Who Needs Remote Power Management for Power Distribution, Power Measurement and Power Control of – 48 VDC Equipment?

A Network Power Management White Paper

Who Needs Remote Power Management for Power Distribution, Power Measurement and Power Control of –48 VDC Equipment? Answer – Any enterprise or service provider that relies heavily on the use of –48 VDC internetworking equipment, such as routers, ATM switches, and DSLAMs, for mission-critical networks or e-commerce services. When a network goes down, 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, CLECs, IXCs, ISPs and ASPs rely on –48 VDC internetworking equipment to power their business models and service offerings. When these devices "lock-up" or fail, the recovery options for these devices are limited. The most proven method to restore the device to its operational state is to cycle the power – a Reboot. When the internetworking device is remotely located in a distant POP site, co-location facility, telco central office, or even an equipment room, gaining access to the device to perform the reboot presents additional challenges.

Why Does Your Organization Need Remote Power Management?

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.
- 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.

What the Sentry -48 VDC Does for Remote Equipment Units

The Sentry -48 VDC allows the network management center to perform essential operations for distributed equipment:

- **Power Distribution**: distribute dual power input feeds to multiple equipment units in a rack or cabinet and eliminate the need for a power distribution panel in the cabinet or rack.
- **Power Measurement:** Extend network management capabilities and protect the investment in internetworking devices with SNMP Measurement traps, including Load Sense, On Sense and Temperature Sense.
- **Power Control**: Perform a **remote reboot** and rectify "locked-up" or failing equipment. Also, manage remote equipment through **console port access** and ensure that software and carrier to the line are running correctly.

How a Sentry -48 VDC Remote Power Manager Supports Equipment

With a Sentry -48 VDC Remote Power Manager, recovery of locked-up devices is easy. The Sentry provides a logical, software-controlled interface to individual power modules. The network operations center can immediately establish a communications session with the Sentry to power cycle (Reboot) an individual internetworking device and quickly return the device to operation status.

In addition to its ability to reboot remote locked-up devices, the Sentry –48 VDC also serves as an Intelligent Power Distribution Unit, eliminating the need for a separate power distribution fuse panel.

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.

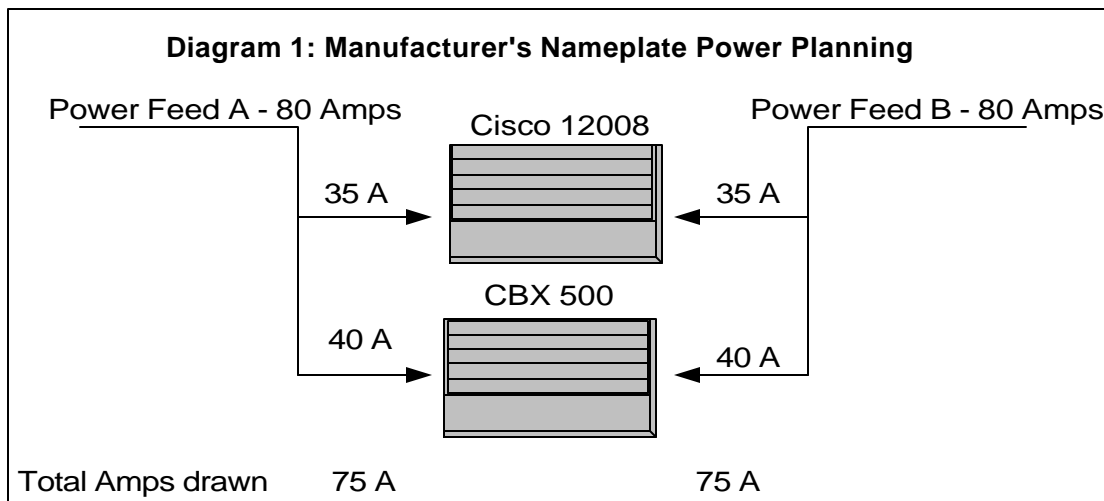**What is the Significance of Intelligent Power Distribution?**

"Available power is the critical factor that defines what equipment can be installed." For businesses and service providers whose revenue streams are dependent upon the quantity of internetworking devices they manage, installing the maximum number of devices that the available power resource will support is critical. Yet, configuring the maximum number of devices for the power supply is not a straightforward exercise.

