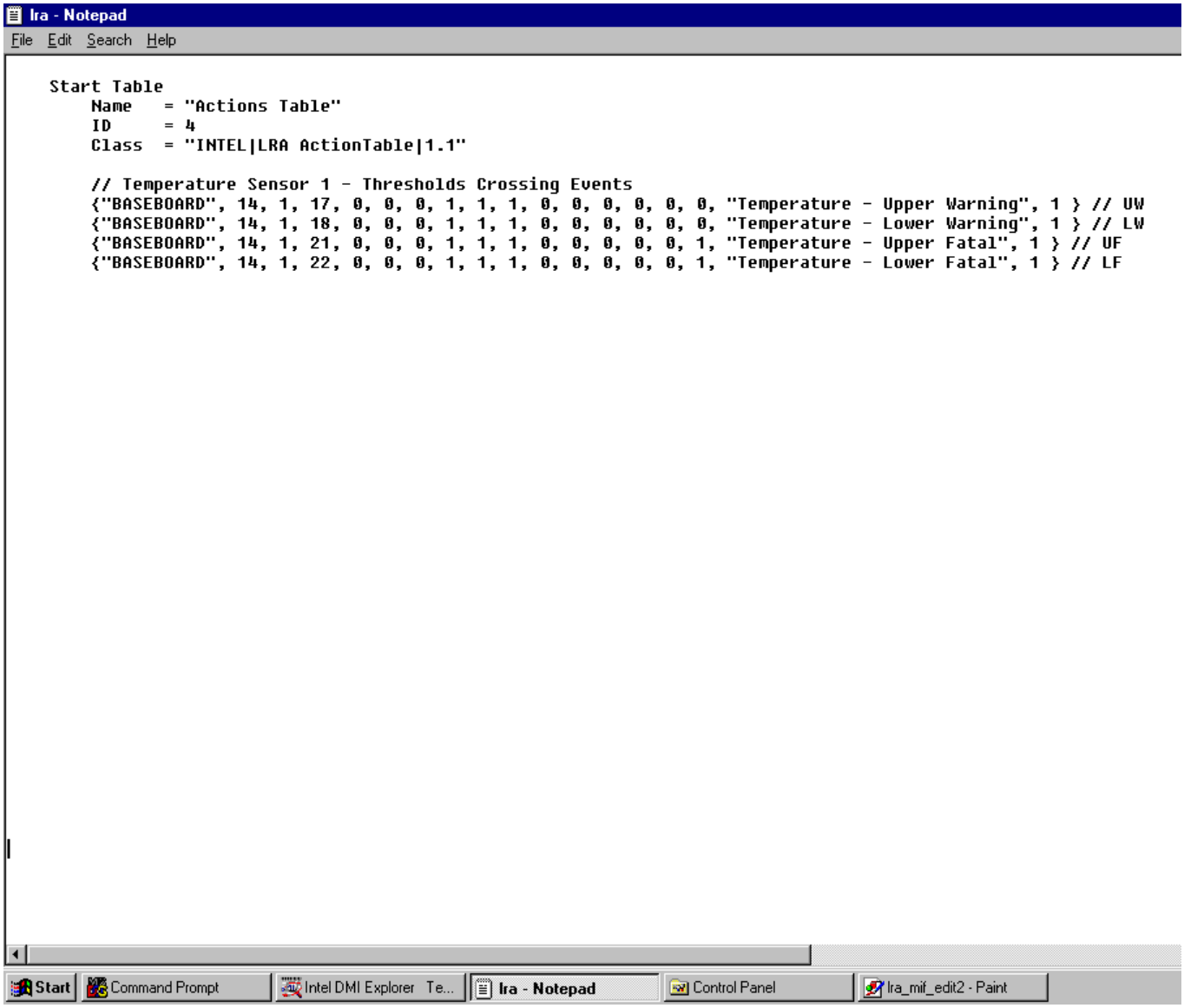


Figure 52-6: LRA.MIF file, bottom of file

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Intel® Server Control v2.x TPS

Section 14: Common Interface for FRU, SDR, and SEL

Common Interface for FRU, SDR, SEL Contents

Common Interface for FRU, SDR, SEL Figures

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53 Introduction to the Common Interface

This Section describes common ISC 2.x GUI features. The GUI is implemented in three different ways, for the, FRU, SDR, and SEL. Following a brief overview, each of these implementations is described in this section.

53.1 User Interface Overview

Regardless of the implementation, the architecture of the ISC GUI consists of four major components:

- ISC Instrumentation Controls
- ISC Core Components
- DMI Managed Object Toolkit (MOT) Engine
- Navigator Container

Each of these is discussed below.

53.1.1 ISC Instrumentation Controls

The ISC Instrumentation Controls User Interface (UI) consists of ActiveX components required to interface ISC functionality with the user. The ISC UI Controls interact with Core components in the console to obtain the current values that are displayed on the screen and to change values set by the user. The UI Controls allow users to configure sensor thresholds and provide detailed sensor information.

The health icon and screen within the UI is dynamically updated to show the current state of the server. The UI also updates the current screen when changes are applied. A refresh menu item allows the user to update the screens with the latest values.

53.1.2 ISC Core Components

The ISC Core is the interface between the ActiveX component layer and the transport layer. The ActiveX control components do not communicate with the Managed Object Toolkit (MOT) control, but rather through the ISC Core components.

