sentinel®
MONITORED POWER DISTRIBUTION

Models: 93500-50, 93500-51, 93500-53, 93500-54

Firmware Version: 1.0

User Guide

MFB Products Pty Ltd
www.mfb.com.au

1 Disclaimer and Revisions

Operation of this equipment in a residential area may cause interference in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Date	Issue	Comments
01 Feb 2012	A	Initial Release

2 Warranty

MFB Products Pty Ltd warrants **Sentinel**

- If used in accordance with all applicable instructions
- To be free from defects in material and workmanship for a period of one year from the date of initial purchase.

This warranty is voided if the customer uses the product in an unauthorized or improper way, or in an environment for which it was not designed. Warranty does not apply to normal wear or to damage resulting from accident, misuse, abuse or neglect.

Table of Contents

3 Introduction to Sentinel

Sentinel is a network based 240V power outlet control unit for computer server racks with environmental monitoring features. It allows turning 240V powered devices on or off as well as power cycling by just by visiting a webpage & controlling the power outlet of the device connected. The 'Current Load' and the environmental sensor status on Sentinel can be monitored via the web interface and the LCD screen on the device. In the case of exceeding user set Current load or environmental thresholds Sentinel has the capability of notifying the incident via email or SNMP traps.

Sentinel allows viewing the status of the server rack power on each individual power outlet, allows custom controlled timed reboots for each power outlet and adding delays on start-up in the case of a power failure allowing selected devices to turn on prior to other devices in a selected sequence. Configuration is performed by remotely accessing the device via a web interface.

When network connectivity is down, as an alternative outlet control access method, Sentinel provides a serial port connection to perform the fundamental control to your outlets.

Sentinel is a network element on the network, thus it will have its own IP address. Sentinel comprises an embedded web server. With a standard web browser installed in almost all computers today, you may easily view Sentinel web pages to monitor status, control power outlets remotely and to view the Current load & sensor status.

Sentinel includes SNMP features where each outlet status, sensor status or the current consumption can be obtained via SNMP GET commands, thus allowing monitoring systems to closely monitor the power of attached devices, sensor status and the current loading. SNMP Traps notify any exceeding of sensor or current load thresholds as well as user action on the outlets.

Features

- 10 or 20 web controlled power outlets (See **Error! Reference source not found. Error! Reference source not found.**)
- Current load monitoring
- 2 Digital sensor inputs to capture external alarms
- Inbuilt temperature and humidity sensors.
- SNMP enabled for obtaining device details, outlet & sensor status and current consumption. SNMP traps for alarms and user outlet action.
- SMTP enabled for notifying alarm conditions.
- 2 x row LCD panel displaying current load, temperature, humidity and system status.
- Powerful embedded microprocessor driven, with networking features.
- Vertical or horizontal product versions.
- LEDs to indicate outlets that are powered on. LED to indicate when Current load or sensor thresholds are in jeopardy.
- Remote configuration and monitoring capabilities.
- Up to 30 entries each in configuration, event & alarm logs.
- Two level protection in controlling. Administration user and up to three normal users with restricted grants.
- Each power outlet can be configured individually.
- Clear status view of each power outlet on user interface.
- Serial port access to control & view status of outlets

Applications

- Allows total control on power outlets on server racks.
- Configures device start up sequence in a power failure occasions for controlled powering up devices.
- Control your home appliances remotely from the Internet.

3.1 Models

MFB Part No	Outlets	Description
93500-50	10	Vertical Active Power Assembly, 10 x 10 amp Australian outlets, with 10 amp double pole circuit breaker, Temperature and Humidity sensor, dual digital inputs
93500-51	10	Vertical Active Power Assembly, 10 x 10 amp IEC C13 outlets, with 10 amp double pole circuit breaker, Temperature and Humidity sensor, dual digital inputs
93500-53	20	Vertical Active Power Assembly, 20 x 10 amp Australian outlets, with 10 amp double pole circuit breaker, Temperature and Humidity sensor, dual digital inputs
93500-54	20	Vertical Active Power Assembly, 20 x 10 amp IEC C13 outlets, with 10 amp double pole circuit breaker, Temperature and Humidity sensor, dual digital inputs

4 Quick Install Guide

This chapter will guide installing Sentinel on the network.

4.1 Minimum Requirements

The minimum requirements to install and access Sentinel are:

- Access to the local network
- A PC with a web browser (IE 6.0, Firefox 3.6 or higher recommended)

4.2 Hardware Setup

4.2.1 Ethernet Connections

Connect Ethernet cable to the Ethernet Socket. Supply power to server rack.

4.2.2 Dual Digital Sensor Connection – Line 2

There is a dual digital connection provided which is an RJ45 type connection.
Please refer to chapter XX for configuration details.

4.2.3 Serial Port Connection – Line 1

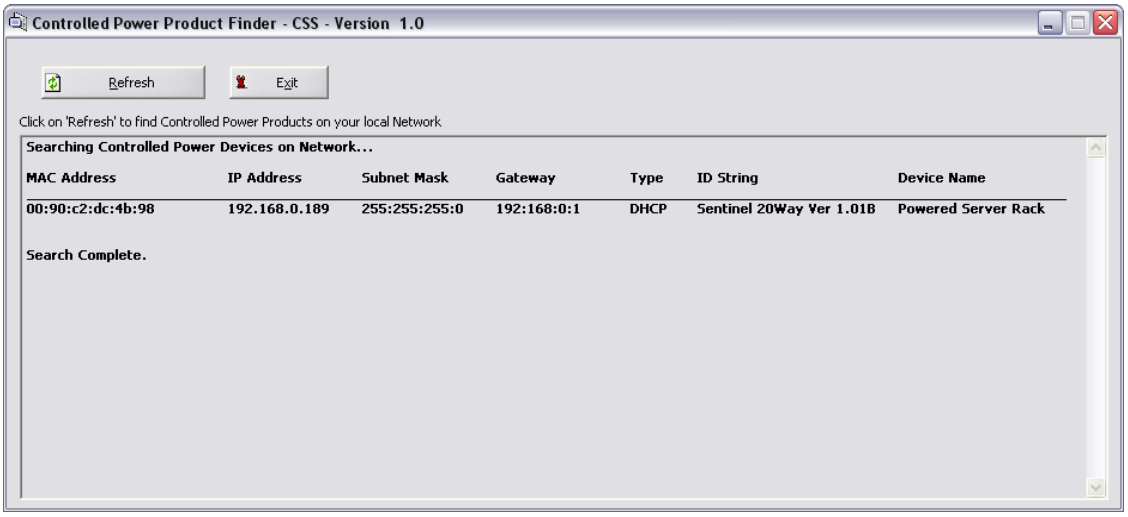
The Serial port connection is a RJ45 type connection.
Please see chapter 10 for configuration details.

5 Accessing Sentinel via Web Interface

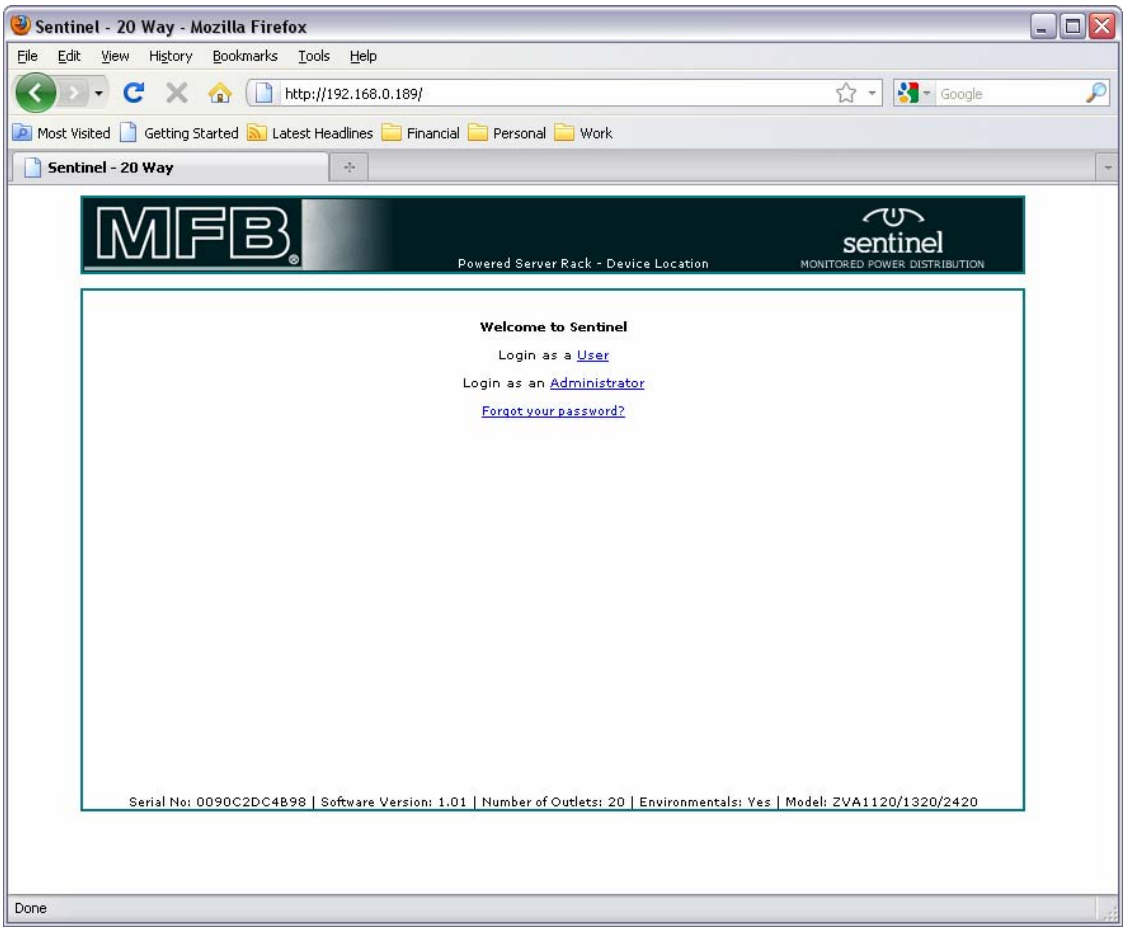
Sentinel web interface can be accessed by visiting the URL using its IP address on a web browser.

Eg: if IP address is 192.168.1.105, open web browser and visit http://192.168.1.105/

Sentinel is DHCP enabled when factory shipped. It will obtain a DHCP address if connected to a DHCP enabled network. Use the **Controlled Power Product Finder** software tool (available for download from www.csspl.com.au) to obtain the DHCP address. Please disable the firewall as a troubleshooting event if this tool does not bring up the IP address of the unit.



Product Finder Screen



Sentinel Login Screen

6 Introduction to User Groups & Security

Sentinel has two user groups that may operate the device. They are:

- Administrator (1 user)
- User (3 users)

Each user group has different level of grants. The Administrator user has grants to control outlets, configure the device and sensor status as well as viewing the status of device. The User group users have grants to view the status of the device and control the outlets.

6.1 Administrator Group

The product is released with the following user credentials for the 'Administrator' group.

Username	Password
admin	admin

To login as the administrator, click on '*Login as an Administrator'* from the main web page. Enter the administration username & password, and then click OK.

The administrator user is responsible for configuring the unit, its users & each outlet. An administrator may also control each outlet & view status.

Note: Please configure the 'secret question' & 'answer' for the administrator within the 'manage users' section under 'configuration'. - In case of a forgotten password the answer is required to reset the administration password back to default.

The administrator should also set usernames and passwords for the user group. The default User group credentials are described in the 'user group' subheading.

6.2 User Group

The unit is released with the following user credentials for the ‘User’ group

Username	Password
user1	pwd1
user2	pwd2
user3	pwd3

To login as a user from the User group, click on ‘*Login as a User’* from the main web page, enter the username and password, and then click OK.

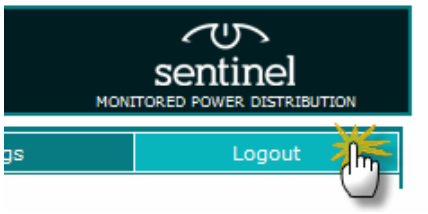
These users have permission to control each outlet & view the status of each outlet and sensors. There are no grants to configure outlet or device configurations.

6.3 Security on Sentinel

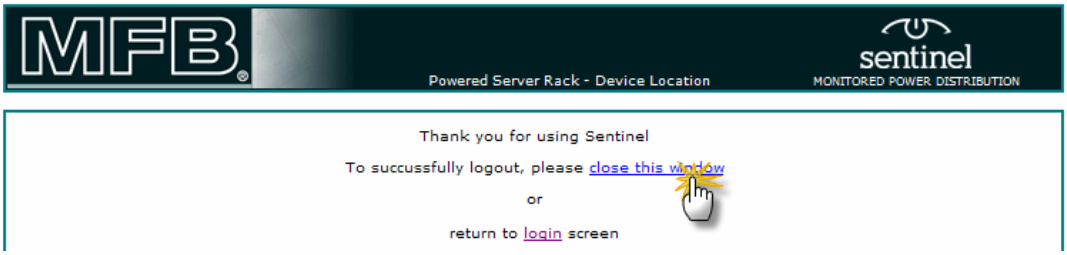
6.3.1 Browser Credentials

Authentication is required to view any of Sentinel web pages. Sentinel uses 'basic authentication' via HTTP.

