

Maximizing Network Uptime with Remote Power Management

A Network Power Management White Paper

Server Technology, Inc.

October, 2000

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Who Needs Remote Power Management?

Answer -- Any enterprise or service provider that relies heavily on the use of distributed LAN/WAN internetworking devices and servers.

When the network goes down in a large enterprise, the problem list gets very long, very quickly. The problem list includes lost revenue, customer dissatisfaction, decreased productivity and potential Service Level Agreement penalties.

Many enterprises rely on a UPS to keep their internetworking devices operational. Multiple internetworking devices are connected to the power outlets on a single UPS. This can be a problem. Consider what happens when an individual router locks-up. The router's power cord is connected to one of the UPS's multiple power outlets. But a UPS does not have the ability to individually power cycle an individual power output receptacle. What are the available recovery choices? The recovery action choices available to the network control center are limited. The first option is a sledgehammer approach whereby an operator can command the UPS to simultaneously power cycle the UPS and all its attached devices. The second option is to find a technician that can be dispatched to the remote location to power cycle just the locked-up router. Neither choice is attractive.

How a Remote Power Management Compliments a UPS

With a Sentry Remote Power Manager the recovery action is easy. The Sentry provides a logical, software-controlled interface to individual power modules. Now a network operations center can immediately power cycle (ReBoot) an individual internetworking device and quickly return the network to operational status without interrupting all the equipment attached to the UPS.

Summary -- service providers, hosting companies and all large enterprises with distributed LAN/WAN networks will improve network operations by installing Sentry Remote Power Managers in their enterprise equipment rooms, POP locations and co-location facilities. When a network device goes down or a distant server hangs up, Server Technology's remotely addressable power switches enable you to power On/Off and ReBoot your devices from a remote location via in-band or out-of-band communications.

Remote Power Management Positively Impacts the Distributed Network

The Sentry Remote Power Managers allow a network management center to perform essential operations for distributed equipment:

- Perform a **remote reboot** and rectify "locked-up" or failing equipment.
- Initiate a **graceful shutdown** for NT, Novell, Linux and Unix servers with Sentry ShutDown.
- Monitor remote equipment with **console port access** through the "Any-to-Any" switch and ensure that software is running correctly.

Why Does An Enterprise Need the Proven Results that a Sentry Remote Power Manager Offers?

Consider this information polled from Server Technology's customers:

- 72% of all third party technicians' service calls to locked-up remote network equipment are solved with a reboot operation.
- Average cost of a third party service call is \$500.

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- Downtime from “locked-up” or failing equipment can be reduced from 1.5 hours to minutes with a Sentry Remote Power Manager.
- The costs of lost revenue and/or service level penalties can be significantly reduced or altogether eliminated.

Benefits of a Sentry Remote Power Manager:

- **Improved problem/solution response time.** Sentry Remote Power Managers shorten recovery time and improve up-time availability of LAN/WAN networks. Servers and internetworking devices that lock-up can be quickly rebooted and restored to operational status.
- **Reduced field service visits.** Sentry Power Managers reduce the need for on-site third party maintenance technicians commuting

to offsite or field locations, providing large third-party maintenance expense savings.

- **Improved network availability.** Sentry Remote Power Managers are used to test and verify Network Management Applications. For example, network operators using the Sentry units can power on-and-off routers or frame relay controllers to determine if the Network Management Application is detecting the correct alarms. Additionally, the “Any-to-Any” switch allow network operators to immediately connect to management ports to inspect, update or load new configuration tables.
- **Improved facility security.** Protect access to equipment with Username/Password security interface and assign specific access to individual network devices with password-per-port security.