The ISC Core interfaces with the following components:

- ISC executable – Navigator, ICMB, and health functions.
- ActiveX controls – to display and change object attributes.
- ICLW SM Abstraction layer – APIs for obtaining machine OS type.
- MOT (DMI Object Model) – used to get and set information for DMI attributes.
- ISecurity control – common security functionality for checking user authorization.
- A path list of all rows in all components for a given group.

53.1.3 DMI Managed Object Toolkit (MOT) Engine

The DMI Managed Object Toolkit Engine provides access from the console to the server's DMI Service Provider. The MOT Engine is an ActiveX control that provides a connection to the server, and transport of DMI data to and from the server.

53.1.4 Navigator Container

The Navigator container provides access to the ISC features, a toolbar, and other menu items. The purpose of the Navigator is to map the list, toolbar, and menu items to an ISC control that is launched when an item is selected. The system default settings are used for the window size and position on desktop, font, and other screen information

54 FRU Implementation

When the FRU Manager is started, a Status Box is displayed indicating that the Manager is loading Field Replaceable Unit information from the Server, assuming a connection to a server exists. A Cancel button is available in the Status Box so the load operation can be terminated.

If Server is connected when the FRU Manager is invoked, a Connect Dialog Box will appear. This box will also support a cancel option.

54.1 FRU Screen Display

The FRU Manager conforms to a Microsoft Windows Explorer-like model, with a Navigation Pane and a Presentation Pane. In addition, a description area can be found below the Presentation Pane. The Navigation and Presentation Panes can be resized via a split bar. Users can also resize the individual data columns in the Presentation Panes.

The FRU Manager is an ActiveX control. This means it can be used across several server management applications. A sample screen shot of the FRU Manager user-interface is shown below.

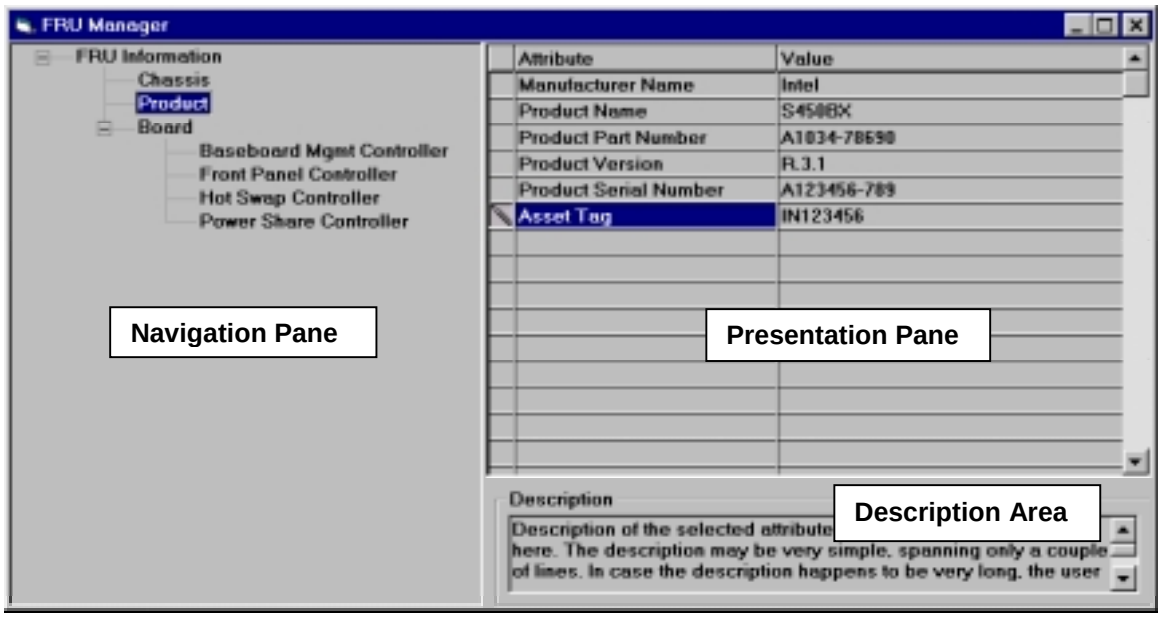


Figure 54-1: FRU Viewer Panes

54.1.1 The FRU Manager (DPC / SSU / PIC)Navigation Pane

The Navigation Pane is implemented with a Tree View. In other words, the items can be presented hierarchically. The root of the Navigation Pane is "FRU Information." Under the root, Information Areas are displayed.

Information Areas available in the FRU implementation include Chassis, Product, and Board. Under the Product category, all devices with Product Area information are enumerated as child nodes. A listing of all the devices available on the server must be obtained from the Device Locator Records in the Sensor Data Record Repository. There is no logical grouping defined for the display of these areas and devices. For the convenience of the user, items within each logical group may be presented in a sorted order.

54.1.2 Presentation Pane

The Presentation Pane consists of a Grid View for displaying attributes of the node selected from the Navigation Pane.

The Presentation Pane is modeled after an attribute-value paradigm, wherein all the attributes of the selected device from the Navigation Pane are displayed in a three-column format. Only those attributes that have meaning from a user's point of view will be displayed here. The following are the fields that may be displayed in the Presentation Pane.

Option Selected from Navigation Pane	Fields Displayed in Presentation Pane
Chassis	Chassis Type (Interpret and display this field) Chassis Part Number Chassis Serial Number
Product	Manufacturer Name Product Name Product Part Number Product Version Product Serial Number Asset Tag
Board	Manufacturing Date/Time (Interpret and display this field) Board Manufacturer Board Product Name Board Serial Number Board Part Number

The Attribute frame describes in the category of the information that is displayed and the Value frame provides specific information for that category. For example, if the Attribute contains "Serial Number" the Value contains the actual serial number information.