To logout from Sentinel, close the browser or click on the logout button on the interface.



Then, click on 'close this window' link to logout from Sentinel. This will close the browser window.



6.3.1.1 Changing the Password

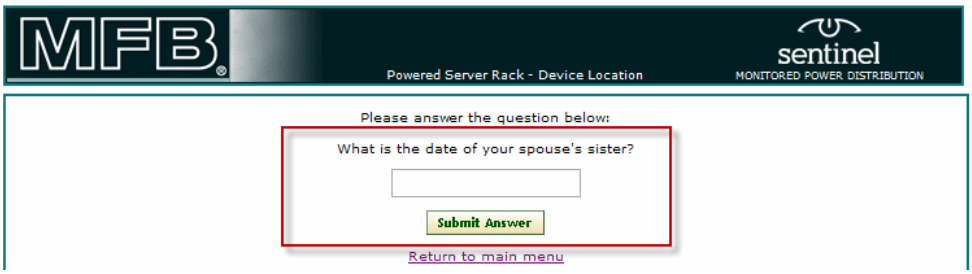
Only the administrator may change the passwords for both 'administrator' & 'user' groups.

6.3.2 Forgotten Password

A forgotten password for a **user** (non-administrative) cannot be reset. The administrator should provide the correct password by logging in and retrieving the password set for each user.

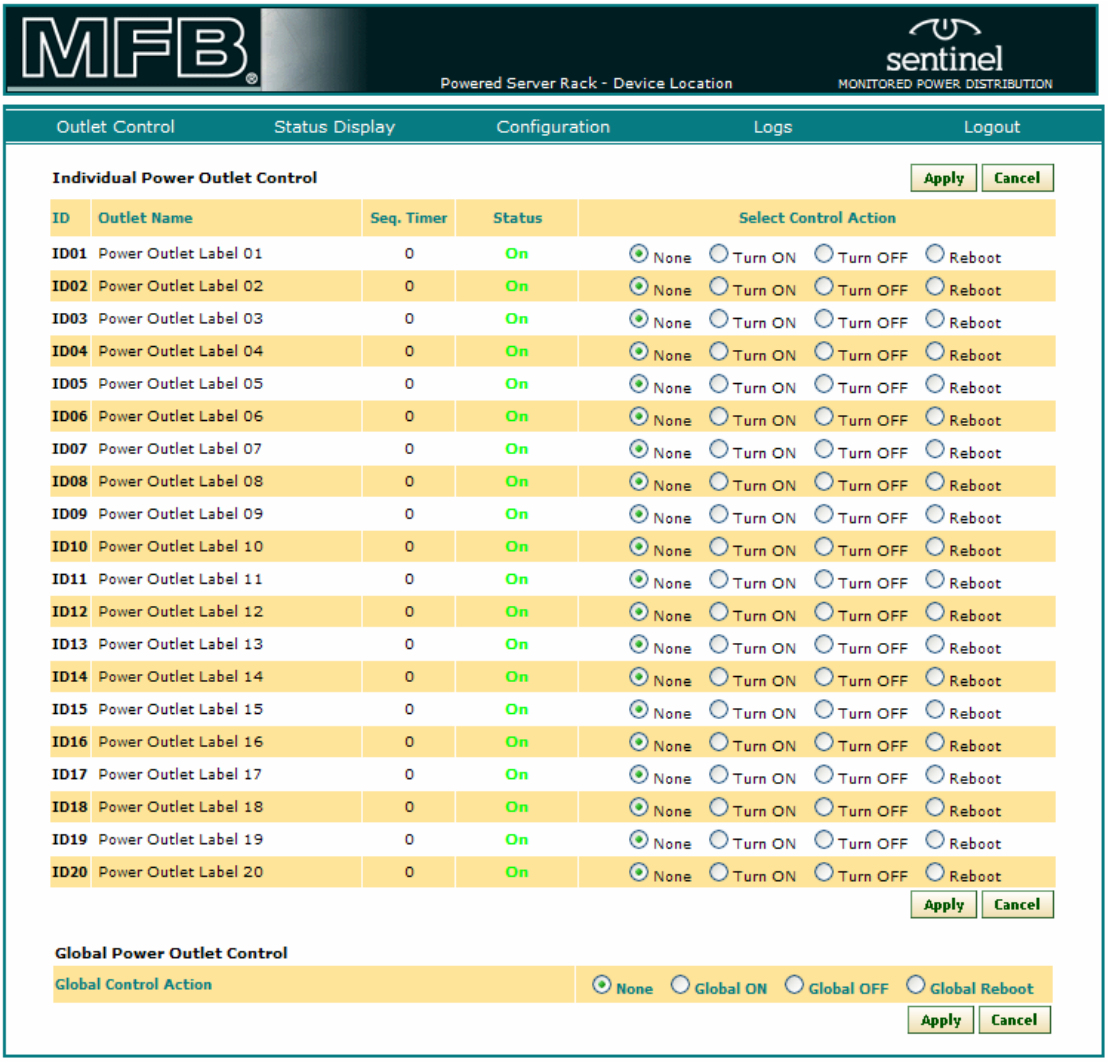
If the administrator password is forgotten, the only available option is to reset the password by responding to the secret question set by the administrator. Answering this question correctly will reset the administration username and password both to be '*admin*'.

PS: Note for the administrator: Please ensure that the secret question & answer is updated when the device is configured for the first time.



7 Controlling & Viewing Status of Sensors and Outlets

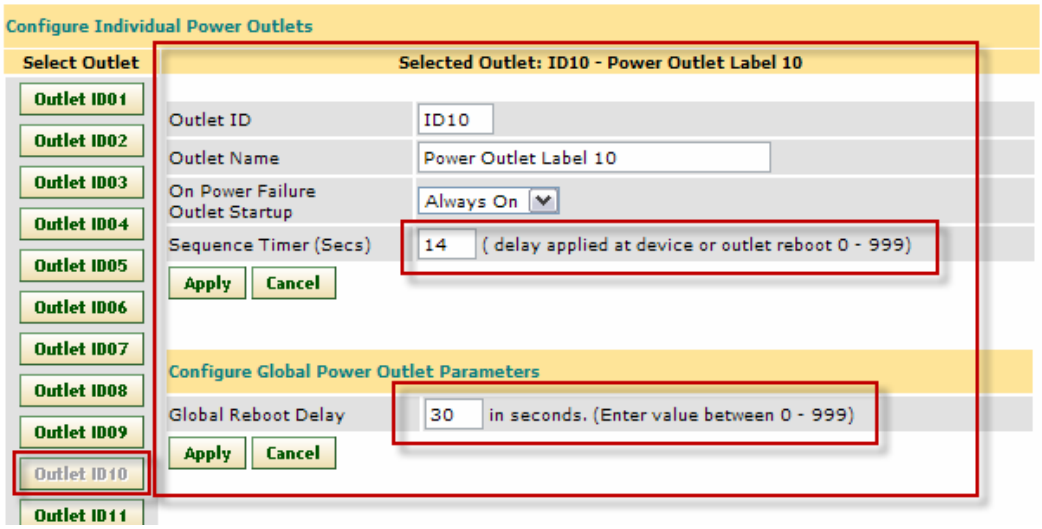
Both ‘Administrator’ and ‘User’ groups can control each individual power outlet. Outlets are controlled from the ‘Outlet Control’ menu. This is the default page loaded when a user logs in to Sentinel.



The parameter ‘Sequence Timer’ (Seq. Timer) is an important parameter for each outlet and is displayed on this page. The ‘Sequence Timer’ is a value in seconds showing how long it will take for an outlet to turn on when the rack is powered. (Note: the outlet startup preference has to be setup in such a way that it will turn on)

The Sequence Timer will also be used when the outlet is rebooted. Each outlet will turn off for duration of Sequence Timer + Global Reboot Delay.

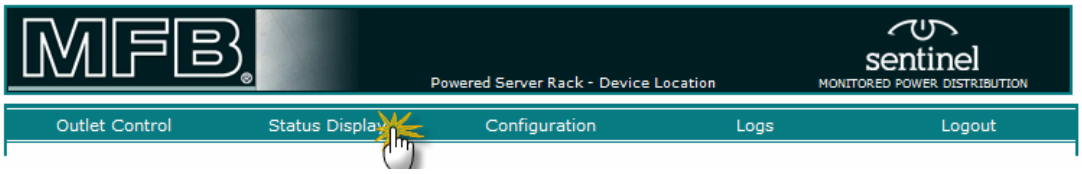
Eg: Sentinel has a Global Reboot Delay of 30 seconds.
Power Outlet 10 has a Sequence Timer value of 14 seconds.
Outlet 10 ‘On Power Failure Outlet Startup’ is selected to be ‘Always On’

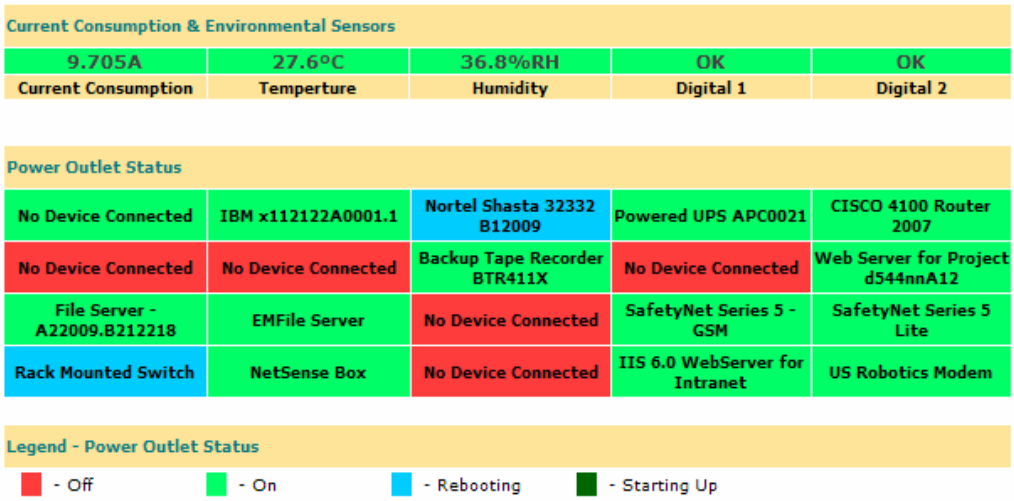


When server rack is powered on: Outlet 10 will be powered on in 14 seconds
When outlet 10 is rebooted or global reboot is selected outlet 10 will be powered in 44 seconds.

7.1 View Outlet Status, Sensor Status & Total Current Consumption of Outlets

Status can be viewed by both administrator & user groups. Click on 'Status Display' from the menu.





The legend describes the status of each outlet based on the colour.

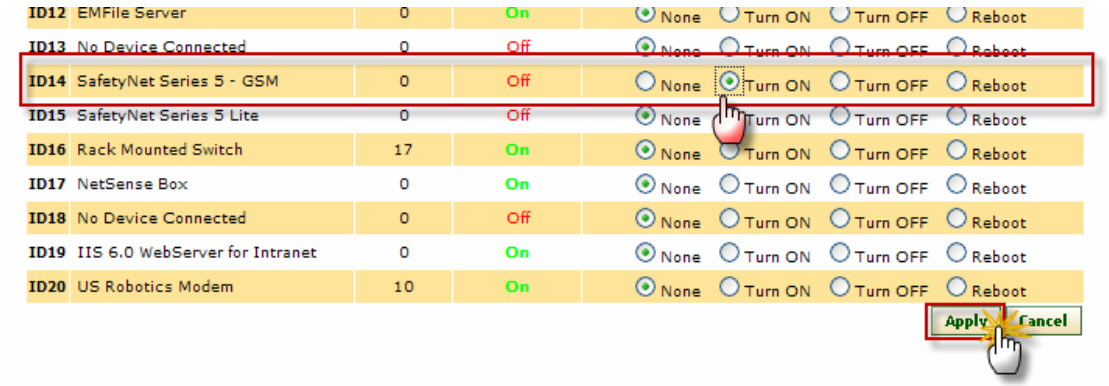
The sensor status is updated every 15 seconds and is colour coded. The following colours are used for status

Display Colour	Sensor Status
Green	OK
Yellow	Warning
Red	Alarm
Blue	Shutdown

The LCD Screen on Sentinel displays the sensor status when in alarm condition. It also updates the Temperature, Humidity sensor & Current load values every 3 seconds.

7.2 Turning On Outlets

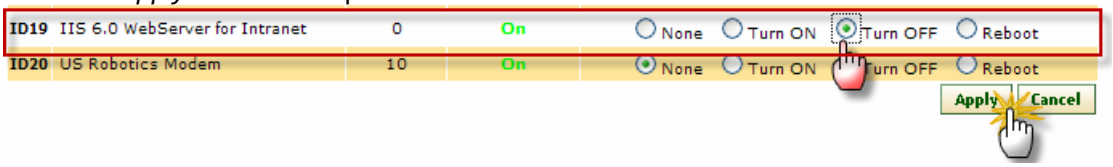
Select the outlet that you intend to turn on by clicking on the appropriate radio button. Eg: if you wish to turn on 'SafetyNet Series GSM' outlet at outlet ID14, click on the 'Turn ON' radio button and then click the *Apply*' button. Multiple outlets are also selectable.



