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## **R1000 NBS/NAC SWITCHING SYSTEM USERS MANUAL**

September 2003  
Part Numbers

|               |         |               |         |
|---------------|---------|---------------|---------|
| R1000-NAC-8   | 5101000 | R1000-NAC-4F  | 5101010 |
| R1000-NAC-16  | 5101001 | R1000-NAC-6F  | 5101011 |
| R1000-NAC-8R  | 5101002 | R1000-NAC-4FR | 5101012 |
| R1000-NAC-16R | 5101003 | R1000-NAC-6FR | 5101013 |
| R1000-NBS-8   | 5101020 | R1000-NBS-4F  | 5101030 |
| R1000-NBS-16  | 5101021 | R1000-NBS-6F  | 5101031 |
| R1000-NBS-8R  | 5101022 | R1000-NBS-4FR | 5101032 |
| R1000-NBS-16R | 5101023 | R1000-NBS-6FR | 5101033 |



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## 1. Specifications

### Connectors:

|                 |  |
|-----------------|--|
| A/B Switches:   | Shielded RJ45 – 16, 24, 32, or 48 depending on model and size<br>Fiber optic ST or SC – 4 or 6 duplex connectors depending on model and size |
| Ethernet:       | Shielded RJ45 – active only in network manageable models   |
| Serial Control: | Female DB9   |
| Power:          | Two-Position DC Power Entry – 2 provided for redundancy  |

### Indicators:

|                       |   |
|-----------------------|---|
| Power supply LEDs:    | (2) power supply input 1, power supply input 2                |
| Switch position LEDs: | (2) all ports position A, all ports position B                |
| Network status LEDs:  | (2) link, activity (active only in network manageable models) |

### Switches:

|                     |                             |
|---------------------|-----------------------------|
| A/B Gang switch:    | (1) momentary toggle switch |
| Gang Switch enable: | (1) key-lock switch         |

### Power:

9-12 VDC, 100 mA nominal (350mA nominal on network manageable models)  
Dual inputs for redundancy

### Physical:

1.75”(H) X 17.25”(W) X 10.5”(D) desktop chassis, steel  
Mounting brackets provided for 1U, 19” rack mount configuration  
5 lbs, excluding power supply

### MTBF:

100,000 hours

### Altitude Tolerance:

10,000 ft. (3048 m)

### Temperature Tolerance:

Operating: 32° to 104° F (0° to 40° C)  
Storage: -4° to 158° F (-20° to 70° C)

### Humidity Tolerance:

Up to 95% non-condensing

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## 2. Introduction

The R1000 Network Backup Switch and Network Access Controller connect port A or port B to COMMON, through latching relays (in the case of the R1000-NAC models, the connection is more appropriately designated ON or OFF, as they are 2 port switches, COMMON and port B). Since the relays are latching, the state of connections will be maintained with power off.

For RJ45 models, pins 1, 2, 3 and 6 are switched, which are the standard 10/100base-T Ethernet signal locations on an RJ45 connector. While the R1000 is primarily intended to switch Ethernet, it can be used for any electronic signal switching, if the signals are passed through the supported pins. The relays are transparent to data rates, signal levels, and format. The RJ45 models are available in 8 and 16 port versions.

Fiber optic models are also latching, and completely optical in construction. They are likewise transparent to data rates, and format. The fiber optic models are available in 4 and 6 port, ST and SC duplex versions.

Manual gang control of all ports is available through a momentary toggle switch on the front of the unit, enabled by a removable key lock. Serial RS232 control can gang or individually switch ports, as well as monitor switch status. An Ethernet port (10base-T) on some models allows remote control and monitoring using TCP/IP

The R1000 models are housed in a steel desktop chassis, with provisions for 19" rack mount brackets (supplied).

## 3. Configuration

There are no user configurable settings on the R1000 models for basic operation. There are some parameters related to TCP/IP operations which are accessed through the serial RS232 port, which are required to communicate to the unit over Ethernet. These settings are described later in this manual.

## 4. Installation

### 4.1. Rack mount Conversion

The R1000 unit is provided with brackets to convert the desktop chassis to a rack mount format.