54.1.3 Description

As users highlight an attribute name or value in the Presentation Pane, the corresponding attribute description is displayed in the description text box under the Presentation Pane. For ISC 2.x the description box will remain static. Container Functionality

PIC, DPC and SSU will provide functionality that is generic to the FRU manager, such as the file menu.

54.1.4 Supported Commands

ISC enables and disables specific UI controls to make supported commands available. All the commands are implemented as menu selection of the control container. "Open", "Save As", and "Print" are sub menu items under "File" menu.

File

- Open…
- Save As…
- Print…
- Exit

Help

54.1.4.1 File Commands

Table 54-1: FRU Manager File Commands

Command	Description
Open	Open a file. It opens a standard Window's file dialog allowing users to select a file from a directory. Only the opening of a standard FRU formatted file will supported.
Save As	Save the file to a directory. It opens a standard Window's file dialog for saving a file. In all cases, the entire FRU file for that device is saved. Only the information for a specific FRU device is saved to a FRU file at any one time. The FRU information written to a file is in FRU file format, with an extension of ".FRU". The FRU file format is specified by the relevant Non-Volatile Storage Load File Format Specification and the IPMI Platform Management FRU Information Storage Definition.
Print	Generic Win32 Print functionality. This option prints the FRU information, as it would be done in a standard Windows application. Unlike the "Save As" function, this feature will print the information as it is displayed. In addition, the print function will support printing selected leafs and nodes of information.

54.2 Available FRU Information

FRU devices provide inventory information, based on the Intelligent Platform Management Interface specification. The format of the information is divided into six different areas:

Table 54-2: Available FRU Information

Area	Description
Chassis Info Area	This area is used to hold Serial Number, Part Number, and other information about the system Chassis. A system can have multiple FRU Information Devices within a chassis, but only one device should provide the Chassis Info Area. Thus, this area will typically be absent from most FRU Information Devices.
Product Info Area	This area is present if the FRU itself is a separate product. This is typically seen when the FRU is an add-in card. When this area is provided in the FRU Information Device that contains the Chassis Info Area, the product info is for the overall system, as initially manufactured.
Board Info Area	This area provides Serial Number, Part Number and other information about the board on which the FRU Information Device is located.
Common Header	The Common Header is mandatory for all FRU Information Device implementations. It holds version information for the overall information format specification and offsets to the other information areas. The other areas may or may not be present, based on the application of the device.
Internal Use Area	This area provides private, implementation-specific information storage for other devices that exist on the same FRU as the FRU Information Device. The Internal Use Area is usually used to provide private non-volatile storage for a management controller.
MultiRecord Info Area	The MultiRecord Information Area provides a region that holds one or more records where the type and format of the information is specified in the individual headers for the records. This differs from the other information areas, where the type and format of the information are implied by which offset is used in the Common Header. The MultiRecord Info Area provides a mechanism for extending the FRU Information Specification to cover new information types without impacting the existing area definitions.

The FRU Manager will display only the information useful to the end-user from the Chassis, Board and Product information areas. The Common Header, Internal Use or MultiRecord information areas are not displayed.

55 SDR Implementation

When the SDR Manager is invoked, a Status Box is displayed, indicating that the Manager is loading Sensor Data Records from the Server, assuming a connection to a server exists. A Cancel button is available in the Status Box so the load operation can be terminated.

If no server is connected when the SDR Manager is invoked, a Connect Dialog Box will appear. This box will also support a cancel option.

55.1 SDR Screen Display

The SDR Manager user interface conforms to a Microsoft Windows Explorer-like model, with a Navigation Pane and a Presentation Pane. In addition, a description area can be found below the Presentation Pane. The Navigation and Presentation Panes can be resized via a split bar.

Users can also resize the individual data columns in the Presentation Pane. The data in the Value column of the Presentation Pane is followed either by an “h” to denote it is a hexadecimal number, a “b” to denote it is a binary number, or by nothing to denote it is a decimal number.

The SDR Manager is an ActiveX control. This means it can be used across several server management applications. A sample screen shot of the FRU Manager user-interface is shown below.

