Avaya Solution & Interoperability Test Lab

Application Notes for IBM Tivoli Netcool/OMNIbus Event Management System with Avaya Communication Manager for SNMP Trap Collection - Issue 1.0

Abstract

These Application Notes describe the configuration steps required to activate SNMP alarm notification on Avaya Communication Manager and SNMP trap collection on the IBM Tivoli Netcool/OMNIbus Event Management System. IBM Tivoli Netcool/OMNIbus was compliance tested with an Avaya S8300 Media Server with a G350 Media Gateway, and an Avaya S8700 Media Server with a G650 Media Gateway. The Avaya Media Servers and Gateways were configured to send event information to IBM Tivoli Netcool/OMNIbus using v1 and v2c SNMP traps.

Information in these Application Notes has been obtained through compliance testing and additional technical discussions. Testing was conducted via the Developer*Connection* Program at the Avaya Solution and Interoperability Test Lab.

1. Introduction

These Application Notes describe the configuration steps required to activate SNMP alarm notification on the Avaya Media Servers and Gateways, and SNMP trap collection on the IBM Tivoli Netcool/OMNIbus Event Management System. Upon detection of a failure, the Avaya Media Servers and Gateways can raise an alarm and send an SNMP trap over the IP network to the designated SNMP trap receiver(s). As a non-intrusive SNMP trap receiver, Netcool/OMNIbus can collect, store, and manage alarm information received from Avaya Communication Manager. Avaya Communication Manager running on the Avaya Media Server reports alarms via SNMP traps according to the configured alarm reporting options.

Figure 1 illustrates an enterprise network comprised of an Avaya S8300 Media Server with a G350 Media Gateway and an Avaya S8700 Media Server with a G650 Media Gateway that connect to the Avaya C363T Converged Stackable Switch. The Avaya Media Servers and Gateways send event and alarm information to the Netcool/OMNIbus Event Management System on UDP port 162 using v1 and v2c SNMP traps. The Avaya S8300 and S8700 Media Servers have an internal SNMP agent that sends SNMP traps directly to the Netcool/OMNIbus ObjectServer. The S8700 Media Server sends all event and alarm information related to the Avaya G650 Media Gateway. Likewise, the S8300 Media Server sends all event and alarm information related to the Avaya G350 Media Gateway. In this configuration, all of the Netcool/OMNIbus software components used in the compliance test were installed in the same server.

The Netcool/OMNIbus components covered in the compliance test included the **MTTrapD Probe**, **ObjectServer**, and **Desktop Client**. The **Flex License Manager** was also used to determine the licensed applications running on the Netcool/OMNIbus system. The Netcool Probe collects SNMP traps received on UDP port 162 and forwards them to the Netcool ObjectServer, which is a database server where all events are stored and managed. The ObjectServer is capable of consolidating repeated events collected by the Probe (also referred to as de-duplication) and correlating related events, such as link down/up events. The ObjectServer converts the traps to human-readable "events" to be viewed and acknowledged with the Desktop application. The Desktop is a graphical tool that is used to view and manage events and can provide a filtered view of color-coded alerts displayed in the Event List. By default, the Desktop application polls the ObjectServer for event information every 60 seconds, or upon demand.