- 4.1.1 Remove the left and right side screws at the front or rear of the chassis, depending on where you need the mounting bracket. The R1000 can be mounted frontward or backward.
- 4.1.2 Position a bracket against the side of the chassis and replace the screw removed in the previous step.
- 4.1.3 Using 2 of the additional provided screws secure the bracket through the 2 holes backed up with threaded inserts.
- 4.1.4 Repeat this procedure on the opposite side of the enclosure.

### 4.2. Installation

- 4.2.1 Find a location suitable for installing the R1000 chassis, with access to AC power outlets and the connections you intend to switch through the unit.
- 4.2.2 If you intend to use serial control, connect a serial cable to the DB9 RS232 console port,. The baud rate is fixed at 9600. The line parameters are fixed at no parity, 8 data bits, and 1 stop bit. See figure 1 for connector signal assignment.
- 4.2.3 Connect a 12VDC power supply to either power supply connector. If you are using redundant power supplies, connect one to each power supply connector. The indicators, PS1 and PS2, on the front of the unit will indicate a power supply energized.
- 4.2.4 Connect RJ45 or fiber optic cables between the R1000 unit and your devices to switch. The R1000 connects the COMMON ports to either A ports or B ports (open or disconnected for NAC models). The R1000

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switches are completely bidirectional, and have no preference to signal direction. Note that the switch provides straight pass thru connections. If your application requires a cross-over cable, use only 1 cross-over cable in that path. Use a straight through cable on the other side of the switch.

- 4.2.6 Apply AC power to (each) power supply. The appropriate power supply status indicators (PS1 and/or PS2) will light. The switch position indicators (A and B) on the front of the unit may or may not light depending on the position of the switches. Indicator A lights when all switches are in position A, and likewise for indicator B.

If you are connecting the R1000 to an Ethernet network, you must first set some TCP/IP related parameters using the serial port. You should set these parameters before attaching a cable to the NETWORK port, as the default parameters may not work or could interfere with your network.

## 5. Operation

When power is applied to the R1000 unit, the appropriate power supply status indicators (PS1 and/or PS2) will light. The switch position indicators (A and B) on the front of the unit may or may not light depending on the position of the switches. Indicator A lights when all switches are in position A, and likewise for indicator B. If some switches are in position A and some in position B then neither light will be on.

For RJ45 models, COMMON port 1 is switched to either A port 1 or B port 1 (R1000-NAC models switch COMMON port 1 to B port 1, or open). Ports 2-N, depending on the model size, are similarly switched.

For fiber optic models, the switching uses duplex connections per channel. For ST models, the two connectors labeled 1 and 2 form the channel 1 path, connectors 3 & 4 form the channel 2 path, and so on. The fiber paths are bidirectional, with COMMON port 1 switched to A port 1 or B port 1 (or COMMON port 1 to B port 1/open), etc. Note that if COMMON port 1 is used as an input, for example, A/B port 1 is then the switched output. For SC models, the COMMON duplex connector labeled 1 is switched to either A port 1 or B port 1 (R1000-NAC models switch COMMON port 1 to B port 1, or open). Ports 2-N, depending on the model size, are similarly switched. All R1000 connections are straight through. Be sure to connect the fiber RX/TX appropriately for your application.

### 5.1 Manual Switching

All R1000 models can be switched (all ports simultaneously) from a manual switch located on the front of the unit. This switching action is enabled by the front panel key switch, which must be in the position labeled ENABLE for manual switching to occur. When “gang” switching all ports, the switch position indicator will light to the appropriate state (A or B).

### 5.2 Serial RS232 Switching

All R1000 models can be switched using commands over a serial communications line. The parameters of the console port are fixed at 9600 baud, no parity, 8 data bits, and 1 stop (commonly abbreviated as 9600, N, 8, 1).

When the R1000 powers up, it will send a sign-on message followed by a prompt character “>” to your serial device. SNMP capable models are designated by an ‘R’ at the end of the model number (i.e. R1000-NBS-8R), for “remote accessible”.

After each command, and any associated response from the unit, it will again issue a prompt character. For systems where the console port is being commanded by software, the software should wait for this prompt character before sending each and every command to the R1000.