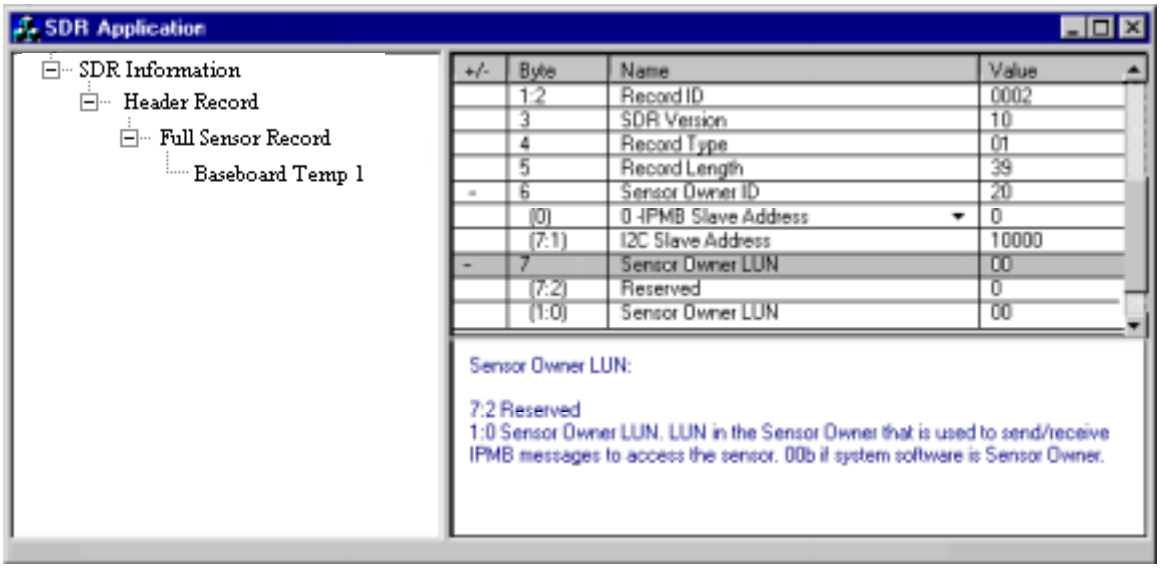


Figure 55-1. SDR Manager (DPC/SSU)

55.1.1 Navigation Pane

The Navigation Pane is implemented with a Tree View – the items are presented hierarchically. The root of the Navigation Pane is “SDR Information”. Under this root, all SDR records are logically grouped, based upon the record type. Each tree node is displayed with a “+” or “–“ sign to show its expandability. The branch names are as follows:

- Header Record
- Full Sensor Record
- Compact Sensor Record

- Entity Association
- Generic Device Locator Record
- FRU Device Locator
- Management Controller Device Locator Record
- Management Controller Confirmation
- BMC Message Channel Information

All individual sensor records are organized as leaf nodes under the corresponding branch name. The Display Name used for each sensor record will depend on the record type as follows:

Table 55-1: IPMI 1.0 Implementation Example

Record Type	Display Name (Attribute)
Full Sensor Record	Sensor type (ID String)
Compact Sensor Record	Sensor type (ID String)
Entity Association	Sensor type (ID String)
Generic Device Locator Record	Sensor type (ID String)
FRU Device Locator	Sensor type (ID String)
Management Controller Device Locator Record	Sensor type (ID String)
Management Controller Confirmation	Sensor type (ID String)
BMC Message Channel Information	Sensor type (ID String)
OEM SDR	Sensor type (ID String)

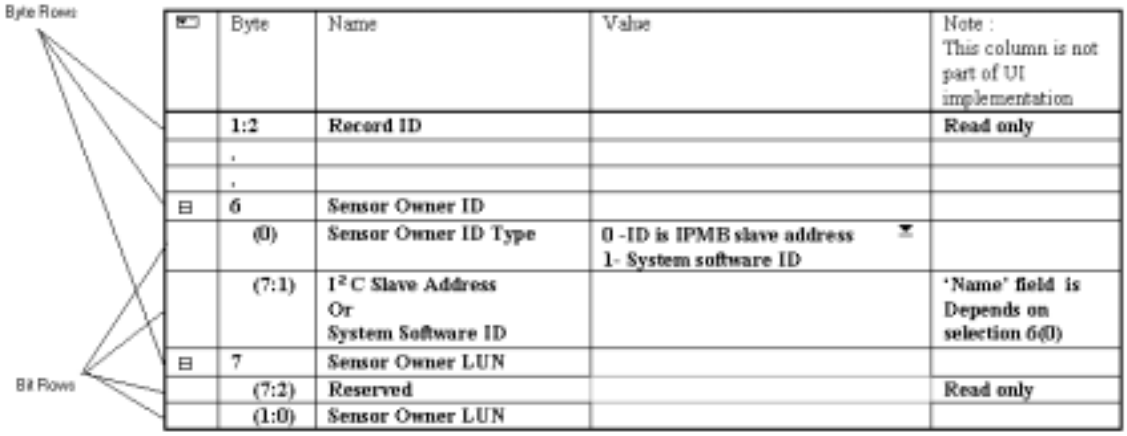
The user may display by sensor type and ID String. For example, there are two fans and two temperatures. The tree display is organized as:

Full Sensor Record
Fan (ID String)
Fan (ID String)
Temperature (ID String)
Temperature (ID String)

When the Type/Length field is zero length, ID string is written as “Unknown”.

55.1.2 Presentation View

The Presentation Pane is based on a multicolumn format with columns labeled with “Expand sign” “Byte”, “Name”, and “Value.” For each SDR device (leaf node) selected in the Navigation Pane, the corresponding attribute information is displayed in the Grid. All attribute information is displayed



	Byte	Name	Value	Note : This column is not part of UI implementation
	1:2	Record ID		Read only
	.			
	.			
⊟	6	Sensor Owner ID		
	(0)	Sensor Owner ID Type	0 -ID is IPMB slave address 1- System software ID	
	(7:1)	I²C Slave Address Or System Software ID		'Name' field is Depends on selection 6(0)
⊟	7	Sensor Owner LUN		
	(7:2)	Reserved		Read only
	(1:0)	Sensor Owner LUN		

Figure 55-2. Example of SDR Grid

55.1.2.1 Expand Sign Column

The rows of byte field (Byte Rows) have three possible states: “can be expanded (+)”, “can be collapsed (-)”, or “cannot be expanded or collapsed”.

The expand sign ‘+’ indicates the byte fields contain detail bit settings. Click the ‘+’ to expand the rows. The ‘-‘ sign indicates the byte field is currently in the expanded state. Click the ‘-‘ to collapse the bit rows so that only the byte rows are displayed. The column of expand sign is empty if the row can not be expanded or collapsed.