Only an outlet than is in 'Off' position can be turned 'On'. If the outlet is not in 'Off' position the command is ignored.

7.3 Turning Off Outlets

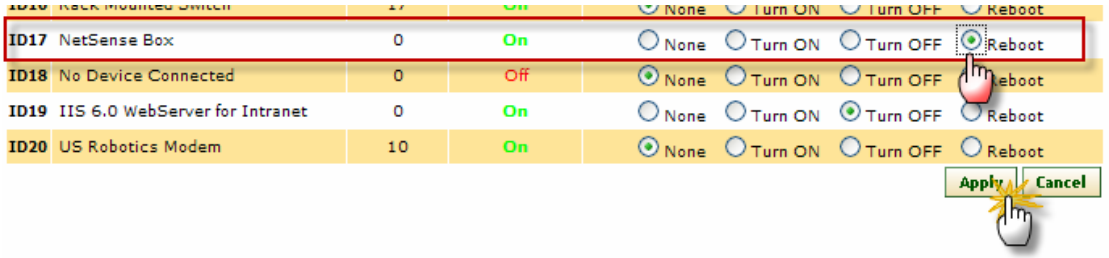
Select the outlet that you intend to turn off by clicking on the appropriate radio button. Click the '*Apply*' button. Multiple outlets are also selectable



Outlets will be turned off only if they were turned on or while rebooting. Turning off an already off outlet will have not affect.

7.4 Rebooting Outlets

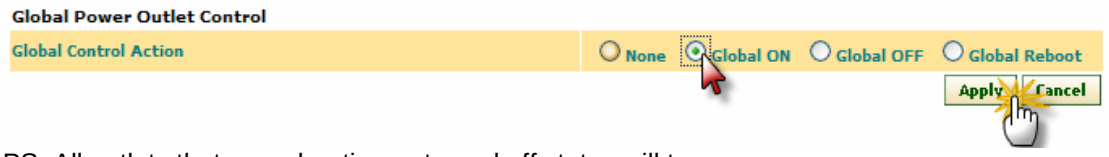
Select the 'Reboot' radio button of the outlet you intend to reboot and click the 'Apply' button. Multiple outlets are also selectable



Outlets will be rebooted only if they were turned on. Rebooting an already off outlet or a rebooting outlet will have not affect.
Each outlet will reboot with a delay of 'Sequence Timer' + 'On Power Failure Outlet Startup' seconds.

7.5 Global On

All outlets can be turned on by selecting this option. Select '*Global ON*' radio button under the Global Power Outlet Control heading and click apply.



PS: All outlets that are rebooting or turned off status will turn on.

7.6 Global Off

All outlets can be turned off by selecting this option. Select '*Global OFF*' radio button under the Global Power Outlet Control heading and click apply
PS: All outlets that are rebooting or turned on status will turn off.

7.7 Global Reboot

All outlets can be rebooted by selecting this option. Select '*Global Reboot*' radio button under the Global Power Outlet Control heading and click apply

PS: All outlets that are turned on will reboot. Outlets that are turned off will remain as is. Each outlet will reboot with a delay of 'Sequence Timer' + 'On Power Failure Outlet Startup' seconds.

Sentinel Display Panel

8 Alarms on Sentinel

Sentinel has the following alarms

Associated Sensor	Alarm Type
Current Load Sensor	• Current load in warning condition • Current load in alarm condition • Current load in critical condition • Current load in normal condition (clearance of an alarm)
Dual Digital Sensor	• Digital sensor in alarm condition • Digital sensor in normal condition
Temperature Sensor	• Temperature in low warning condition • Temperature in low alarm condition • Temperature in low shutdown condition • Temperature in normal condition (clearance of an alarm) • Temperature in high warning condition • Temperature in high alarm condition • Temperature in high shutdown condition
Humidity Sensor	• Humidity in low warning condition • Humidity in low alarm condition • Humidity in low shutdown condition • Humidity in normal condition (clearance of an alarm) • Humidity in high warning condition • Humidity in high alarm condition • Humidity in high shutdown condition

In the event of any of these conditions, Sentinel is capable of notifying the user via SNMP traps & email.

The front panel LCD display shall also indicate if in alarm condition. A blinking red LED will also attract attention.

8.1 Email Messages

By configuring the SMTP settings & the relevant sensors, Sentinel can deliver email notification when sensors get into and out of alarm conditions.

Below are some samples of emails that are sent out from Sentinel

8.2 LCD Text in Alarm Condition

Sensor Associated	Condition	LCD Text
N/A	System is OK	**X.XXXA ←→ X.X°C ←→ X.X%RH All's Well**
Current Load	Current Load in warning condition	**!!Load warning X.XXXA**
	Current Load in alarm condition	**!!Load alarm X.XXXA**
	Current Load in critical condition	**!!Load critical X.XXXA**
Temperature	Temperature in warning condition	**!!TMP [High|Low] warning**
	Temperature in alarm condition	**!!TMP [High|Low] alarm**
	Temperature in critical condition	**!!TMP [High|Low] shutdown**
Humidity	Humidity in warning condition	**!!HMD [High|Low] warning**
	Humidity in alarm condition	**!!HMD [High|Low] alarm**
	Humidity in critical condition	**!!HMD [High|Low] shutdown**
Dual Digital	Digital Senor in alarm condition	**!!Digital Alarm [1|2]**
Network Cable	Cable Disconnected	**!!Network Disconnected**

8.3 SNMP Trap Message

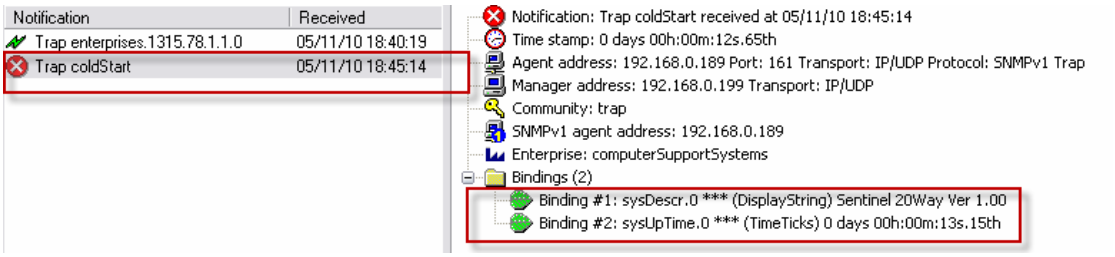
Sentinel delivered SNMP V1 traps up to three nominated Network Management Elements.

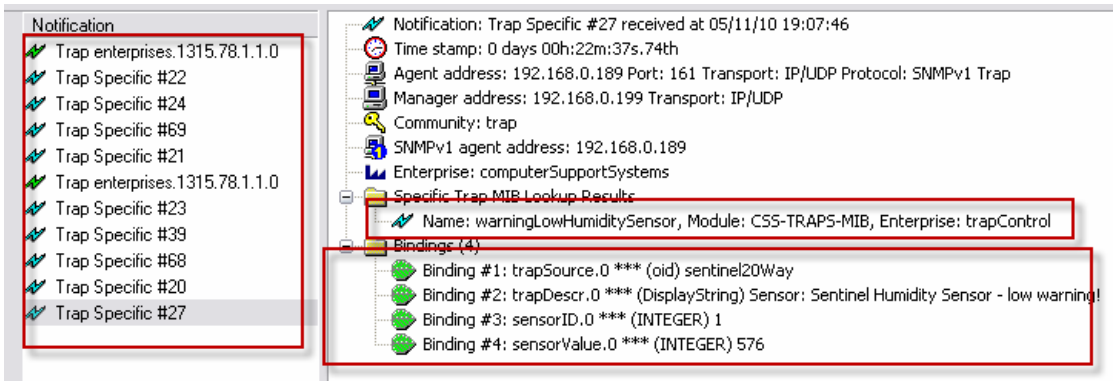
Sentinel delivers SNMP traps in the following events:

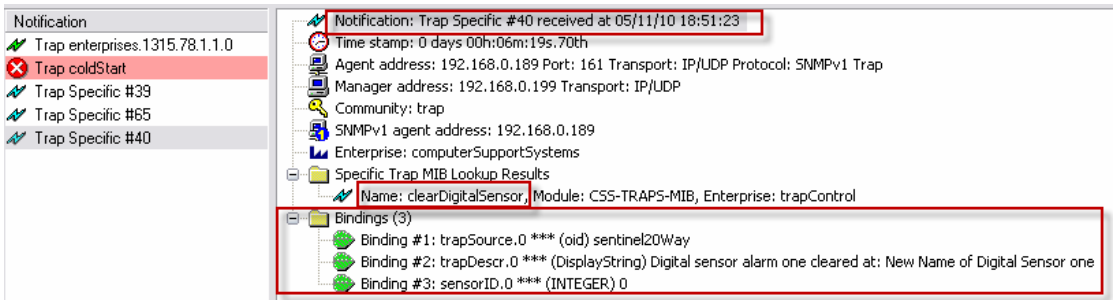
- Coldstart – indicate boot up
- User turning on/off/rebooting outlet
- User turning on/off/rebooting all outlets via global control
- Current sensor reaching warning, alarm or critical levels; also on clearance, ie: normal conditions
- Temperature or Humidity sensor reaching low or high warning, alarm or shutdown conditions. Also on clearance, ie: normal conditions
- Digital sensor 1 or 2 going in or out of an alarm condition
- Configuration updates:
    - SNMP configuration update
    - SMTP configuration update
    - Sensor (Current, Temperature, Humidity or Digital) configuration update
    - User forcing device reboot via web interface
    - System default settings update
    - Time/date update
    - Updating device name or location
    - Triggering of a test email
    - Configuration of an outlet
    - Configuration of the serial port
    - Admin or users configuration
    - Configuration, Alarm or Event log being cleared

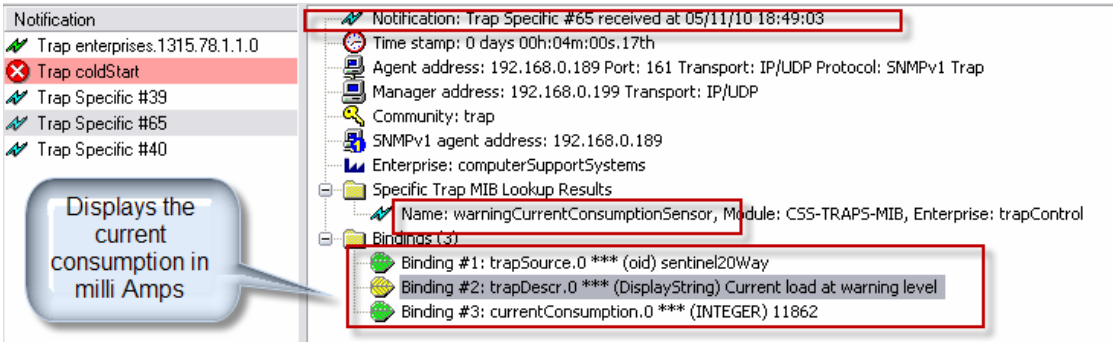
Sentinel Traps are defined and appropriate bindings are defined in CSS-TRAPS-MIB file.

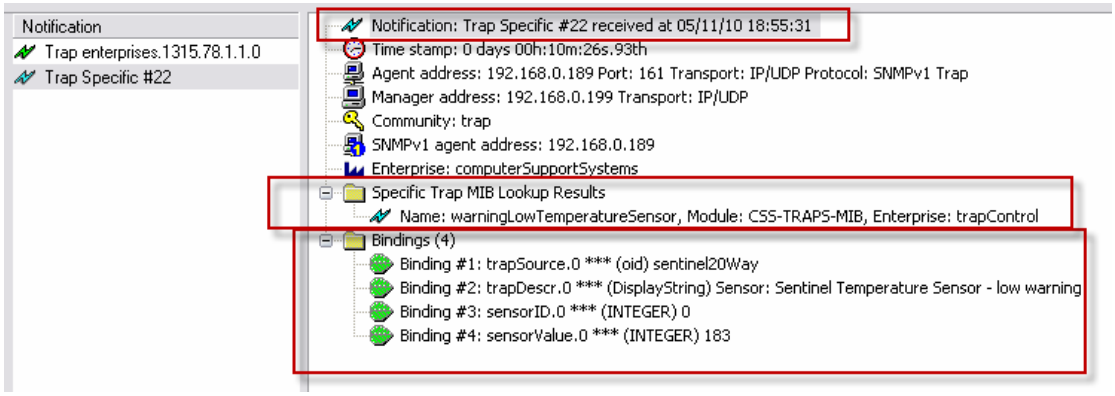
Several sample traps below:











9 Configuring Sentinel

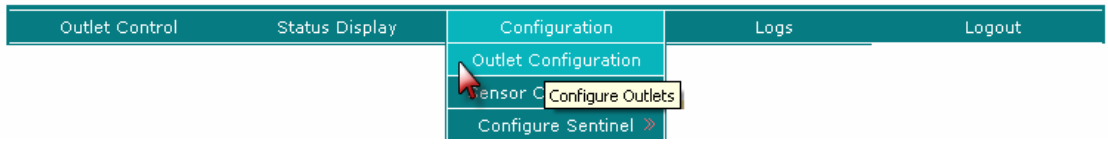
Only the administration user can configure Sentinel.