It is possible to switch any or all of the ports to either A or B from serial commands. It is also possible to query the position of any or all of the ports from serial commands. Serial command functionality is NOT affected by the position of the front panel key switch.

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## Table 5.2.1 – Console Switching Commands Summary

| Command      | Description   |
|--------------|---|
| get all *    | get all ports status                                  |
| get port n   | get port n status (n = port, range 1 to 16)           |
| set all X *  | set all ports to X (X = A or B)                       |
| set port n X | set port n to X (n = port, range 1 to 16, X = A or B) |
| Help or ?    | Display the software version and command list         |

Notes:

- Commands can be entered in upper or lower case.
- Models with less than 16 ports will display X in place of A or B when querying status.
- All commands should be terminated with a carriage return (ASCII 13).
- Set/get all and set/get port commands can be abbreviated using just first letters, i.e. “g a” for “get all” or “s p 4 a” for “set port 4 a”.
- \* Remote (network) models use “get system” and “set system X” for “get/set all” commands. The command “get all” returns all parameter settings (to be compatible with R5000 and R6000 command structures).

## 5.3 Ethernet Switching (not applicable to all models)

The R1000 can be switched using SNMP commands over a TCP/IP Ethernet network. The NETWORK port is 10base-T only. There are two status indicators which function as follows. The LINK led is on whenever the R1000 network interface is ready for communication. This should happen very shortly after power on, and should go out if there is some problem with the interface detected by the unit. Note that it does not indicate that a valid network connection is made or not made. The ACT led will blink whenever the R1000 receives a command from the network interface. Note that only accesses to variables on the ‘private’ branch will trigger the ACT led (OID 1.3.6.1.4...). In addition the ACT led will blink when a switching command is issued via the serial port.

After setting up the system and powering up for the first time (see Network Setup section), you must set the IPADDRESS and SUBNETMASK at a minimum before connecting to your network. You may or may not need to also change the READCOMMUNITYNAME and/or WRITECOMMUNITYNAME for your application. These parameters are stored in non-volatile memory, and must be made permanent by using the SAVE command. After saving new parameters, cycle power or use the RESET command to reboot the R1000 to use the newly saved parameters.

## Table 5.3.1 – Console Network Commands Summary

| Command                    | Description   |
|----------------------------|---|
| set/get ipaddress          | Display or change current IP address, default 192.168.1.30        |
| set/get subnetmask         | Display or change current subnetmask, default 255.255.255.0       |
| set/get gateway            | Display or change current gateway IP address, default 192.168.1.1 |
| set/get readcommunityname  | Display or change current readcommunityname, default ‘public’     |
| set/get writecommunityname | Display or change current writecommunityname, default ‘private’   |
| Save                       | Save parameters to nv memory (use after changing parameters)      |
| Reset                      | Reboot the system (use after any save command)                    |
| get version                | Display software version  |
| get all                    | Display all parameters  |

Notes:

- Commands can be entered in upper or lower case.
- All commands should be terminated with a carriage return (ASCII 13).

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## 6. Network Setup

To perform initial setup of the unit you will need a serial terminal capable of 9600 baud, no parity, 8 data bits, and 1 stop bit. Connect this terminal to the DB9 console connector as follows (Use a straight thru M/F cable to connect to an IBM PC standard DB9 serial port).

Table 6.1 – DB9 Pin Assignment

| DB9 | SIGNAL           | DIRECTION     |
|-----|------------------|---------------|
| 2   | RECEIVED DATA    | TO TERMINAL   |
| 3   | TRANSMITTED DATA | FROM TERMINAL |
| 5   | GROUND           |               |

Attach a 10base-T CAT5 cable to the network port and an available port on your hub.

Apply power to the system.