55.1.2.2 Byte Column

The byte column displays the byte or bit number. The bytes are set to the left of the column and are not enclosed by parentheses. The bits for the byte are in the rows under the corresponding byte (when the byte field is expanded). The bits are set to the right side of the column and are enclosed by parentheses. For example, in the above Figure, bits (7:2) and (1:0) belong with byte 7.

55.1.2.3 Name Column

The name column is similar to the “Field name “ of each SDR type in the IPMI specification. See the IPMI specification available on the IPMI website URL:
http://developer.intel.com/design/servers/ipmi/index.htm

55.1.2.4 Value

The “Value” column cell may support in-cell editing, pull-down list selection, or read only data. Each Value column in rows where bytes are indicated (versus bits) supports in-cell editing, as long as that byte is not read-only. This allows expert users to enter Hex values for speed data entry.

- **In-cell editing:**
  Once a user enters data into the Value column, the corresponding detail bit settings are changed automatically to reflect byte field input. The users may expand the rows, edit cells and then select from a pull down list to set detail bits. The Byte row / Value column as a result, will automaticly reflect correct Hex values.

- **Pull down list selection:**
  When a user clicks on a "Value" column cell, the ▼ button appears in the cell if the cell supports pull down list selection. The users can click on the ▼ button to display the pull down list and select a value. After the user makes a selection from the pull down list, the Value column will reflect the data in Hex.

55.1.2.4.1 Viewer Mode

When the SDR application is operated as a Manager for DPC and SSU, all the SDR information is read only. Therefore, the "Value" column displays the current value, but it is not possible to edit the value and the pull down list is not available. The SDR Manager application supports IPMI specification v1.0.

55.1.2.5 Description

As a user highlights an attribute name or value, the corresponding attribute description is displayed in the text box located beneath the Grid. For ISC 2.x the description box will remain static. In future versions it may be become a floating description window.

55.1.3 Container Functionality

The ISC component applications (PIC, DPC and SSU) will provide generic functionality for the SDR manager. UI controls are made available to support commands such as "Open", "Save As", and "Print" which are sub menu items under "File" menu.

55.1.4 Supported Commands

The application will enable and disable specific UI controls to make the supported commands available. All the commands are implemented as menu selection of the control container and are on the containers menu bar. "Open", "Save As", and "Print" are sub menu items under "File" menu.

File

Open…
Save As…
Print…
Exit

Help

55.1.4.1 File Commands

Table 55-2: SDR Manager File Commands

Command	Function
Open	Open a file. It opens a standard Window's file dialog allowing users to select a file from directory. Only the opening of a standard SDR formatted file will supported.
Save As	Save the file to a directory. It opens a standard Window's file dialog for saving a file. In all cases, the entire SDR file is saved. It is suggested that a small pop-up box inform the user that all SDR information is being saved. The SDR information written to a file is in SDR file format, with a ".SDR" extension.
Print	Generic Win32 Print functionality. Print the SDR information, as it would be done in a standard Windows application. Unlike the "Save As" function, this feature will print the information as it is displayed. Additionally, the printing function will support the printing of selected leafs and nodes of information.

55.2 Available Information

SDR records, programmed during manufacturing, support the following types of information:

- SDR Header Record
- SDR Key Bytes
- SDR Type 01h, Full Sensor Record
- SDR Type 02h, Compact Sensor Record
- SDR Type 08h, Entity Association
- SDR Type 10h, Generic Device Locator Record
- SDR Type 11h, FRU Device Locator
- SDR Type 12h, Management Controller Device Locator Record
- SDR Type 13h, Management Controller Confirmation
- SDR Type 14h, BMC Message Channel Info
- SDR Type 0C0h, OEM SDR

56 SEL Implementation

The SEL Manager will conform to Microsoft Windows Explorer like model, with a Presentation Pane. Users can resize the individual data columns in the view. The SEL Manager as an ActiveX control so that it may be used across several server management applications.

For all ISC components, the SEL Manager will appear as follows:

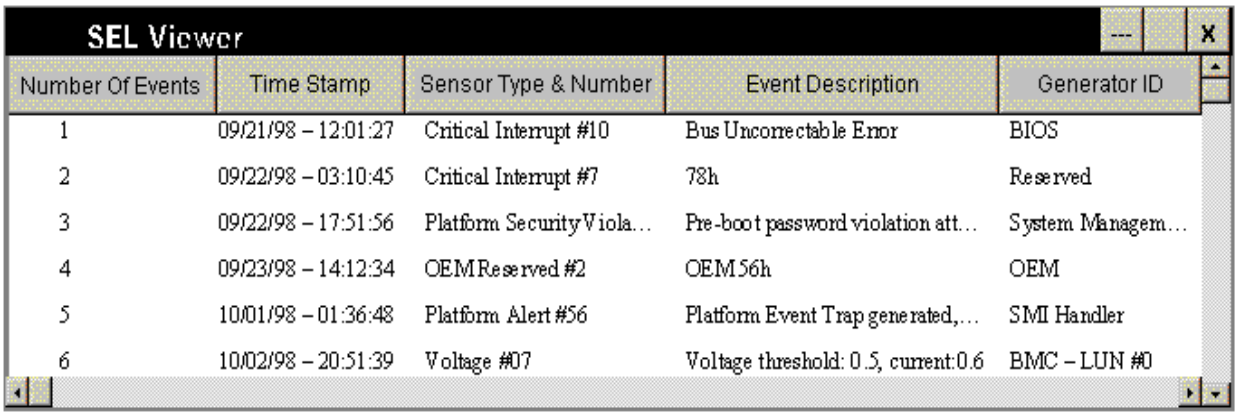


Figure 56-1. SEL Manager (PIC/DPC/SSU)