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Power Control System (c) Server Technology, Inc. 1 of 2
Column Titles:      [Router #1]      [NT Server]      [DSU/CSU]      [Hub]
Status:             ( ) On           ( ) On           ( ) On           ( ) On
                   (x) Off           (x) Off           (x) Off           (x) Off
Minimum On-Time:    00:00:00         00:00:00         00:00:00         00:00:00
Minimum Off-Time:   00:00:00         00:00:00         00:00:00         00:00:00
Wake-Up State:      Off              Off              Off              Off
Group:              [ ]              [ ]              [ ]              [ ]
Access:             All              All              All              All
Location: [ ]
Page: [ ]
Press: N)ext, C)mnd, Q)uit, Space-Bar to Select
```

Figure 1: Sentry User Interface Screen

TCP/IP. The Sentry prompts the user for a password and then allows the user to control

How the Sentry Remote Power Manager Works

Using a terminal emulation application, the network control center establishes an immediate asynchronous communications session via modem, terminal server or

each power output receptacle via the user interface screen.

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The User Interface

Sentry supports two types of user interfaces. The type of interface can be configured by the system administrator. First is the Screen interface. The screen interface allows an operator to control individual Power Modules directly from the interface screen. Second is the Command Prompt interface. The Command interface allows script files to be constructed and sent directly to Sentry for execution. Response codes are returned after each command is executed. Also 'group names' are supported which allows a single command to control multiple devices.

Password Secure Access

When a session is started, the user is prompted to enter a password. A two-level password structure is supported. Level one is for the systems administrator who needs to make configuration changes. Level two supports two general user passwords that can be restricted to specific Power Modules for password-per-port security to support multiple users on a single Sentry unit. Passwords are up to 20 characters and are case sensitive. Password sessions are time limited and to up three attempts are allowed after which the session is terminated.

In-Band & Out-of-Band Communication Interfaces

The Sentry Remote Power Manager supports two types of **Out-of-Band** Communications:

1. **RS-232** -- The RS-232 interface is supported by a DB9 connector on the back panel. This port can be used to establish a communications session between a terminal server and the Sentry unit.
2. **Dial-in-Modem** -- An external modem can be used to establish communications with the Sentry. A standard null modem cable is used between the DB9 connector and the modem's DB25. Additionally, an integrated modem can be enclosed in the Sentry unit.

The Sentry Remote Power Manager also supports **In-Band** Communications:

The optional **LAN communications interface** supports Ethernet connection to the Sentry with either 10BaseT or cabling to enable a TCP/IP Telnet session or an SNMP session.

What About SNMP?

Network Management applications collect SNMP MIB information about internetworking devices -- including Routers, Hubs, Bridges, Concentrators, Servers and Switches. When an alarm is issued for a specific SNMP managed device, the Network Management application can send SET Commands to a TCP/IP addressable Sentry Remote Power Manager. The SET Commands instruct the Sentry to power cycle the failing (locked-up network device).

“Always-on” Power Modules

Sentry Remote Power Managers use internal Power Modules or external (distributed) In-line Power Modules (IPM) to control the flow of power to individual internetworking devices. Power from the UPS comes into the Sentry Remote Power Manager, or the IPM, and the power cord for a network device plugs into a power output receptacle. The Power Module's internal circuitry accepts commands from the master Sentry and uses industrial quality relays to control the power flow. This allows a Power Module to Power-ON, Power-OFF, or ReBoot an individual device.

The Power Modules use a closed relay design. This means the Power Module is 'Always-on', except for the period of time when the relay is opened to perform a power cycle ReBoot. The analogy can be made that with 'Always-on' Power Modules, a continuous solid copper connection exists between the UPS, the Power Module and the power cord associated with a specific network device. The Sentry Remote Power Manager can fail, but the Power Modules will always supply power to the internetworking device.

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The In-line Power Modules can be used with the Sentry Commander, Sentry Administrator, Sentry R-2000 or Sentry Ambassador. Power input cords are attached to the input side of the In-line Power Module. On the opposite end, a power jumper cord is used to connect to the internetworking device. The In-line Power Module can be up to 1000 feet from the Sentry control unit and is controlled by a two conductor signal cable.

Sentry Power Modules, both internal and external, are available in a variety of power supply sizes:

- **110 VAC Power Module** -- Each power module is agency approved for 10 Amps, 1200 watts.
- **230 VAC Power Module** -- Each power module is agency approved for 10 Amps, 1200 watts.