In a –48 VDC network environment, internetworking devices receive power from battery packs via a 60 to 100 Amp power feed cable. The power input feed is then distributed to multiple devices in an equipment rack through a power distribution panel.

With the 24x7 environment of the Internet economy, installation of new equipment is routinely needed to handle increasing data loads. Adding additional equipment, however, is constrained by the availability of power resources and complicated by the manufacturer's nameplate specification, which is generally inaccurate and cannot be used for power planning.
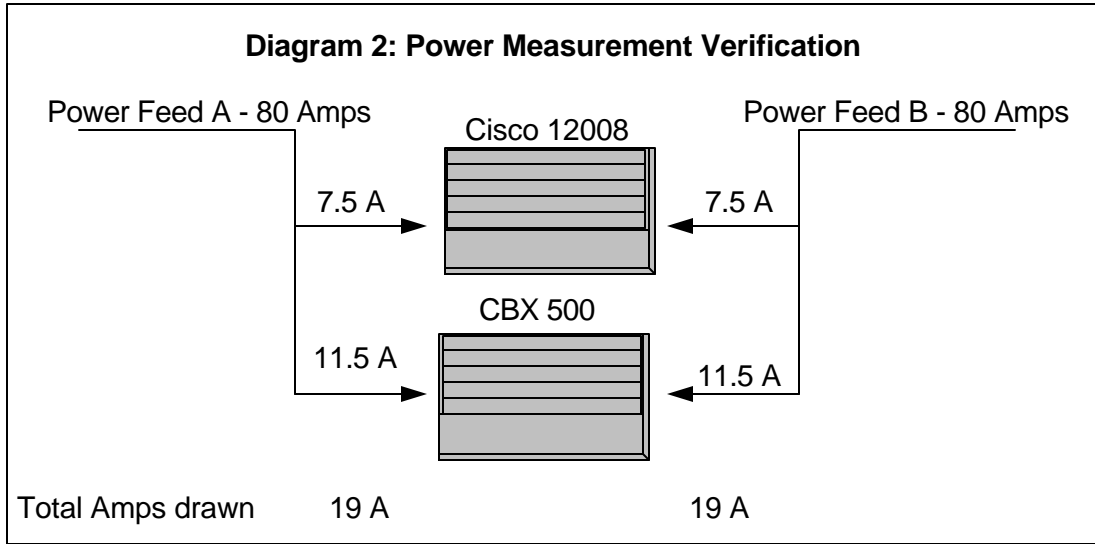
The solution for adding new equipment to existing power resources is to perform power measurement verification. However, when equipment units are co-located at multiple sites, performing on-site power measurement verifications becomes costly and untimely. Additionally, the availability of personnel with the skills to perform power verification draws from a limited field. To expedite this process, performing remote-site power measurement verification through Sentry's Load Sense is the solution.

The following diagrams show the benefits of real-time power measurement:

Diagram 1: Manufacturer's Nameplate Power Planning

Power Feed A - 80 Amps   Cisco 12008   Power Feed B - 80 Amps

35 A   35 A

CBX 500

40 A   40 A
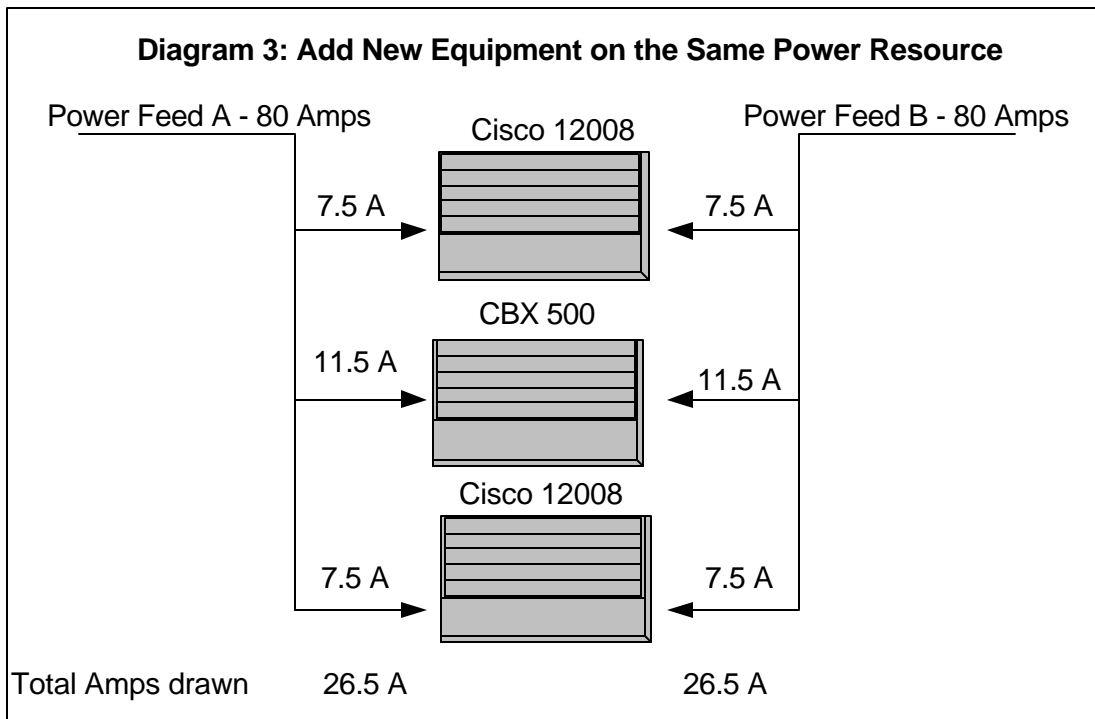
Total Amps drawn   75 A   75 A

Using the manufacturer's nameplate specification for power consumption (Diagram 1) would indicate that the available power resource has been maximized.

However, an on-site measurement verification (or a Remote power measurement verification through a Sentry -48 VDC) proves differently (Diagram 2):

Diagram 2: Power Measurement Verification

Power Feed A - 80 Amps	Cisco 12008	Power Feed B - 80 Amps
7.5 A		7.5 A
	CBX 500	
11.5 A		11.5 A
Total Amps drawn 19 A		19 A

Using the **Sentry's Load Sense** option, the amount of power being used at each DC circuit is measured in a real-time manner. The result of real-time power measurement allows more equipment to be added on existing power resources (Diagram 3):

Diagram 3: Add New Equipment on the Same Power Resource

Power Feed A - 80 Amps	Cisco 12008	Power Feed B - 80 Amps
7.5 A		7.5 A
	CBX 500	
11.5 A		11.5 A
	Cisco 12008	
7.5 A		7.5 A
Total Amps drawn 26.5 A		26.5 A

Eliminate the Need for a Separate Power Distribution Panel

The Sentry -48 VDC combines the functions of a power distribution panel and remote power management unit into a compact 2U 19" rack-mounted enclosure.

Each power output block is protected by a "push-to-reset/pull-to-break" circuit breaker, replacing the old-style fuses on a power distribution panel. Heat from the high-amp load equipment units will frequently weld fuses into a fuse panel. When the fuse is welded, removing the fuse without damaging the fuse panel is nearly impossible. Sentry's push/pull circuit breakers eliminate the problem of high Amp loads welding fuses to their mountings on the fuse panel.

Many –48 VDC devices do not have power on/off switches and require a fuse to be removed if the device is to be powered-off (rebooted). Installation engineers may use Sentry's push/pull circuit breaker as an on/off switch. Now new equipment can be safely added to an equipment rack without exposure to current carrying terminals.

Expand Remote Power Management Capabilities with SNMP Traps

The Sentry XL utilizes SNMP Measurement traps to extend network management capabilities and protect an enterprise's investment in internetworking devices.

Load Sense dynamically measures the load in amps that each connected server, internetworking device and telecom equipment unit is drawing and sends an alarm when a unit draws power outside defined thresholds.   Additionally, power-planning engineers can use Load Sense to determine how much capacity remains on an existing power source by precisely measuring the amps each equipment unit draws.