The following can be configured:

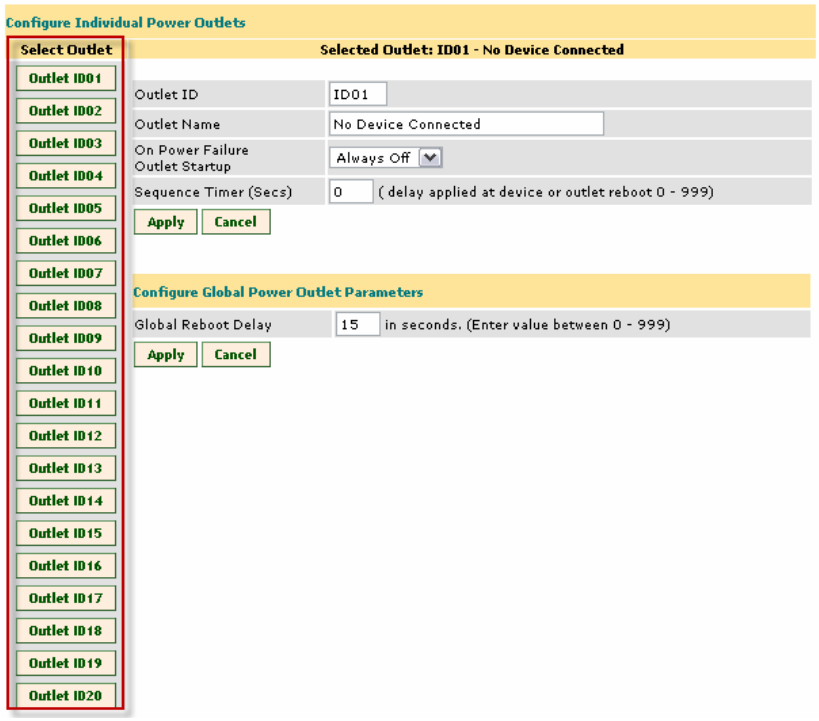
- Outlet configuration
- Sensor configuration - Current Load, Temperature, Humidity and two digital sensors
- Sentinel device configuration, includes Network, SNMP, Serial Port, SMTP & Date and Time
- Loading factory defaults and rebooting via the interface
- Manage users (user names and passwords)
- Clear alarm, configuration and event logs

Each of the above shall be described in the following sections.

9.1 Outlet Configuration

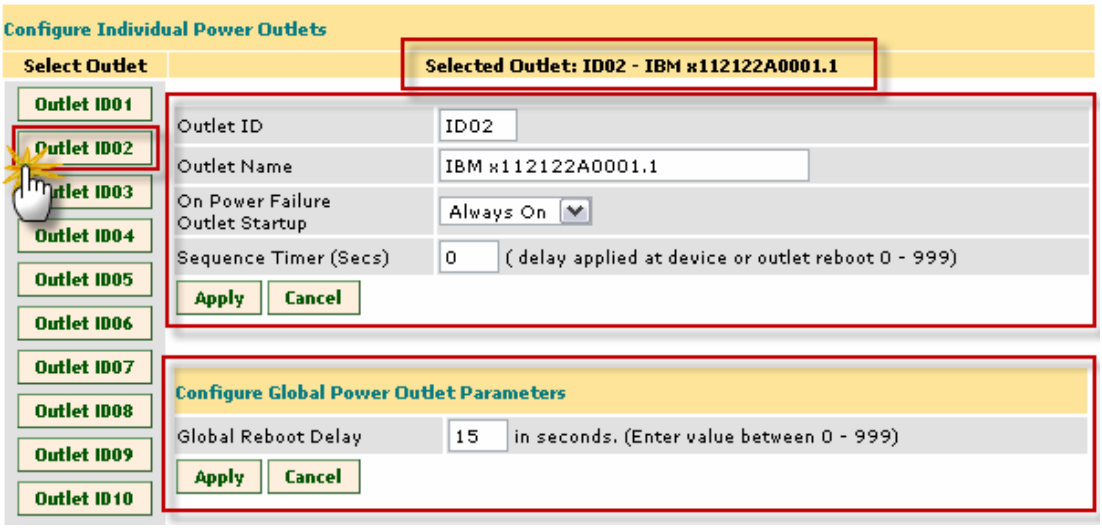


Click on '*Outlet Configuration*' from the '*Configuration'* main menu: The first outlet configuration page will be loaded. To configure each outlet click on the button displayed with the ID's of outlets.

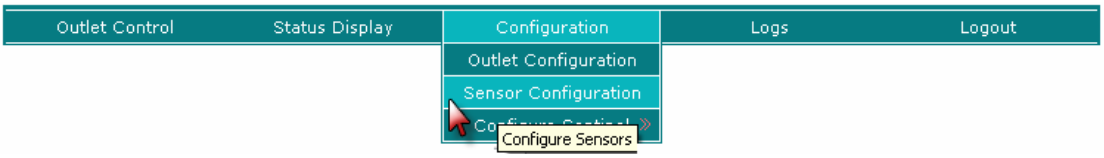


Set the ID (optional) & the name of the power outlet, sequence timer value in seconds & the startup preference & click '*Apply*'.

The '*Global Reboot Delay*' can be set whilst setting any of the outlets. PS: note that this is common to all outlets.



9.2 Sensor Configuration

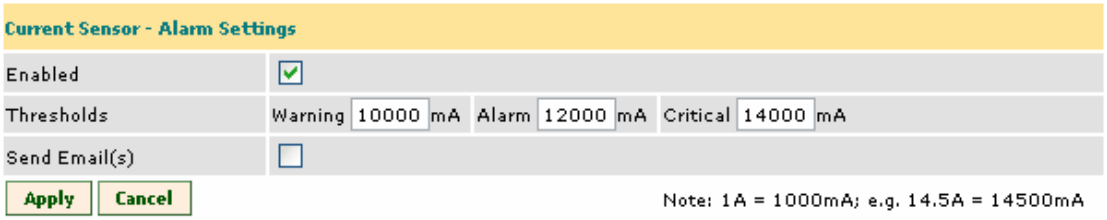


Navigate to 'Sensor Configuration' from the 'Configuration' main menu. The following settings are configurable:

- Set thresholds & preferences for the Current Load sensor
- Set thresholds & preferences for the Temperature sensor
- Set thresholds & preferences for the Humidity sensor
- Set thresholds & preferences for the Dual Digital sensor

9.2.1 Current Alarm Settings

Allows configuring the Current Load Warning, Alarm & Critical levels in milliAmperes:

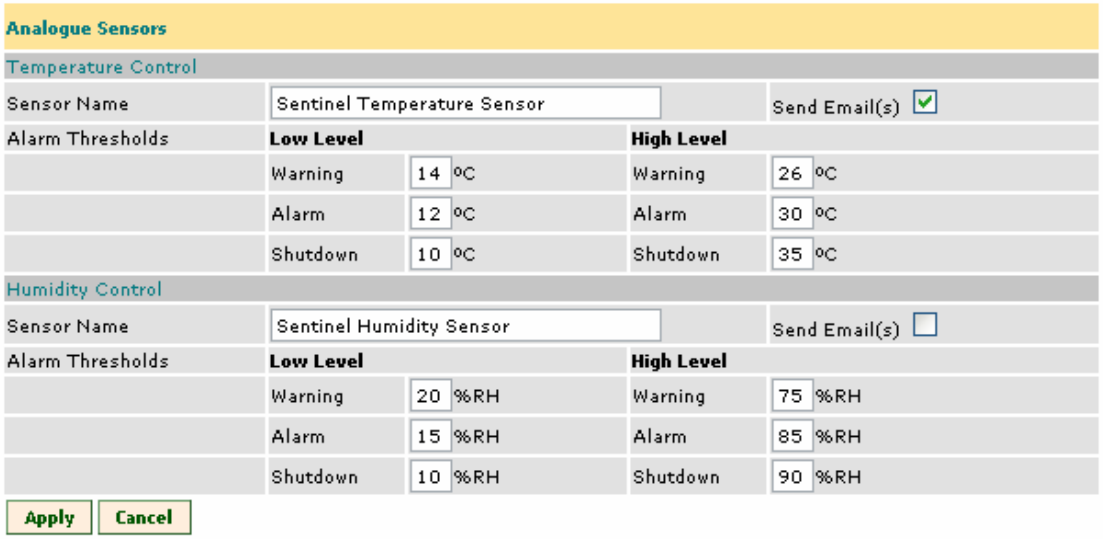


Tick the Send Email(s) check box for emails when thresholds are crossed.

9.2.2 Analogue Sensor Settings

The analogue sensor (Temperature & Humidity) settings are configured as below:

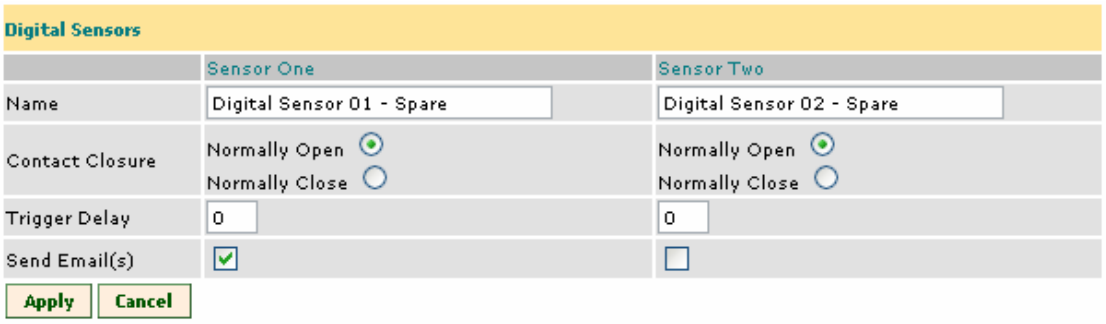
Send Email(s): Tick to send an email(s) when temperature/humidity alarm moves from one threshold limit to another
Sensor Name: A name given for sensor for identification purposes
Alarm Thresholds: Set the respective threshold values for warning, alarm & shutdown level settings for low and high settings. These values are used to trigger analogue alarms.



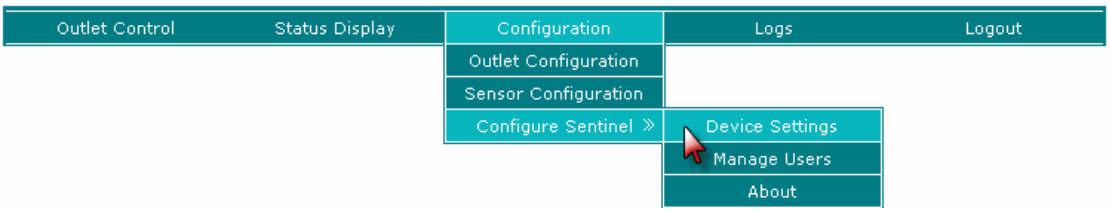
Note: Shutdown alarms will not turn off outlets or shutdown the power board.

9.2.3 Digital Sensor Settings

Send Email(s): Tick to send an email(s) when digital alarm changes state
Sensor Name: A name given for sensor for identification purposes
Trigger delay: A delay value in seconds that is used to calculate the time to trigger the digital sensor from change of state. If the sensor changes state for more than the Trigger time limit the alarm shall be activated.
Contact Closure: 'Normally Open' setting is for open contact closure for non alarming state and vice versa for 'Normally Close' state



9.3 Sentinel Device Configuration



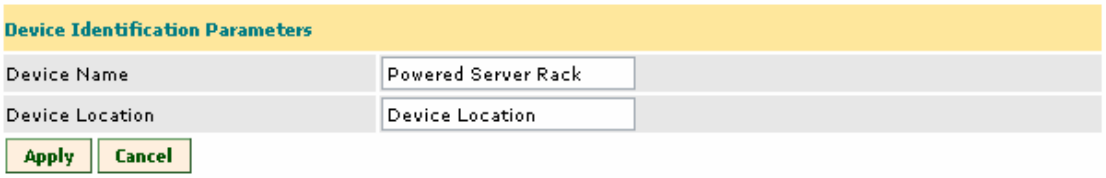
Navigate to 'Device Settings' from the 'Configuration' - > 'Configure' menu. The following settings are configurable

- Device identification parameters
- Network interface settings
- SMTP settings
- SNMP community & Network Manager configuration
- Serial port settings
- Date & time of Sentinel
- Loading factory defaults

There is also an option which allows rebooting Sentinel under this menu. Please note that rebooting the device shall turn off all outlets and then each outlet's start up preference as the device turns on.

9.3.1 Device Identification Parameters

Allows setting name & location details for Sentinel. Click '*Apply*' to save settings.