56.1 Viewer

The Presentation Pane (list view) is based on a multi-column format. All SEL record information is displayed in the List View, one system event per row. The SEL data information are ordered and named as follows:

- A count of the system events being displayed. Starting with 1, and increasing by one for each event. The title is selected as ‘Number Of Events’, so that if the column is shortened ‘Num’ is still meaningful.
- Timestamp
- Sensor Type and number
- Event description
- Generator ID

The interpretation of the event, event type and event data 1, 2, & 3, is presented in the Event Description column.

Each of the columns can be sorted by clicking on the column heading.

56.2 Container Functionality

ISC will enable and disable specific UI controls to make the supported commands available. All the commands are implemented as menu selection of the control container and are on the containers menu bar. “Open”, “Save As”, and “Print” are sub menu items under “File” menu.

56.2.1 Supported Commands

The application will enable and disable specific UI controls to make the supported commands available. All commands are implemented as menu selections of the control container. The Menus and submenus may be outlined as follows.

File		
	Save As…	Save the file to a directory. This option opens a standard Window's file dialog for saving a file. All SEL information written to a file are in SEL file format, with a ".SEL" extension. The first row in the file would list the column headings. The SEL file format is specified as an ASCII readable text file, with each field delimited by a TAB and each System Event ending with a Carriage Return/Line Feed. In the simplest terms, whatever is displayed on the screen is written to the file.
	Print…	Print the SEL information. Printed in the same format as described in "Save As".
	Clear SEL	Clicking this function will clear the System Event Log on the server, then update the display with the latest information. A dialog box informs the user what actions will take place and asks for confirmation. This is a destructive operation and will clear the log, not just clear the viewer.
	Exit	
View		(see the section below for additional details)
	SEL Properties	Displays SEL information. Refer to the figure above for information displayed in a dialog box when user selects this option
	Refresh	If a connection to the server has not been established then this selection is grayed out. This option allows the user to update the display with any newly generated options. For performance requirements particularly when retrieving SEL information via modem, SEL information is retrieved only if 'Most recent add timestamp' or 'Most recent clear timestamp' has been changed since last retrieval.
Help		

56.2.1.1 View Commands

In any view option selected, a message informs the user if no SEL records are available for display. In the case when the SEL information was being read from the server and the user canceled the status, only the information read before the cancellation is available for display.

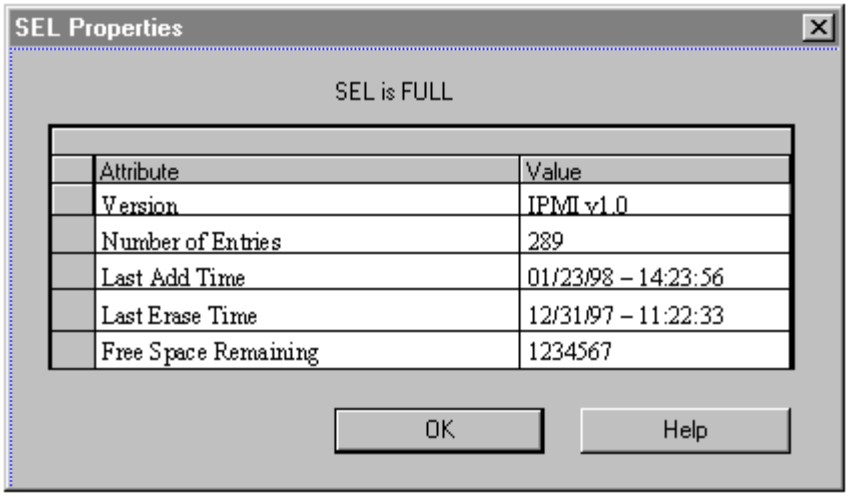


Figure 56-2. SEL Information dialog

56.3 Available Information

The SEL information is expected to be IPMI 1.0 compliant.

56.3.1 Steps for Decoding

The decoding of the SEL Event Record per IPMI Specification version 1.0 starts with table 19-1 SEL Event Records. The SEL records contain the following information:

Byte	Record type 02h
1-2	Record ID
3	Record Type
4-7	Timestamp
8-9	Generator ID
10	Event Message Format Version
11	Sensor Type
12	Sensor #
13	Event Type
14	Event Data 1
15	Event Data 2
16	Event Data 3

The information to decode and display includes:

- Time Stamp
- Generator ID
- Sensor Type
- Sensor Number
- Event Type
- Event Data 1
- Event Data 2
- Event Data 3

The Generator ID specifies where the event was generated. If the Generator ID specifies a system software ID, the user should refer to Table 5-4, System Software Ids, in the IPMI Specification document.

Sensor Type codes are mentioned in the 'Sensor Type Code' column of Table 30-3, Sensor Type Codes, in the IPMI Specification.

Sensor number is converted to decimal for display.

The Event Type specifies the category of the event. Refer to Table 30-1, Event/Reading Type Code Ranges, in the IPMI Specification for the event categories. Event Type also indicates whether the event is an 'Assertion' or 'Deassertion' event.