After this process is complete you will see a sign-on message displayed on the serial console, i.e.

```
R1000 Network Agent Version 1.04 May 2003
Copyright (C) 2003 Market Central, Inc.
All rights reserved
www.mctech.com
```

```
System starting ...
console ready.
>
```

At this point the console is ready for some low level configurations necessary before you will be able to communicate with the unit using TCP/IP. You will need to enter an IP address and subnet mask, as well as read and write SNMP community names if using SNMP, or a web password for browser access. These parameters will be saved into non-volatile memory, and the system will be reset to allow it to reconfigure with the new settings. Any time one or more of these parameters is changed, they must be saved followed by a system reset. The following shows a typical setup session. Change the entered parameters to suit your application requirements. All the console level commands available are described in detail in section 7.

```
>set ipaddress 192.168.1.200
OK
>set subnetmask 255.255.255.0
OK
>set readcommunityname public
OK
>set writecommunityname private
OK
>save
OK
>reset
restarting ...
```

After the system reinitializes, you will again be greeted by the sign-on message as before. At this time, the unit will respond to SNMP and HTTP messages at the assigned IP address. See the MIB Path Summary for a list of SNMP variables and their functions.

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## 7. Console Commands

The following commands are available from the console prompt of the unit. All commands are case insensitive, although several variable parameters are case sensitive (read/write community names and web password). GET, SET, SYSTEM, and PORT can all be abbreviated by the first letter of the command. This allows shorthand entry of switching commands.

### GET ALL

Displays all parameters and settings. An example output is shown here.

```
System Status: B
IP Address: 192.168.1.200
Subnet Mask: 255.255.255.0
Read Community Name: public
Write Community Name: private
Web Enable: ON
Web Password: mctech
Web Timeout: 300
Authentication Trap: ON
Software Versions: 1.04 May 2003 / Ctrl Rev. D
SNMP Manager Table:
1: 192.168.1.113
2: 192.168.1.115
3: 192.168.1.149
```

### GET VERSION

Displays the software revision of the system.

```
Software Versions: 1.04 May 2003 / Ctrl Rev. D
```

### GET SYSTEM

Displays the system status. This is the same as the status returned by the SNMP variable r1000GangPort. It will report "A" if any switches are in position A, and "B" if all switches are in position B. This is meaningful only when using system level switching commands.

```
System Status: A
```

### SET SYSTEM A[B]

Sets the system to position A or B.

### GET RACK

Displays status of unit. This is the same as the status returned by the SNMP variable r1000Channels. It displays a 16 character string showing the status of each switch.

```
Rack Status: AAABAAABAAAABAAAA
```

### GET PORT N

Displays the status of switch N (1-16). The response will be "A" or "B".

```
Port 4: B
```

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SET PORT N A[B]

Sets the addressed switch N (1-16) to position A or B.

SET IPADDRESS X.X.X.X  
GET IPADDRESS

Set or display the current IP address of the network module. Any change will not become permanent until a SAVE and RESET operation sequence is performed.

SET SUBNETMASK X.X.X.X  
GET SUBNETMASK

Set or display the current subnet mask of the network module. Any change will not become permanent until a SAVE operation is performed.

SET GATEWAY X.X.X.X  
GET GATEWAY

Set or display the current gateway IP address of the network module. Any change will not become permanent until a SAVE operation is performed.

SET READCOMMUNITYNAME string  
GET READCOMMUNITYNAME  
SET READCOMMUNITYNAME string  
GET READCOMMUNITYNAME

Set or display the current read or write community name as specified. Note that in general these are case sensitive fields. Any change will not become permanent until a SAVE operation is performed.

SET WEBENABLE ON[OFF]  
GET WEBENABLE

Set or display the current state of web based access. The network module will not accept any HTTP requests when web enable is off. The system must be SAVEed and then RESET for this setting to take affect.

SET WEBPASSWORD string  
GET WEBPASSWORD

Set or display the current web password. Note that this is a case sensitive field. Any change will not become permanent until a SAVE operation is performed.

SET WEBTIMEOUT seconds  
GET WEBTIMEOUT

Set or display the current web timeout in seconds. After a period of inactivity of this many seconds, the network module will request a login. Note that the web timeout cannot be disabled.

SET AUTHENTICATIONTRAP ON[OFF]  
GET AUTHENTICATIONTRAP

Set or display the current state of authentication error traps. Authentication traps will be generated when this parameter is set to ON, and not when OFF. Note that this setting only affects the trap generation, and not how the network module handles an authentication failure. An authentication failure generally means that an SNMP access was attempted with an incorrect community name. Any change will not become permanent until a SAVE operation is performed.

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## SET MANAGER N X.X.X.X

Set SNMP manager N (1-16) IP address.