Note: You must log out and log back in for these settings to take effect on the main page.

9.3.2 Network Interface Settings

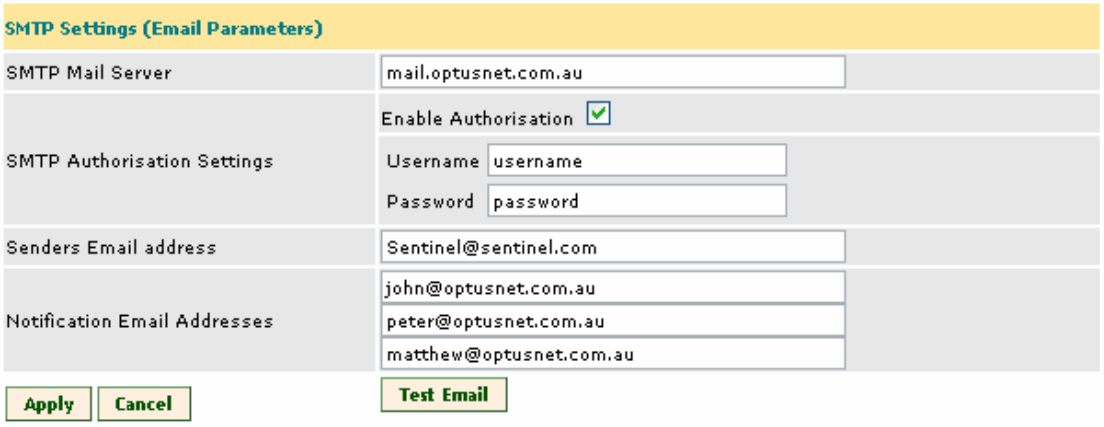
Allows setting the network parameter & boot up preference. I.e.: DHCP or Static. If DHCP is selected the network parameters entered will be ignored. Within 60 seconds (page needs to be requested after 60 seconds) these fields shall be updated with the DHCP obtained IP address. Click '*Apply*' to save settings.

If a DHCP server is not detected, Sentinel sets in with a fall back IP address as described below:

- Fall back IP address: 192.168.1.100
- Fall back subnet mask: 255.255.255.0
- Fall back gateway: 0.0.0.0

9.3.3 SMTP Settings (Email Settings)

Allows setting the SMTP mail server address, senders email address and the recipient email addresses. Messages are sent to these recipients when in alarm condition for sensors which are selected to send emails.

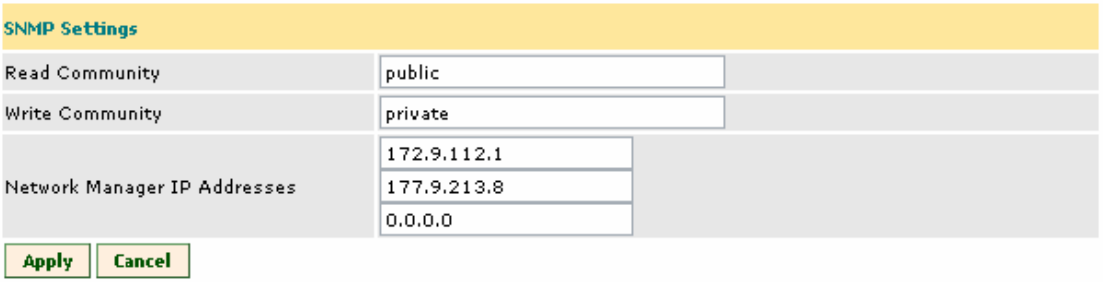


Ensure the SMTP Mail Server address is entered. If your mail server requires authentication tick the *Enable Authorisation* check box & provide the username and password for SMTP authentication.

You can test the email sending functionality by clicking the 'Test Email' button. Make sure you have saved your settings before you click this button.

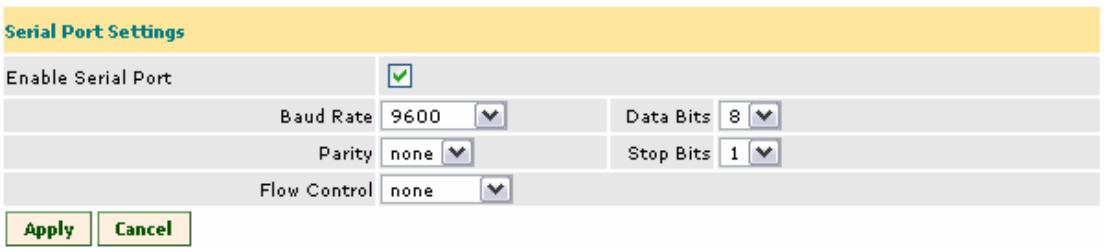
9.3.4 SNMP Settings

Allows setting read/write SNMP communities and Network managers for receiving trap notifications.



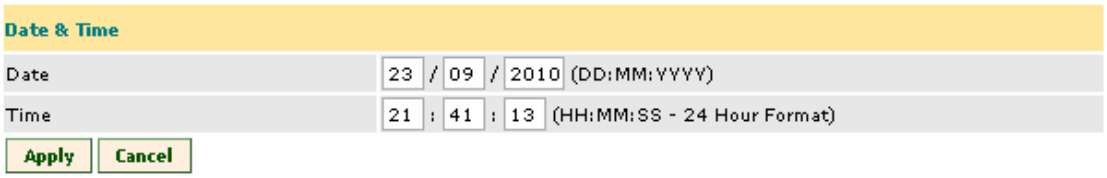
9.3.5 Serial Port Settings

Allows configuring the serial port connection.



9.3.6 Set Date & Time

Use this section to update the device Date and Time



Ensure the date and time formats conform as displayed below:

- Time - > HH:MM:SS – 24 hour format
- Date - > DD/MM/YYYY

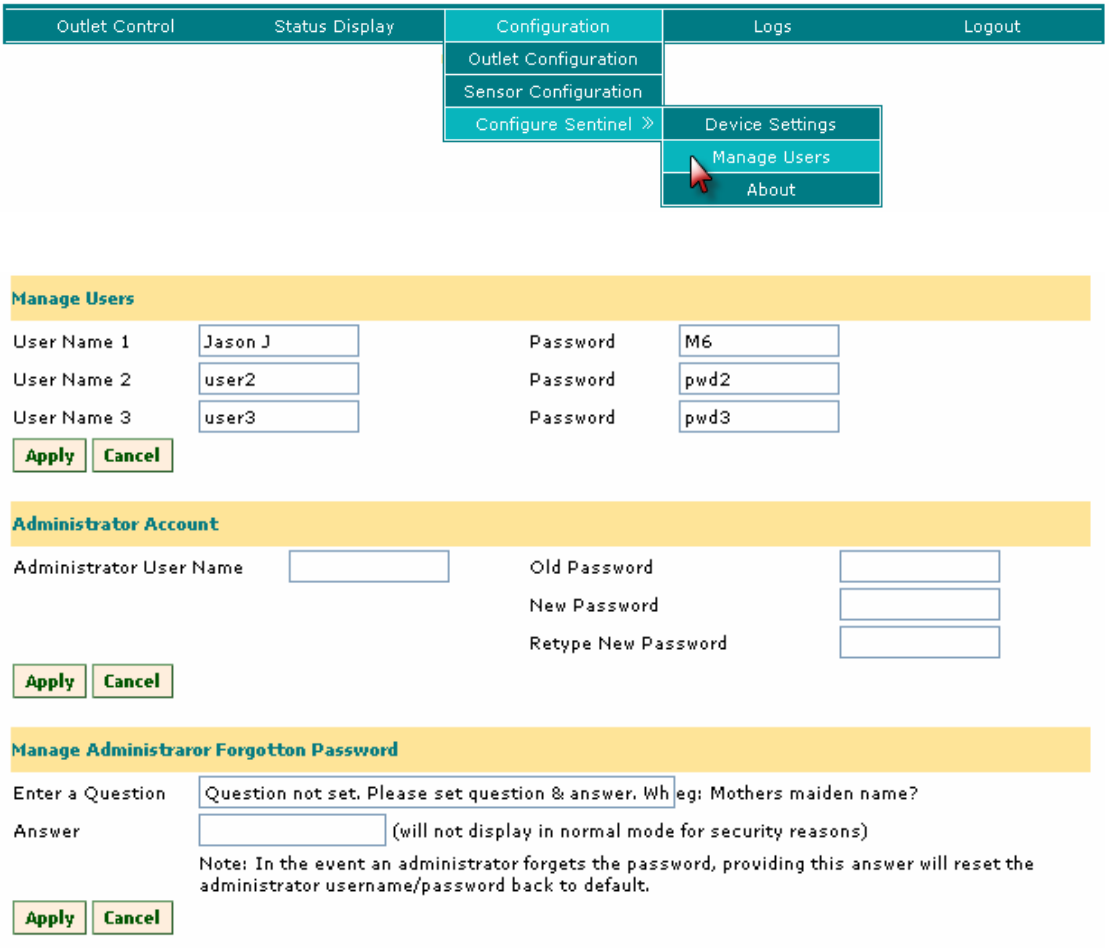
9.3.7 Loading Factory Defaults

The following action is performed:

- User accounts, credentials, secret question & answer are set to defaults.
- Device name & location shall be reset.
- Each outlet name, ID, sequence timer, preference of startup & global reboot timer values are reset.
- SMTP, SNMP, Serial port settings are set to default
- Alarm, configuration & event logs shall be cleared.
- Digital and Analogue sensor thresholds and settings shall be set to default values

Network settings or present outlet status will not be affected. Though, when server rack is powered on the next time, the default preference (ALWAYS ON) of outlets shall be used, hence all outlets will be powered on.

9.4 Manage Users



Click on '*Manage Users*' to configure user credentials. Credentials for all three users of the Users category shall be displayed.

The administrator password can only be changed by entering the present administrator password.

The secret question & answer for administrator is can also be set under this menu.

10 Serial Port Connection on Sentinel – Line 1

Sentinel provides a RS232 console connection (RJ45 type) which allows controlling the outlets and obtaining the Current load. The serial port is an asynchronous port and configured as data terminal equipment (DTE).

By default the settings on the serial port are:

- Serial Port is enabled
- 9600 Baud rate
- 8 Data bits
- No parity
- 1 stop bit
- No flow control

The acceptable RJ45 based connection for serial communication should have the following pin configuration:

PIN Number	Console Port (DTE)
1	RTS
2	-
3	TxD
4	GND
5	GND
6	RxD
7	-
8	CTS

There are commercially available RJ-45-to-DB-25 female DTE or RJ-45-to-DB-9 female DTE adapters which can be used along with a rollover RJ45 cable.
See http://www.cisco.com/en/US/products/hw/routers/ps214/products_tech_note09186a00801f5d85.shtml as a reference guide.

When connected via the console port, Sentinel has the following acceptable command input:

status <outlet# [command]> | <CUR>

outlet#: outlet number in **two** digit format. Alternatively, the word 'ALL' can be provided. 01-20, ALL

command: intended action on the 'outlet#'. Acceptable values are 'ON', 'OFF' or 'REBOOT'

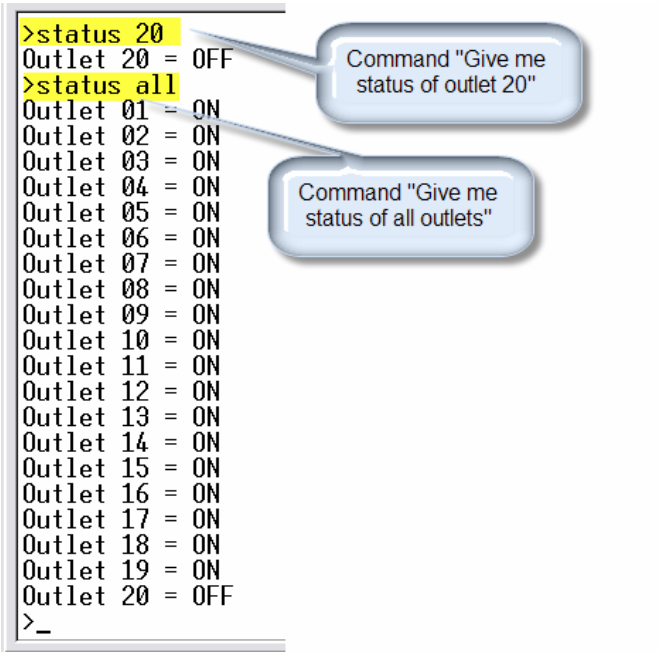
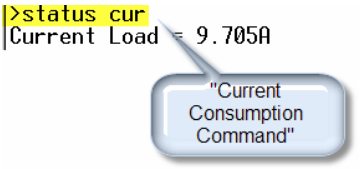
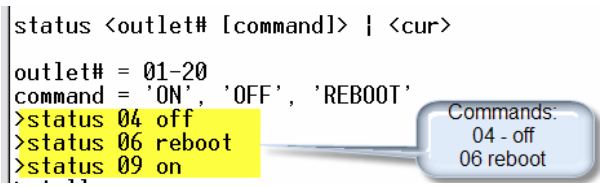
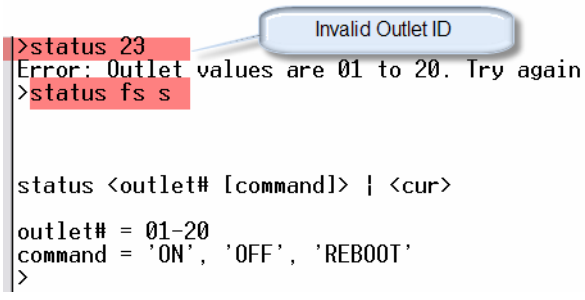
Please see below table for total command set and responses.