Glossary

ACPI	Advanced Configuration and Power Interface. Name for a configuration and power management specification by Intel, Microsoft, and Toshiba.
AGP	Accelerated Graphics Port
AP	Application Processor
Asserted	Active-high (positive true) signals are asserted when in the high electrical state (near power potential). Active-low (negative true) signals are asserted when in the low electrical state (near ground potential).
BBS	Phoenix BIOS Boot Specification
BIS	Boot Integrity Service
BIST	Built-in Self-test. BIST refers to a particular self-test that is built into Pentium® II processors. The processors are connected such that BIST runs whenever they are powered up or hard reset.
BMC	Baseboard Management Controller. A server management microcontroller located on the baseboard.
Bridge	The circuitry that connects one computer bus to another, allowing an agent on one to access the other.
BSP	Bootstrap Processor. The processor that is designated to boot the system in a multi-processor configuration.
Cabot	Name used to refer to the Intel OEM chassis that will initially hold the baseboard/processor board set.
CEL	Critical Event Logging. CEL software is implemented as a System Management Interrupt (SMI) Handler that is loaded by the BIOS into a protected area of RAM during POST. The CEL SMI Handler runs in System Management Mode (SMM), independently from and unknown to the operating system. The CEL code handles system critical events, such as Non-maskable Interrupts (NMIs), Error-Correcting Code (ECC) Memory errors, and certain processor failures. These critical events are typically logged to the System Event Log (SEL) via the Baseboard Management Controller (BMC).
CIF	Component Instrumentation Framework
CMOS	The PC-AT compatible region of battery-backed memory that normally resides on the baseboard.
CU	Configuration utility. Refers to BIOS Setup and System Setup Utility.
De-asserted	A signal is de-asserted when it is in its inactive state. For example, active-high (positive true) signals are de-asserted when in the low electrical state (near ground potential). Active-low (negative true) signals are de-asserted when in the high electrical state.
DIMM	Dual-inline Memory Module. The Plug-in modules used to hold the system's Dynamic Random Access Memory (DRAM).
DMI	Desktop Management Interface
DMTF	Desktop Management Task Force
DPC	Direct Platform Control. It is an RS232-based bus used to access server management functions under emergency condition. Formerly known as EMP.
DWORD	Double word is a 32-bit quantity.
EBDA	Extended BIOS Data Area
ECC	Error-correcting Code. A set of bits on system RAM that are used to provide a check code. This is used in conjunction with special hardware in memory controller devices to verify memory data integrity. ECC allows certain classes of memory errors to be corrected and others to be detected. The memory controller will use the ECC to automatically correct data bits that go to the processor when the memory location is accessed. Errors that can be corrected this way are referred to as "correctable ECC errors" while errors that can be detected but not corrected are referred to as "uncorrectable ECC errors."
EEPROM	Electrically Erasable Programmable Read-only Memory.
EMP	Emergency Management Port. See DPC.
ESCD	Extended System Configuration Data, contains information about configuration of the baseboard and the add-in cards

Event Receiver	Term from the Intelligent Platform Management Bus Communications Protocol. Refers to a device that can receive Event Messages via the Intelligent Platform Management Bus. In the Saber/Polar system, the BMC is typically the Event Receiver. The BMC can generate an SMI upon receipt of an Event Message, triggering the system's CEL routines.
FLASH	Also 'FLASH ROM'. A type of fast write Electrically Eraseable Programmable ROM (read-only memory). FLASH ROM varies from what is typically referred to as EEPROM in that typical EEPROM is reprogrammable on a per byte basis, while FLASH is byte writable, but to be re-written must be block erased. The main advantages of FLASH include fast read/write speed and significantly lower cost per bit than EEPROM.
FPC	Front Panel Controller. The Front Panel Controller is a microcontroller and associated support circuitry. It interfaces push-button switches for power and reset, and drives status LEDs that indicate system power, power supply/power control fault. FPC may also work as the bridge between (IPMB and ICMB) or (DPC and IPMB/ICMB).
FRB	Fault Resilient Booting. System features and algorithms that improve the likelihood of the detection of, and recovery from, processor failures in a multiprocessor system.
Front Panel NMI	A limited access switch on the front panel that is used to trigger a 'diagnostic dump' on certain operating systems. The FPC is not involved in Front Panel NMI operation.
GB	1024 MB.
GPIO	General Purpose I/O. Used in reference to programmable I/O pins.
GTL	Gunning Transceiver Logic.
GUID	Globally Unique ID
Hard Reset	A reset event in the system that initializes all components and invalidates caches.
HRT	Hardware Resource Table
HSC	Hot-swap Controller. The microcontroller that implements the SAF-TE command set and controls the fault lights and drive power on a Hot-swap RAID Backplane.
Hublink	
I2C	Inter-integrated Circuit Bus. A multi-master, 2-wire serial bus used as the basis for the Intelligent Platform Management Bus.
I_2O	Intelligent I/O. An open architecture for the development of device drivers in network system environments.
ICH	IO Controller Hub. The IO controller part of the Intel 820 AGPSet.
ICMB	Intelligent Chassis Management Bus. Name for the architecture, protocol, and implementation of a special bus that connects different chassis.
ICMB Address	A 16 bit (2 byte) address that is assigned by the management software to identify each chassis on the ICMB.
IERR	Internal Error. A signal from the processor indicating an internal error condition.
IOP	I_2O Compliant I/O Platform
IPI	Inter Processor Interrupt, an interrupt send by one processor to self, or another processor, typically over APIC bus.
IPL	Initial Program Load
IPMB	Intelligent Platform Management Bus. The architecture, protocol, and implementation of a special bus that interconnects the baseboard and chassis electronics and provides a communications media for system platform management information. The bus is build on I2C and provides a communications path between management controllers, such as the BMC and HSC.
IPMI	Intelligent Platform Management Interface
ISA	Industry Standard Architecture. Legacy PC Bus and "AT" architectural elements in the system.
KB	Killobytes. 1024 bytes.
KBC	Keyboard Controller
LBA	Logical Block Address
LED	Light Emitting Diode. The front panel LEDs (also referred to as 'lights') are generally used to provide basic status reporting.
LUN	Logical Unit Number. In the context of the Intelligent Platform Management Bus protocol, this is a sub-address that allows messages to be routed to different logical units that reside behind the same I2C slave address.