Up to 16 SNMP MANAGER IP addresses can be entered for destinations of trap messages. Trap messages will be sent to all enabled MANAGER IP addresses. To remove an entry from the list, set the IP address to 0.0.0.0.

```
SNMP Manager Table:  
1: 192.168.1.113  
2: 192.168.1.115  
3: 192.168.1.149  
4: 192.168.1.100
```

## GET MANAGER N

Display SNMP manager N (1-16) IP address.

## GET MANAGER

Display all SNMP manager IP addresses.

## SAVE

Save settings for next startup. All settings are stored in NV memory and restored upon power on. Changes to parameters will not become permanent unless a SAVE operation is performed.

## RESET

Causes a network system reboot and reloads all parameters from stored settings. An IP address change will not take affect until after a SAVE and RESET.

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?

HELP

Displays a list of commands.

```
R1000 CONSOLE COMMANDS:
GET          ALL (display all parameters)
GET          VERSION (display software versions)
GET[SET]    SYSTEM [A/B] (control all system ports)
GET         RACK (display all ports)
GET[SET]    PORT N [A/B] (control single port)
GET[SET]    IPADDRESS [X.X.X.X]
GET[SET]    SUBNETMASK [X.X.X.X]
GET[SET]    GATEWAY [X.X.X.X]
GET[SET]    READCOMMUNITYNAME [string]
GET[SET]    WRITECOMMUNITYNAME [string]
GET[SET]    WEBENABLE [ON/OFF]
GET[SET]    WEBPASSWORD [string]
GET[SET]    WEBTIMEOUT [N] (seconds)
GET[SET]    AUTHENTICATIONTRAP [ON/OFF]
GET[SET]    MANAGER N [X.X.X.X] (0.0.0.0 to disable an entry)
GET         MANAGER (display all SNMP managers)
SAVE        save settings for next startup
RESET       restart (use after SAVE)
```

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## 8. Web Interface

The network module provides access to console commands through a web browser interface. When enabled (see SET WEBENABLE command) accessing the default page on the modules IP address (index.html) will present the following page (or similar).

Web Interface Version 1.0  
Copyright (c) 2003, Market Central Inc.  
All rights reserved.  
[www.mctech.com](http://www.mctech.com)

**Please logon:**

Password:

Figure 8.1 Logon Screen

After successfully entering the correct web password (see SET WEBPASSWORD command) you will get the following page (or similar).

R1000 Web Interface Version 1.0  
Copyright (c) 2003, Market Central Inc.  
All rights reserved.  
[www.mctech.com](http://www.mctech.com)

**Command console:**

Output from last command...

---

---

Enter new command:

Figure 8.2 Initial Command Screen

At this point you may enter any valid command into the text box and click “Send Command” to execute. The following is an example result of the GET ALL command.

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R1000 Web Interface Version 1.0  
Copyright (c) 2003, Market Central Inc.  
All rights reserved.  
[www.mctech.com](http://www.mctech.com)

## Command console:

Output from last command...

---

System Status: B  
IP Address: 192.168.1.200  
Subnet Mask: 255.255.255.0  
Read Community Name: public  
Write Community Name: private  
Web Enable: ON  
Web Password: mctech  
Web Timeout: 300  
Software Versions: 1.04 May 2003 / R1000 Rev. B

---

Enter new command:

Figure 8.3 Example Command Results Screen

The network controller will allow only 1 web access session. To free up a session without waiting for the web timeout, click "Logoff". For this reason, the web timeout should be set to a workable time. Resetting the unit will clear any current web session.

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## 9. SNMP MIB Path Summary

[internet] – 1.3.6.1  
[private] – 1.3.6.1.4  
[enterprises] – 1.3.6.1.4.1  
[mctech] – 1.3.6.1.4.1.9477

[mctech] – 1.3.6.1.4.1.9477  
Market Central, Inc. private enterprise number

[mcAgent] – 1.3.6.1.4.1.9477.1  
Market Central, Inc. SNMP Agent

The following is a list of the A/B Switch System SNMP variables corresponding to:  
R1000 NBS/NAC Switch