10.1 Serial Command Table

Command	Description	Possible Serial Response
status X	Command to retrieve outlet status of outlet X (X should be 2 digits) (condition: 01<X<20)	Outlet X = ON Outlet X = OFF Outlet X = REBOOTING Outlet X = STARTING UP
status X ON	Command to turn outlet X ON (X should be 2 digits) (condition: 01<X<20)	-
status X OFF	Command to turn outlet X OFF (X should be 2 digits) (condition: 01<X<20)	-
status X REBOOT	Command to reboot outlet X (X should be 2 digits) (condition: 01<X<20)	-
status all ON	Command to turn all outlets on	-
status all OFF	Command to turn all outlets off	-
status all REBOOT	Command to reboot all outlets	-
status CUR	Command to obtain Current load	Current Load = 3.267A

If outlet ID is invalid the system shall provide with response: **Error: Outlet>20. Try again**

Below are extracted screenshots of requests and responses via the serial port

Activity	Screenshot
Request status of outlet 20 **Request status of all outlets**	
Request 'Current' status	
Request outlet 04 off **Request outlet 06 reboot** **Request outlet 09 on**	
Error condition: **User requests outlet # not supported**	

11 Dual Digital Sensor Connection – Line 2

Sentinel provides an RJ45 connection which allows input for two devices each having a two point connection. A contact input adaptor is available which connects to the digital port and allows for the connection of the two devices.

Contact Input Adaptor

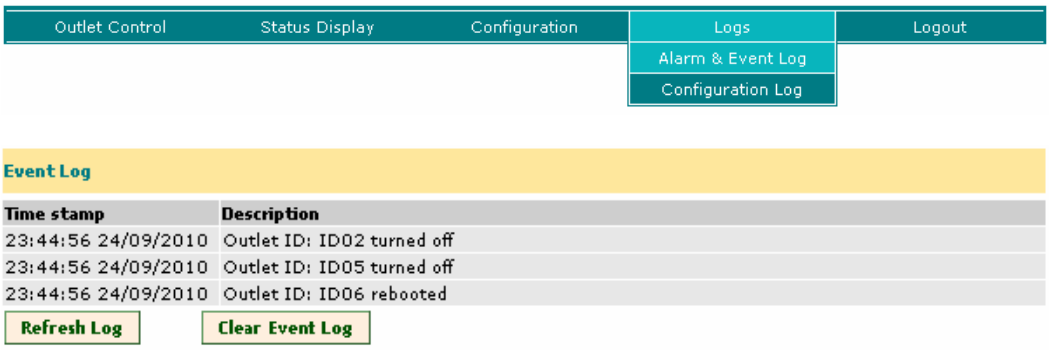
12 Alarm, Configuration and Event Logs on *Sentinel*

Sentinel stores internal log entries for each alarm, event and configuration change that takes place. These are three separate logs with up to 30 entries of each. When the log reaches more than 30 entries, the oldest entry is removed and the latest entry is added. Therefore, at any given time it is able to review the last 30 entries of alarms and events & configuration changes. To keep a record of the alarms and events, it is recommended to print of the table or copy and paste the table to a file (eg: to Notepad) frequently.

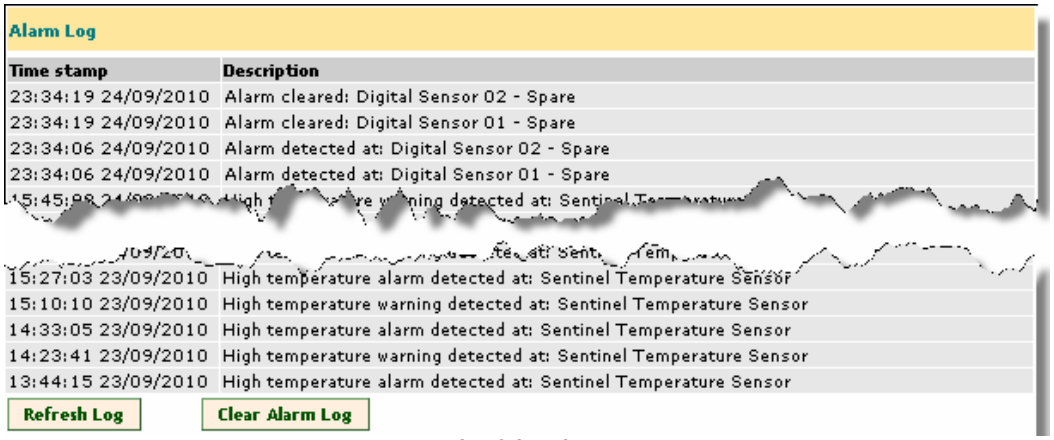
Each log entry consist a time stamp and a description of the alarm, event or the configuration.

The configuration log can be viewed only by the administrator user group. The administrator can also clear both types of logs by clicking the '*Clear Log*' button.

A user from the 'User group' can access the event & alarm log. The configuration log will not be accessible by this user.



Sample of the Event Log

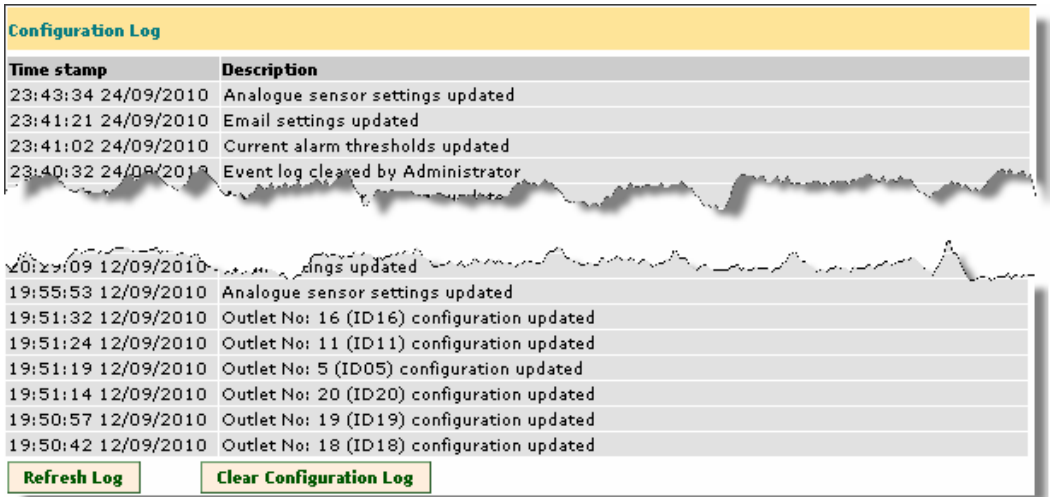


Alarm Log

Time stamp	Description
23:34:19 24/09/2010	Alarm cleared: Digital Sensor 02 - Spare
23:34:19 24/09/2010	Alarm cleared: Digital Sensor 01 - Spare
23:34:06 24/09/2010	Alarm detected at: Digital Sensor 02 - Spare
23:34:06 24/09/2010	Alarm detected at: Digital Sensor 01 - Spare
15:27:03 23/09/2010	High temperature alarm detected at: Sentinel Temperature Sensor
15:10:10 23/09/2010	High temperature warning detected at: Sentinel Temperature Sensor
14:33:05 23/09/2010	High temperature alarm detected at: Sentinel Temperature Sensor
14:23:41 23/09/2010	High temperature warning detected at: Sentinel Temperature Sensor
13:44:15 23/09/2010	High temperature alarm detected at: Sentinel Temperature Sensor

Refresh Log Clear Alarm Log

Sample of the Alarm Log



Configuration Log

Time stamp	Description
23:43:34 24/09/2010	Analogue sensor settings updated
23:41:21 24/09/2010	Email settings updated
23:41:02 24/09/2010	Current alarm thresholds updated
19:55:53 12/09/2010	Analogue sensor settings updated
19:51:32 12/09/2010	Outlet No: 16 (ID16) configuration updated
19:51:24 12/09/2010	Outlet No: 11 (ID11) configuration updated
19:51:19 12/09/2010	Outlet No: 5 (ID05) configuration updated
19:51:14 12/09/2010	Outlet No: 20 (ID20) configuration updated
19:50:57 12/09/2010	Outlet No: 19 (ID19) configuration updated
19:50:42 12/09/2010	Outlet No: 18 (ID18) configuration updated

Refresh Log Clear Configuration Log

Sample of the Configuration Log

13 SNMP on Sentinel

13.1 Introduction to SNMP Features on Sentinel

Sentinel supports SNMP (Simple Management Network Protocol) v1. Sentinel is an SNMP agent where traps for alarming & events and GET/GETS commands are supported for selected variables.

Sentinel has the capability to deliver traps up to three Network Manager Systems. Refer to section 8.3 for SNMP configuration.

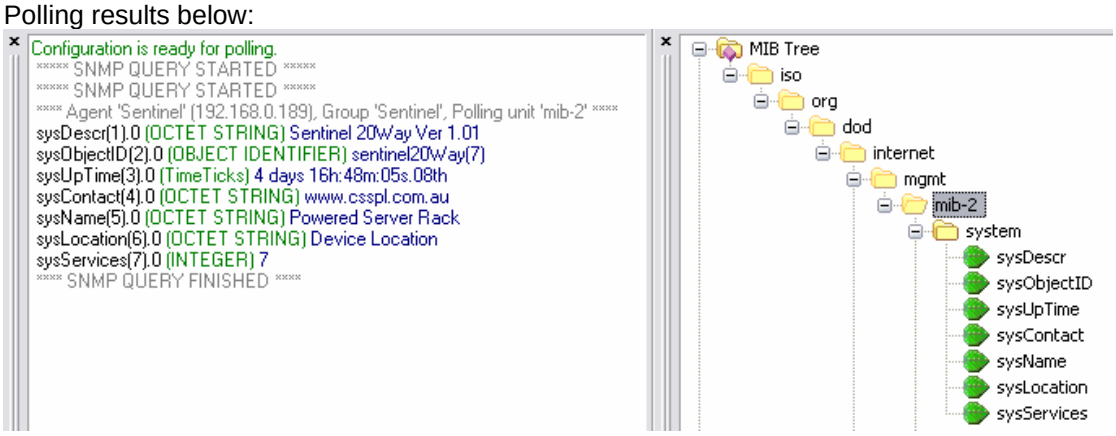
CSS-TRAPS-MIB.MIB file supplied by Computer Support Systems defines all the trap types and the bindings for Sentinel.

13.2 SNMP Implementation

Computer Support Systems enterprise ID is 14748.

Sentinel supports the SNMP 'System' group in the MIB-II Objects:
SysDescr, sysObjectID, sysUpTime, sysContact, sysName, sysLocation & sysServices

Polling results below:



MIB-II System - OID Name	OID
sysDescr	1.3.6.1.2.1.1.1
sysObjectID	1.3.6.1.2.1.1.2
sysUpTime	1.3.6.1.2.1.1.3
sysContact	1.3.6.1.2.1.1.4
sysName	1.3.6.1.2.1.1.5
sysLocation	1.3.6.1.2.1.1.6
sysServices	1.3.6.1.2.1.1.7

Sentinel product OID is set as: 1.3.6.1.4.1.14748.2.7 also named as sentinel20Way in CSS-TRAPS-MIB.MIB file.