On Sense feature ensures power is flowing through the Sentry XL. On Sense positively verifies that there is voltage at each of Sentry XL's power outlet circuits and sends an alarm when voltage is not present.

Temperature Sense makes certain that remote hardware operates only in optimal temperatures. Each Sentry XL is fitted with temperature probes that measure the ambient temperature in degrees centigrade inside an equipment rack or cabinet. When low and high temperature thresholds are exceeded – putting equipment units at risk, Temperature Sense reports the variance.

With a Sentry XL unit, SNMP traps are generated:

- When the temperature exceeds user specified limits;
- When the device load on any of the Power Modules exceeds specified limits;
- When a failure is detected on any of the Power Modules;
- When the state (i.e., "on" or "off") of a Power Module is changed; and
- When the chain of Sentry units is started (i.e., booted).

These traps can be enabled or disabled by the user, and the limits for the temperature and device load can be set by the user. Traps are detected by the Sentry and then sent to an attached LAN interface for relay onto an SNMP destination.

Console Port Access

The optional R484/R488 "Any-to-Any" pass thru connection ports connect to a remote device's console port to allow the reboot process and console port monitoring to be managed from the network operations center.

If a device looses "carrier" from a high-speed communications line, the device must be rebooted to restore carrier. The Any-to-Any switch can be used to perform the reboot, monitor the software and make certain carrier to the communications line is restored -- without the need to dispatch technical personnel or install a terminal server in a remote location.

NEBS Compliant

Network Equipment Building Standards (NEBS) is Bellcore's established equipment specifications for fault-tolerance and is a requirement for co-location equipment within a telco central office. NEBS ensures that telecommunications and network equipment located at a central office conforms to safety and operational requirements related to specific environmental hazards.

For companies seeking to co-locate equipment within a telco central office, the NEBS compliant Sentry -48VDC provides an added level of assurance that their network equipment maintains high availability. Now, CLECs and ISPs can deploy the versatile Sentry -48 VDC alongside their DSLAMs, routers and other equipment in the Bell Atlantic, Southwestern Bell, Pacific Bell and Nevada Bell central offices.

The Sentry 48 VDC has been tested to the following NEBS standards:

GR-63-Core		GR-1089-Core	
Spatial Requirements	Section 2.0	EMI Emissions	Section 3.2
Thermal Requirements	Section 4.1	Lightning & AC Power Fault	Section 4.0
Fire Resistance	Section 4.2	Electrical Safety	Section 7.0
Earthquake/Vibration	Section 4.4	Bonding and Grounding	Section 9.0
Acoustic Noise	Section 4.6		

Sentry –48 VDC Power Distribution, Power Measurement and Power Control Highlights:

- Remote Power Management = Increased Service Levels and Reduced Expenses

  * Eliminate expensive third party service technicians calls to power cycle locked-up equipment
  * Improved problem determination
  * Faster Alarm notification and recovery
  * Improved network availability
  * Reduced equipment outages
  * Improved facility security

- Real-time Power Measurement

  * Add more (new) equipment on existing power resources
  * New equipment = increased revenues
  * Power Measurement at each DC circuit provides improved power planning and forecasting

- Enhanced equipment protection

  * Eliminate a power distribution panel and eliminate associated welded fuse problems
  * Push/Pull circuit breakers can be used an On/Off switch by installation engineers
  * Load Sense provides over/under limit reporting for each device
  * Temperature Sense sends alarms regarding ambient temperature beyond thresholds
  * Always-on architecture eliminates single points-of-failure
  * Auxiliary 5 Amp terminal block drives fans and aux equipment

How to Measure the Benefits of a Sentry -48 VDC Power Manager

Eliminate power distribution panel	($600.00)
Eliminate one on-site service call/ yr.	($500.00)
Eliminate one equipment outage/yr.	($500.00)
Eliminate verification visits	($300.00)
Improved SLA, reduced penalties	??
Install new equipment faster/increased Rev.s	+ Value
Optimize investments in Power resources	+ Value

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