LVDS	Low Voltage Differential Signaling. Used to implement a high-speed digital signal bus for SCSI.
MB	1024 KB.
MB/s	Megabytes per second.
MCH	Memory Controller portion of the Intel 820 AGPSet
MIF	Management Information Format
MP	Multi-Processor
MPS	Intel Multi-Processor Specification
MTH	Memory Translator Hub, translates Rambus channel signals to SDRAM signals
MBE	Multi-bit Error
Negated	A signal is negated when inactive. Active-low signal names have a "#" symbol at the end of the name. Active-high signal names have no "#" suffix. To reduce confusion when referring to active-high and active-low signals, the terms one/zero, high/low, and true/false are not used when describing signal states
NMI	Non-maskable Interrupt. The highest priority interrupt in the system, after SMI. This interrupt has traditionally been used to notify the operating system fatal system hardware error conditions, such as parity errors and unrecoverable bus errors.
PCI-A	I/O bus for the H820+ baseboard, containing bridge to PC-compatible standard I/O, PCI-to-PCI bridge, and 4 expansion slots.
PCI-B	64 bit, 66 MHz I/O bus for the H820+ baseboard, 3 expansion slots.
PERR	Parity Error. A signal on the PCI bus that indicates a parity error on the bus.
PIIX	PCI to ISA Interface. An ASIC on the baseboard that provides PCI-to-ISA bridging functions, as well as incorporating most of the standard ISA core peripherals, such as the DMA controllers and Programmable Interval Timers.
PHP	PCI Hot-Plug
POST	Power On Self Test.
PPP	Point to Point Protocol
PSC	Power Share Controller. The microcontroller on a chassis power share board. This controller can be used to control operations such as 240VA overload detection and shutdown, and to provide information about electrical current consumption and redundancy status of the power supplies.
PXE	Preboot Execution Environment
QWORD	Quad word. A 64-bit quantity.
Rambus	Random Access Memory Bus
RTC	Real-time Clock. A component of the PIIX4 device on the baseboard. In addition to providing a source for time-of-day, the RTC section provides an area of non-volatile RAM (NVRAM) for system configuration storage, and a timed alarm signal that is used by the Front Panel Controller (FPC) to allow system power-on / off to be programmed at a preset time.
SAF-TE	SCSI Accessed Fault-tolerant Enclosure Specification. A set of SCSI commands whereby drive fault status can be sent to an enclosure for the purpose of presenting fault information with external indicators, such as fault lights. Other commands are provided so certain management information about the enclosure, can be retrieved.
SBE	Single Bit Error
SCI	System Control Interrupt. A system interrupt used by hardware to notifiy the operating system of Advanced Configuration and Power Interface (ACPI) events. SCI is an active low, sharable interrupt.
SDRAM	Synchronous DRAM. A type of DRAM's that uses external clock and allow faster memory accesses.
SECC	Single Edge Connector Cartridge. The packaging used for Pentium® II microprocessors.
SEEPROM	Serial Electrically Erasable Programmable Read-only Memory.
SEL	System Event Log. A non-volatile storage area that is used to hold system event log information related to platform hardware events.
SERR	System Error. A signal on the PCI bus that indicates a fatal error on the bus.

SFC	Server Monitor Module Card (SMM Card) Feature Connector. A 20-pin header used to connect special baseboard signals, such as system power and reset control signals, to the SMM card. This connector provides a connection to the Intelligent Platform Management Bus (IPMB), the system power control and reset logic, and other signals.
SMI	System Management Interrupt. The highest priority non-maskable interrupt. The handler code for this interrupt is located in a memory space that is only accessible from SMM. This memory region is loaded with CEL code by the BIOS during POST.
SMM	System Management Mode. A special mode of Intel processors, entered via a System Management Interrupt (SMI).
SMM Card	Server Monitor Module Card. An Intel emergency management card. An autonomous computer implemented on an add-in card. The SMM Card provides its own communication interfaces to provide an out-of-band communication path to system management functions when the main system processor operating system is down. The card has its own temperature and voltage monitoring capabilities and links into the baseboard management functions via the baseboard's SMM Feature Connector (SFC).
SMS	System Management Software designed to run under the operating system.
Soft Reset	A reset event in the system which forces CPUs to execute from the boot address, but does not change the state of any caches or peripheral devices.
SSU	System Setup Utility
USB	Universal Serial Bus
VID	Voltage ID. A set of pins from the processor cartridge that indicates the voltage at which the cartridge should be operated.
WOL	Wake-on LAN. Technologies related to awakening a PC from a sleeping (low-power) state. The awaking is accomplished via receipt of particular network packets.
Word	A 16-bit quantity.

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