- **20 Amp Power Module** -- Designed to work with the High-Capacity Cisco 7513 router. Both 110 & 230 VAC models are available.
- **-48 VDC Power Modules** -- The Sentry 48 VDC Remote Power Manager and Intelligent Power Distribution Unit supports both 20 and 35 Amp -48 VDC internetworking devices; Additionally, Sever Technology manufactures a 20 Amp -48 VDC IPM.

Call Pass Through 'Any-to-Any' Asynchronous Communication Switch

Sentry Remote Power Managers are frequently installed in equipment racks with other internetworking devices. Many internetworking devices have RS-232 Network Management System Ports. These management ports permit users to upload new software and to update/inspect configuration tables.

A Sentry Remote Power Manager can be optionally equipped with the four or eight port asynchronous 'Any-to-Any' communications switch. This option allows the initial communications session (modem, RS-232 or TCP/IP) established with the Sentry Manager

to be switched directly to a device's management port.

For example, a communications session could be established with Sentry to perform a ReBoot on a locked-up router. After the router is back in operation, the same communications session can be switched to the router's management port. (The communications session can be switched directly from the Sentry interface screen.) This allows the network operator to inspect or update the router's configuration table, or to verify its operability.

The Any-to-Any option currently supports four or eight switched asynchronous connections, and has been used successfully to make switched connections to management console ports on Cisco routers, NewBridge multiplexors (CPSS Management System), Stratacom frame-relay controllers (Strataview Plus Management System), and the Novell RCONSOLE application. Using this versatile asynchronous switch saves valuable space in an equipment rack by eliminating the need for a stand alone terminal server. It will also eliminate multiple modems and dial-up lines.

Any-to-Any Switch Highlights

- Supports a communications link from Sentry and switches the communications to any of eight ports, which are cable connected to a management port located on an internetworking device
- Makes port connections directly from the Sentry screen interface
- Network Management - Connects to the management port on an internetworking device to obtain status information, update configuration tables, or upload new files
- The Any-to-Any Communication Matrix Switch provides you with inexpensive console port pass-through connectivity. Currently, many users purchase expensive terminal

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servers costing thousands of dollars to perform the same function.

Initiate an Orderly Shutdown

If a remote server needs to be shutdown, the Sentry Shutdown feature provides the network operator to gracefully shutdown, without having to perform a hard reboot. The optional Sentry ShutDown feature allows a network administrator to initiate an orderly shutdown of a remote unattended server. After the operating system is safely shutdown, Sentry ShutDown allows the user to power-off and/or power-on the remote server.

A special cable connects from the Sentry ShutDown port to a serial port on the remote server. The Sentry's interface prompts the user for a password and then allows the user to perform remote shutdown and remote power control actions via a user interface screen. The Sentry ShutDown user interface screen allows network control center operators to send a 'shutdown' signal to the Server. An application module on the Server detects the shutdown signal and proceeds to perform an orderly close-down for all the open applications (to protect application data integrity). After the 'shutdown' operation is complete, the operator can then remove AC power to the Server (power-off) and then later restore AC power (power-on) the Server.

The Sentry ShutDown application supports the following operating systems: Windows NT, Novell, Linux, Apple, SGI, NetWare, OS/2, DG-UX, Digital Ultrix, OSF/1, DEC VMS, HP-UX, and Standard UNIX (SCO Unix, SCO XENIX, IBM AIX, SVR4, SUN OS, Solaris - Intel, Solaris - SPARC, Uinteractive Unix).

How Server Technology Customers Use Sentry Remote Power Managers

- **Banks**

A large New York Bank installs a Sentry Remote Power Manager with every router in their global network. A large Canadian Bank installs a Sentry Remote Power Manager with each OS2/LAN manager in their 1500 Branch locations.

- **Electrical Utilities**

A large Southeastern inter-state utility installs a Sentry Remote Power Manager with each router in their multi-state network. A large Canadian Electric installs a Sentry Power Remote Manager at each Branch Office for use with their CC-Mail System.

- **Global Network Enterprises**

A major European communication enterprise installs Sentry Remote Power Managers in every POP in all their pan-European networks.

- **Internet Service Providers**

A number of ISP's utilize the Sentry Remote Power Managers to guarantee access to the Internet for their customers.

- **CLECs**

Several CLECs use the NEBS compliant Sentry Remote Power Managers to support their DSLAMs, Routers and ATM switches that are co-located in various telco central offices.

- **Government**

Sentry Power Managers are a vital part of the LAN/WAN being installed to insure accurate flight telemetry data.