The following implementation is made for the sentinel20Way OID tree:

Object	Description
sentinel20_outlet1 to sentinel20_outlet20 OID: 1.3.6.1.4.1.14748.1.7.1.1.1 to 1.3.6.1.4.1.14748.1.7.1.10.1 Eg: sentinel20_outlet1 sentinel20_outlet2 … … sentinel20_outlet10 … .. sentinel20_outlet20 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..3	Provides the Outlet Status of outlet X where X is sentinel20_outlet**X** 00 = OUTLET OFF 01 = OUTLET ON 02 = OUTLET REBOOTING 03 = STARTING UP
sentinel20_currentConsumption_Reading OID: 1.3.6.1.4.1.14748.2.7.2.1.1 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..40000	Total current consumption - Sentinel 20 This value is in milli-amperes. To convert to Amperes, multiply by 1000
sentinel20_currentConsumption_Status OID: 1.3.6.1.4.1.14748.2.7.2.1.2 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..4	Alarm for Current Load Sensor 0 = level OK 1 = level at warning level 2 = level at alarm level 3 = level at critical level
sentinel20_temperature_Name OID: 1.3.6.1.4.1.14748.2.7.2.2.1 Numerical syntax: Octets Base syntax: OCTET STRING Composed syntax: DisplayString Status: mandatory Max access: read-only Size list: 1: 0..42	Temperature Sensor Name - Sentinel 20
sentinel20_temperature_Reading OID: 1.3.6.1.4.1.14748.2.7.2.2.2 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: -20..120	Temperature Sensor Reading - Sentinel 20 Use multiplier 0.1 for actual reading
sentinel20_temperature_Status OID: 1.3.6.1.4.1.14748.2.7.2.2.3	Alarm for Temperature Sensor 0 = level OK 1 = level at high warning level 2 = level at high alarm level 3 = level at high shutdown level 4 = level at low warning level 5 = level at low alarm level 6 = level at low shutdown level

Object	Description
sentinel20_humidity_Name OID: 1.3.6.1.4.1.14748.2.7.2.3.1 Numerical syntax: Octets Base syntax: OCTET STRING Composed syntax: DisplayString Status: mandatory Max access: read-only Size list: 1: 0..42	Humidity Sensor Name - Sentinel 20
sentinel20_humidity_Reading OID: 1.3.6.1.4.1.14748.2.7.2.3.2 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: -20..120	Humidity Sensor Reading - Sentinel 20 Use multiplier 0.1 for actual reading
sentinel20_humidity_Status OID: 1.3.6.1.4.1.14748.2.7.2.3.3 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..6	Alarm for Humidity Sensor 0 = level OK 1 = level at high warning level 2 = level at high alarm level 3 = level at high shutdown level 4 = level at low warning level 5 = level at low alarm level 6 = level at low shutdown level
sentinel20_digital_1_Name OID: 1.3.6.1.4.1.14748.2.7.2.4.1 Numerical syntax: Octets Base syntax: OCTET STRING Composed syntax: DisplayString Status: mandatory Max access: read-only Size list: 1: 0..42	Digital Sensor One Name - Sentinel 20
sentinel20_digital_1_Reading OID: 1.3.6.1.4.1.14748.2.7.2.4.2 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..1	Digital Sensor One Reading - Sentinel 20 1 = sensor in alarm condition 0 = sensor not in alarm condition
sentinel20_digital_2_Name OID: 1.3.6.1.4.1.14748.2.7.2.5.1 Numerical syntax: Octets Base syntax: OCTET STRING Composed syntax: DisplayString Status: mandatory Max access: read-only Size list: 1: 0..42	Digital Sensor Two Name - Sentinel 20
sentinel20_digital_2_Reading OID: 1.3.6.1.4.1.14748.2.7.2.5.2 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..1	Digital Sensor Two Reading - Sentinel 20 1 = sensor in alarm condition 0 = sensor not in alarm condition

The above table provides information of OIDs to perform certain GET commands to retrieve Sentinel related readings from a given NMS.

Note: The latest CSS-TRAPS-MIB.MIB is also available at http://www.csspl.com.au

13.3 SNMP TRAP Implementation

CSS-TRAPS-MIB.MIB implements TRAP-TYPE objects defined by RFC-1215:

Trap types for Sentinel can be categorized in to four types:

1. Alarm type traps – for digital and analogue type sensors
2. Warning type traps – for analogue sensors ie: Temperature, Humidity & Current
3. Clear type traps – clearance of an alarm digital/analogue or other
4. Event type traps – Event Notifications.

The trap types can be recognized from the prefix of the trap type name. All trap types have its Enterprise type set as 'trapControl' (1.3.6.1.4.1.14748.4)

The trapControl OID and the trap-type together has all information to capture and display traps and its relevant bind information

Name	OID	Description
trapSource	OID: 1.3.6.1.4.1.14748.4.1 Type: OBJECT-IDENTIFIER	points to the product the trap originates from - i.e.: sentinel20Way
trapDescr	OID: 1.3.6.1.4.1.14748.4.2 Numerical syntax: Octets Base syntax: OCTET STRING Composed syntax: DisplayString Status: mandatory Max access: read-only Size list: 1: 0..80	provides a textual description of the particular trap
sensorID	OID: 1.3.6.1.4.1.14748.4.3 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..16	allows identifying the sensor number the trap originates from
sensorValue	OID: 1.3.6.1.4.1.14748.4.4 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: -200..200	provides the sensor value if originated from an analogue type (use multiplier 0.1 for actual reading)
currentConsumption	OID: 1.3.6.1.4.1.14748.4.5 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..40000	Current Consumption Sensor reading. Value is in milli-Amperes. For value in Amperes, multiply by 1000
outletID	OID: 1.3.6.1.4.1.14748.4.6 Numerical syntax: Integer (32 bit) Base syntax: INTEGER Composed syntax: INTEGER Status: mandatory Max access: read-only Size list: 1: 0..20	Provides an identification for outlet, where an event occurred. 0 = first outlet 1 = second outlet ... n = outlet n+1
outletName	OID: 1.3.6.1.4.1.14748.4.7 Numerical syntax: Octets Base syntax: OCTET STRING Composed syntax: DisplayString Status: mandatory Max access: read-only Size list: 1: 0..33	Outlet name where event occurred

Trap-Type table is listed below. Based on the alarm/warning/clearance or event on Sentinel, the below trap types are used.

Trap Number	Trap-Type	Description
20	clearTemperatureSensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Temperature sensor sensorID alarm is cleared. Sensor reading is sensorValue
21	warningHighTemperatureSensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Temperature sensor sensorID has triggered a high warning. Sensor reading is sensorValue
22	warningLowTemperatureSensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Temperature sensor sensorID has triggered a low warning. Sensor reading is sensorValue
23	alarmHighTemperatureSensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Temperature sensor sensorID has triggered a high alarm. Sensor reading is sensorValue
24	alarmLowTemperatureSensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Temperature sensor sensorID has triggered a low alarm. Sensor reading is sensorValue"
25	clearHumiditySensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Humidity sensor sensorID alarm is cleared. Sensor reading is sensorValue.
26	warningHighHumiditySensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Humidity sensor sensorID has triggered a high warning. Sensor reading is sensorValue
27	warningLowHumiditySensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Humidity sensor sensorID has triggered a low warning. Sensor reading is sensorValue

Trap Number	Trap-Type	Description
28	alarmHighHumiditySensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Humidity sensor sensorID has triggered a high alarm. Sensor reading is sensorValue
29	alarmLowHumiditySensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID, sensorValue} DESCRIPTION Trap origin is from trapSource. Humidity sensor sensorID has triggered a low alarm. Sensor reading is sensorValue"
39	alarmDigitalSensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID} DESCRIPTION Trap origin is from trapSource. Digital sensor sensorID has triggered an alarm
40	clearDigitalSensor	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr, sensorID} DESCRIPTION Trap origin is from trapSource. Digital sensor sensorID has cleared an alarm
101	eventSNMPUpdate	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'SNMP settings updated' triggered
102	eventEmailUpdate	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Email settings updated' triggered
103	eventSensorSettingsUpdate	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Sensor settings updated' triggered
105	eventDefaultsLoad	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Defaults loaded' triggered
107	eventPasswordUpdate	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Password changed' triggered
108	eventDeviceReset	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Device reset via web interface' triggered

Trap Number	Trap-Type	Description
109	eventTimeDateUpdate	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Date/Time updated' triggered
110	eventDeviceParamsUpdate	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Device name/location updated' triggered
111	eventNetworkParamsUpdate	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Network parameters changed' triggered
116	eventLogCleared	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Alarm and Event log cleared' triggered
125	eventTestEmail	ENTERPRISE trapControl VARIABLES {trapSource, trapDescr} DESCRIPTION Trap origin is from trapSource. Event 'Test Email' triggered
126	eventOutletTurnedOn	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr, outletID, outletName } DESCRIPTION Trap origin is from trapSource. Event 'Outlet Turned On' triggered. Outlet id is denoted by outletID. Outlet name is outletName"
127	eventOutletTurnedOff	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr, outletID, outletName } DESCRIPTION Trap origin is from trapSource. Event 'Outlet Turned Off' triggered. Outlet id is denoted by outletID. Outlet name is outletName"
128	eventOutletTurnedRebooted	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr, outletID, outletName } DESCRIPTION Trap origin is from trapSource. Event 'Outlet Rebooted' triggered. Outlet id is denoted by outletID. Outlet name is outletName
129	eventGlobalOutletOn	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. Event 'Global Outlets Turned On' triggered

Trap Number	Trap-Type	Description
130	eventGlobalOutletOff	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. Event 'Global Outlets Turned Off' triggered
131	eventGlobalOutletReboot	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. Event 'Global Reboot on Outlets' triggered
132	eventOutletConfigured	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr, outletID } DESCRIPTION Trap origin is from trapSource. Outlet bearing 'outletID' has been configured
133	eventCurrentThresholdUpdate	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. Current Sensor threshold values updated
134	eventSerialPortParamsUpdate	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. Serial Port Settings Updated
135	eventUserParamsUpdate	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. User Parameters updated. User names or passwords have been updated
136	eventAdminUserParamsUpdate	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. Administrator User Parameters updated
137	eventConfigurationLogCleared	ENTERPRISE trapControl VARIABLES { trapSource, trapDescr } DESCRIPTION Trap origin is from trapSource. Configuration Log Cleared

13.4 Requirements

- A Network Manger System installed on your network or a SNMP sniffer program installed on your PC to detect SNMP traps.
- Correct SNMP configuration panel settings.

13.5 Setting the MIB File

Use the CSS-TRAPS-MIB.MIB file and make it available for the Network Manager Software. The latest MIB file is located at http://www.csspl.com.au. The SNMP software will allow configure/add paths to where the MIB file is. Read the SNMP software help files to find out how to apply MIB paths on your NMS

Once the MIB path is effectively applied the trap bindings will indicate the details of the trap message.

13.6 Interpreting Traps

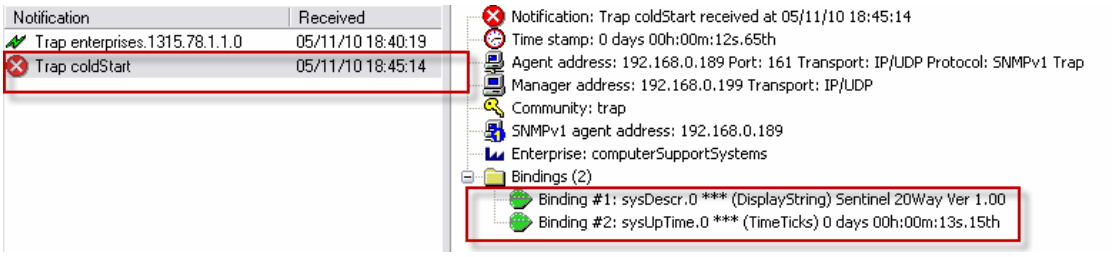
Every SNMP trap is accompanied by an OID indicating the device of the trap origin. This is provided by OID 1.3.6.1.4.1.14748.4.1 or 'trapSource' object in the MIB File. The 'trapSource' will point at 'Sentinel 20Way' (1.3.6.1.4.1.14748.2.7) at all times for this product.

Every trap also binds a string, which describes the notification in plain simple English. The OID of the message string is 'trapDescr' (1.3.6.1.4.1.14748.4.2).

In most alarm/warning/notification cases, more binding are attached to the trap, so that the alarm/warning or the notification can be handled by the network manager software. E.g. 1: the sensor value is sent for analogue type sensors. This value can be set to be checked by the NMS to perform third party action. E.g. 2: If an outlet state is change by a user, outlet ID & outlet Name are sent along with the appropriate trap type.

A few samples of the SNMP traps detected on a SNMP sniffer programs is depicted below.

13.6.1 Coldstart trap

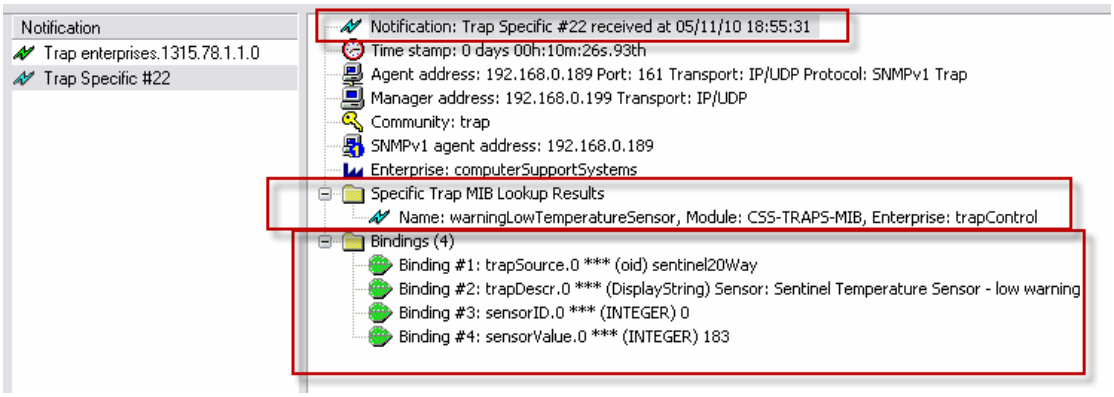


The bindings in the above image give indication of:

1. System description: Gives the software version and model name.
2. System up time: How long the device has been up for.

The above bindings are objects on the MIB-II implementation.