[r1000] – 1.3.6.1.4.1.9477.1.6  
R1000 Switch

[r1000GangPort] – 1.3.6.1.4.1.9477.1.6.1  
[r1000KeyStat] – 1.3.6.1.4.1.9477.1.6.2  
[r1000PowerStat] – 1.3.6.1.4.1.9477.1.6.3  
[r1000SoftwareVersion] – 1.3.6.1.4.1.9477.1.6.4  
[r1000Name] – 1.3.6.1.4.1.9477.1.6.5  
[r1000Channels] – 1.3.6.1.4.1.9477.1.6.6

[r1000ChannelTable] – 1.3.6.1.4.1.9477.1.6.7  
[r1000ChannelIndex] – 1.3.6.1.4.1.9477.1.6.7.1.1. ChannelIndex  
[r1000ChannelControl] – 1.3.6.1.4.1.9477.1.6.7.1.2. ChannelIndex  
[r1000ChannelName] – 1.3.6.1.4.1.9477.1.6.7.1.4. ChannelIndex

[IpRequester] – 1.3.6.1.4.1.9477.2

Traps generated by the system

|                       |                |
|-----------------------|----------------|
| coldStart             | generic trap 0 |
| authenticationFailure | generic trap 4 |

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## **R1000 Switch SNMP Variable Definitions:**

[r1000GangPort] – 1.3.6.1.4.1.9477.1.6.1

R1000 Switch gang control. This variable is used to control all channels in a unit. A unit may contain 4, 6, 8, or 16 channels depending on model. On a “GET” of this variable, the unit will respond as follows. If any of the channels in the unit are at position A, the status will be A. If all of the channels in the unit are at position B, the status will be B.

[r1000KeyStat] – 1.3.6.1.4.1.9477.1.6.2

R1000 Key-Lock Switch Status. This is a read only variable. This variable can be used to determine if the Key-Lock Switch is in the OFF or ON position.

[r1000PowerStat] – 1.3.6.1.4.1.9477.1.6.3

R1000 Power Status. This is a read only variable. If power is applied to both power entry connectors, the Power Status will report “TwoSupplies”. If power is applied to only one of the power entry connectors, the Power Status will report “One Supply Down”.

[r1000SoftwareVersion] – 1.3.6.1.4.1.9477.1.6.4

R1000 Software Version. This is a read only variable, and is limited to a maximum of 14 characters.

[r1000Name] – 1.3.6.1.4.1.9477.1.6.5

R1000 Identification String. The string is limited to a maximum of 14 characters.

[r1000Channels] – 1.3.6.1.4.1.9477.1.6.6

R1000 channel status, One character for (up to) sixteen channels in the unit. Channels which are not used will be represented by an X character. This is a READ ONLY variable.

[r1000ChannelTable] – 1.3.6.1.4.1.9477.1.6.7

R1000 channel variable table. This variable is not directly accessible.

[r1000ChannelIndex] – 1.3.6.1.4.1.9477.1.6.7.1.1. ChannelIndex

R1000 channel number.

[r1000ChannelControl] – 1.3.6.1.4.1.9477.1.6.7.1.2. ChannelIndex

R1000 channel control. This variable is used to control the addressed channel. When set to A, the switch will connect channel A to C. When set to B, the switch will connect channel B to C.

[r1000ChannelName] – 1.3.6.1.4.1.9477.1.6.7.1.3. ChannelIndex

R1000 channel Identification String. The string is limited to a maximum of 14 characters.

[IpRequester] – 1.3.6.1.4.1.9477.2

The IP address of the remote entity that last accessed branch 1.3.6.1.4.1.9477.1. This variable can be used to identify the last IP address to access any mcAgent variable. It is returned in the authenticationFailure message.

## R1000 Switch System SNMP Trap Definitions:

All traps carry the sysObjectId (1.3.6.1.2.1.1.2) variable, whose value is 1.3.6.1.4.1.9477.1.

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coldStart – generic trap 0

This trap is sent during a power on initialization and reboot of the SNMP controller. It carries the sysDescr variable (1.3.6.1.2.1.1.1).

authenticationFailure – generic trap 4

This trap is sent as a result of an authentication failure in processing an SNMP request. Generally an authentication failure occurs as a result of an SNMP request with an invalid community name. It carries the IpRequester variable.

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