13.6.2 Temperature (Analogue) warning trap



The 4 bindings in the above image give indication of:

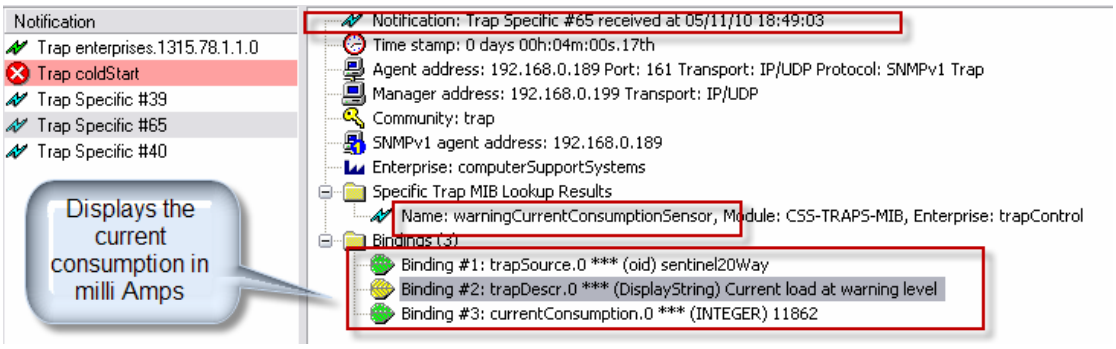
1. Trap Origin from Sentinel 20Way
2. trapDescr
3. Warning trap is generated from Sensor 0 (Sensor 0 = TMP, 1 = HMD)
4. The reading of the sensor value = 18.3 centigrade degrees

Also note the 'Specific' trap lookup is set as type #22, warningLowTemperatureSensor indicating that it is a temperature sensor that is in low warning condition.

Similarly there are individual trap numbers of Low Alarm, Low Shutdown, High Warning, High Alarm and High Shutdown.

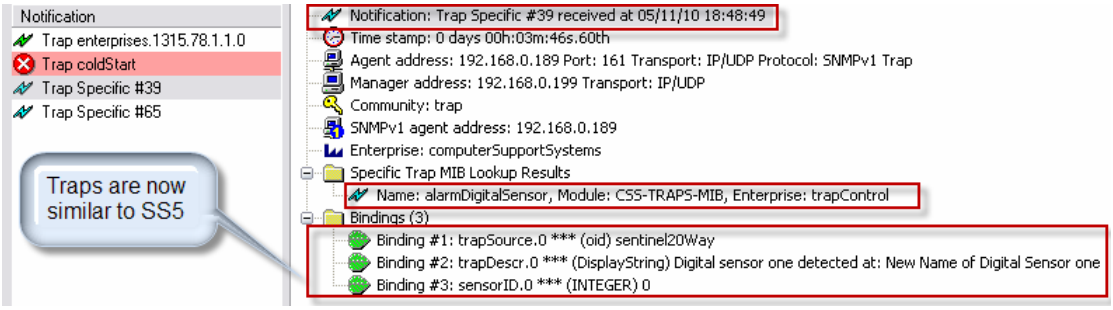
Same applies for Humidity Sensor as well.

13.6.3 Current Sensor Warning



Similarly Alarm and Shutdown Current trigger points send traps, thus network managers now can capture very specific Trap numbers and determine a subsequent action as desired.

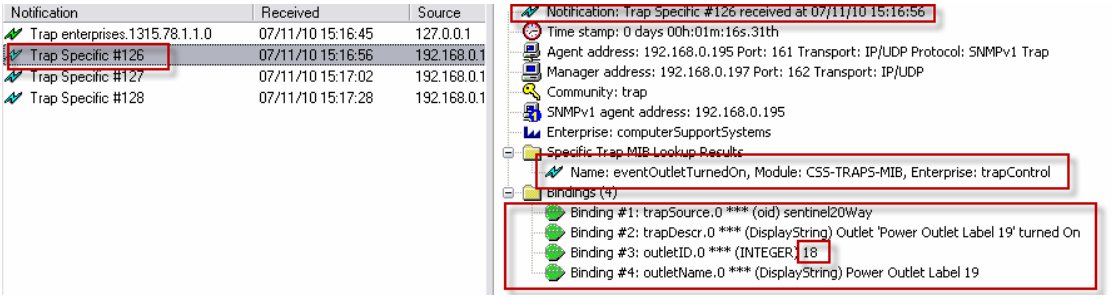
13.6.4 A digital sensor alarm trap

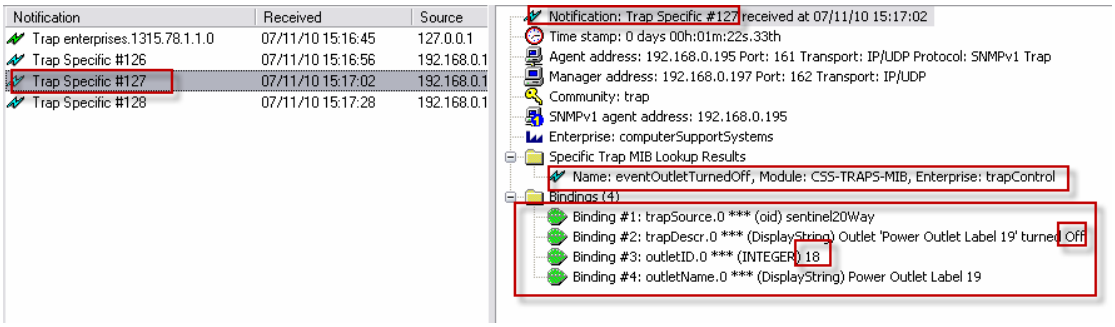


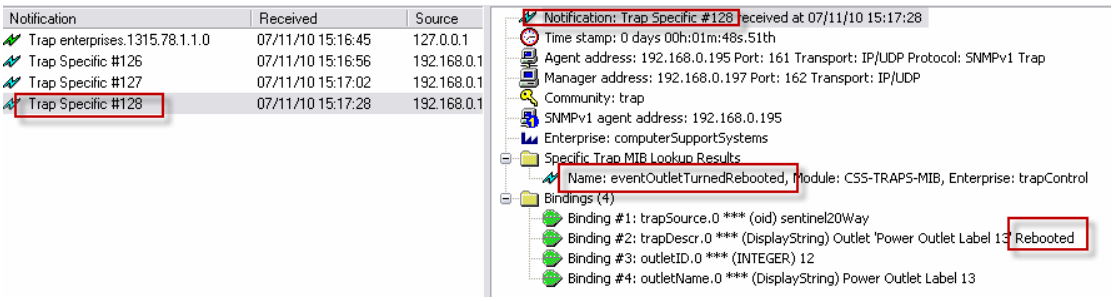
Digital Sensor 1 = Sensor ID 0
Digital Sensor 2 = Sensor ID 2

Also note the 'Specific' trap lookup is set as type #39, alarmDigitalSensor, Module: CSS-TRAPS-MIB, Enterprise: trapControl, indicating that it is a digital sensor that is in alarm condition.

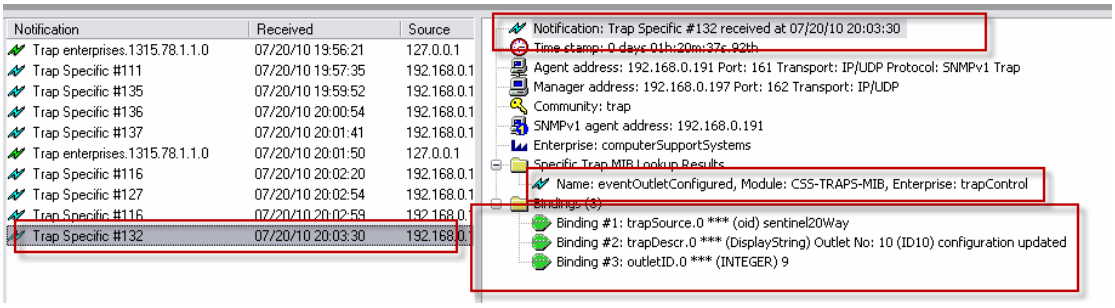
13.6.5 Outlet State Change Trap Samples







13.6.6 A configuration update notification



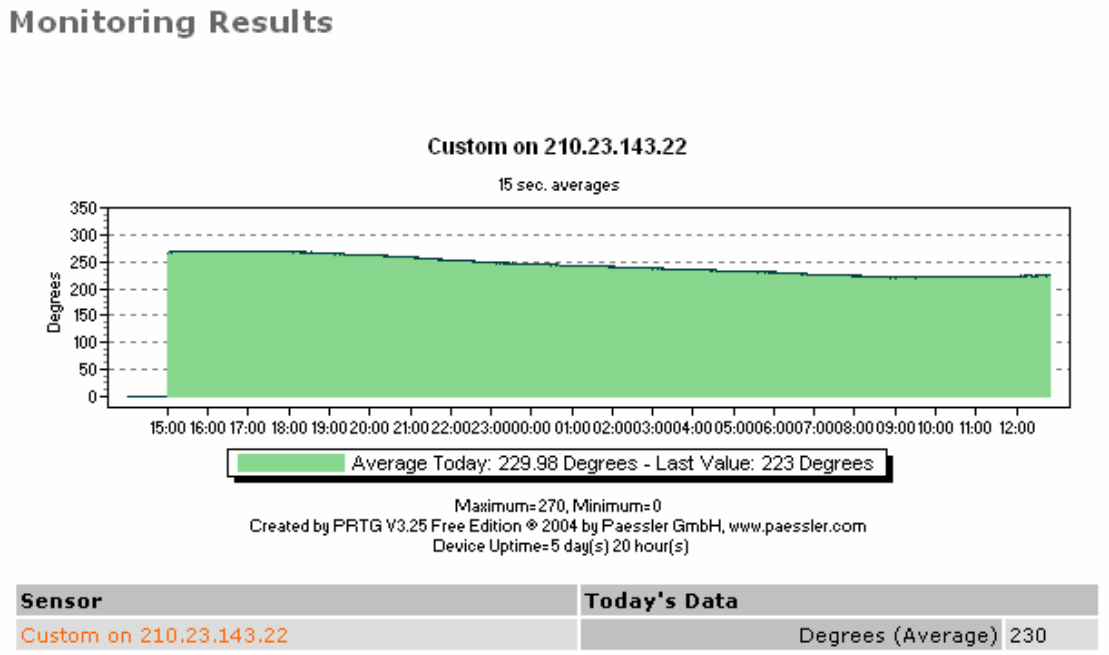
Note the specific trap type is eventOutletConfigured, #132 indicating that the Outlet has been configured. The OutletID within the bindings (#3) reveals as to which outlet was configured.

13.7 SNMP Polling

It is possible for the Network Manager Software (NMS) to poll the current sensor/outlet status and values of analogue sensors periodically and store for graphing purposes. For digital alarms the poll reply will indicate 1 or 0, where 1 is interpreted as an active alarm and 0 as an inactive alarm. If sensors are disabled, polled reply will indicate a zero value.

The values retrieved for analogue sensors (including Current) are integers hence a temperature, humidity value is shown as a multiplication of 10. The Current sensor value is shown in milli-amps. Most SNMP graphing tools provide a method to view the graph by using a customised multiplier. In this case, use the multiplier 0.1 to retrieve the exact value for temperature or humidity type sensor. For example, temperature value 25.6°C is retrieved as 256 & humidity value 60.4% is retrieved as 604.

Below is sample screen shot of a temperature sensor graph polled via SNMP using a tool named as Paessler Router Traffic Grapher. (http://www.paessler.com)



14 Hardware Specifications

Network Interface

- RJ45 Ethernet 10Base-T, Realtek Semiconductors
- LED indication: 10Base-T TX Activity, Full/half duplex.
- Network Compatibility: Ethernet: Version 2.0/IEEE 802.3

Sentinel MCU Operating Conditions

- Temperature range: -20°C to +70°C
- Humidity range: 5 - 95%, non condensing

Power Requirements & Specifications

- Input power: 240V A/C 50-60Hz
- Current usage: 380 mA for MCU
- Total outlet supply: 16A rated. (TBD)

Inbuilt Temperature and Humidity Sensor Specifications

- Humidity Accuracy ±3.5 % RH,
- Temperature Accuracy ±0.5 @ 25°C
- Range –20°C to 100°C and 0 to 100%
- Power consumption 28µA

LCD Panel Specifications

- 2 x 8 char LCD

15 Troubleshooting

15.1 Technical Support

For any technical difficulties contact CSS technical support at:

Email: support@csspl.com.au

Telephone: +613-9419 3955
Fax: +613-9419 3509

Please have the following details when you contact CSS technical staff:

- Model of product with software version.
- Serial number (Label on back panel or from the main menu display)
- Date of purchase
- Clear definition of problem
- Steps taken so far to fix problem

16 Declaration of Conformity

Manufacturer's Name & Address:

Computer Support Systems Pty Ltd,
373 Johnston Street, Abbotsford, Victoria 3067, Australia.

Product Name & Manufacturers Model Numbers:

Sentinel 20 Way (ZVA1120, ZVA1320, ZVA2420)
Sentinel 10 Way (ZHA1110, ZHA1310, ZHA2410, ZVA1110, ZVA1310, ZVA2410)

17 Copyright and Trademark

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