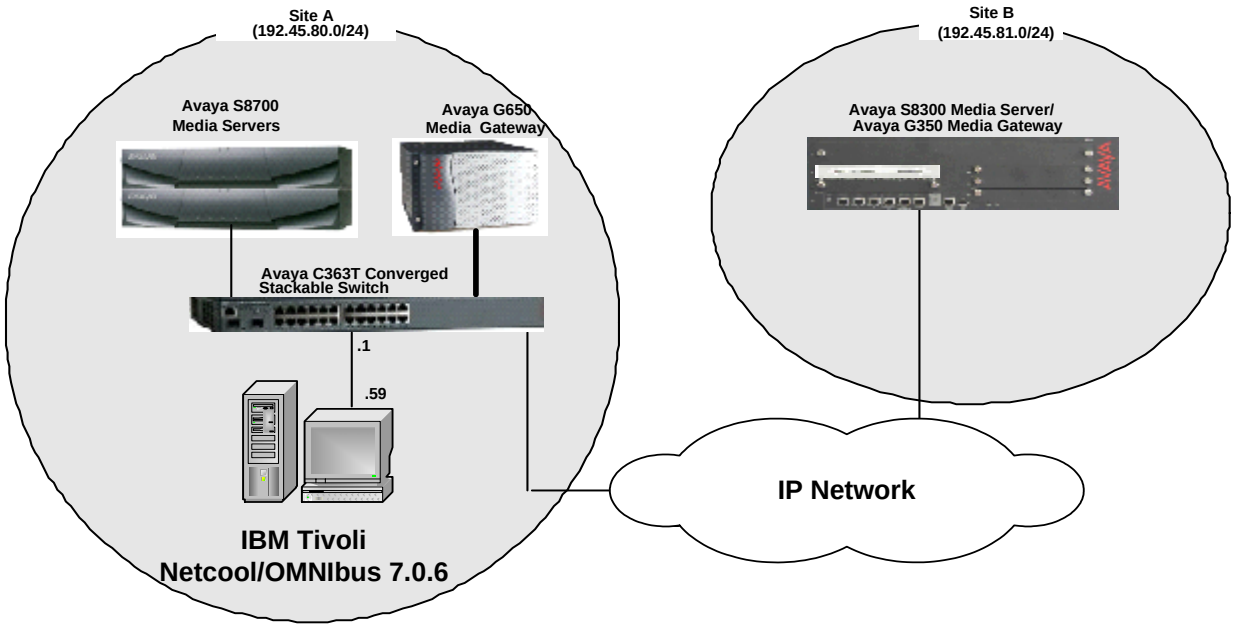


Figure 1: Netcool/OMNIbus and Avaya Communication Manager Network Configuration

2. Equipment and Software Validated

The following equipment and software were used for the sample configuration provided:

Equipment	Software
Avaya S8700 Media Server with Avaya G650 Media Gateway	Communication Manager 3.1 (R013x.01.0.628.6)
Avaya S8300 Media Server with Avaya G350 Media Gateway	Communication Manager 3.1 (R013x.01.0.628.6)
IBM Tivoli Netcool/OMNIbus ▪ SNMP Probe ▪ ObjectServer ▪ Desktop Client ▪ Flex License Manager OS – Microsoft Windows XP Professional	Version 7.0.6
Netcool Knowledge Library (NcKL)	Release 1.2

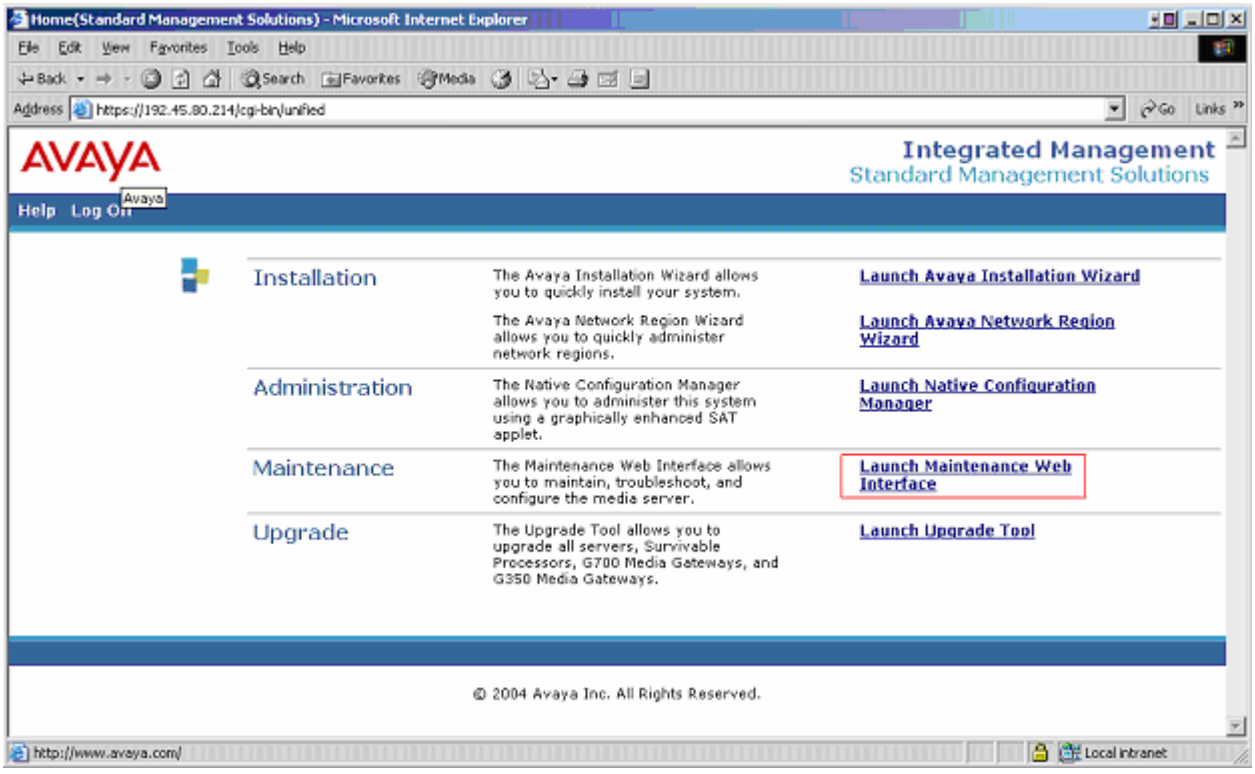
3. Avaya Media Server SNMP Configuration

This section describes the procedure for configuring the Avaya S8300 and S8700 Media Servers to report alarms to an SNMP trap destination. The required steps are:

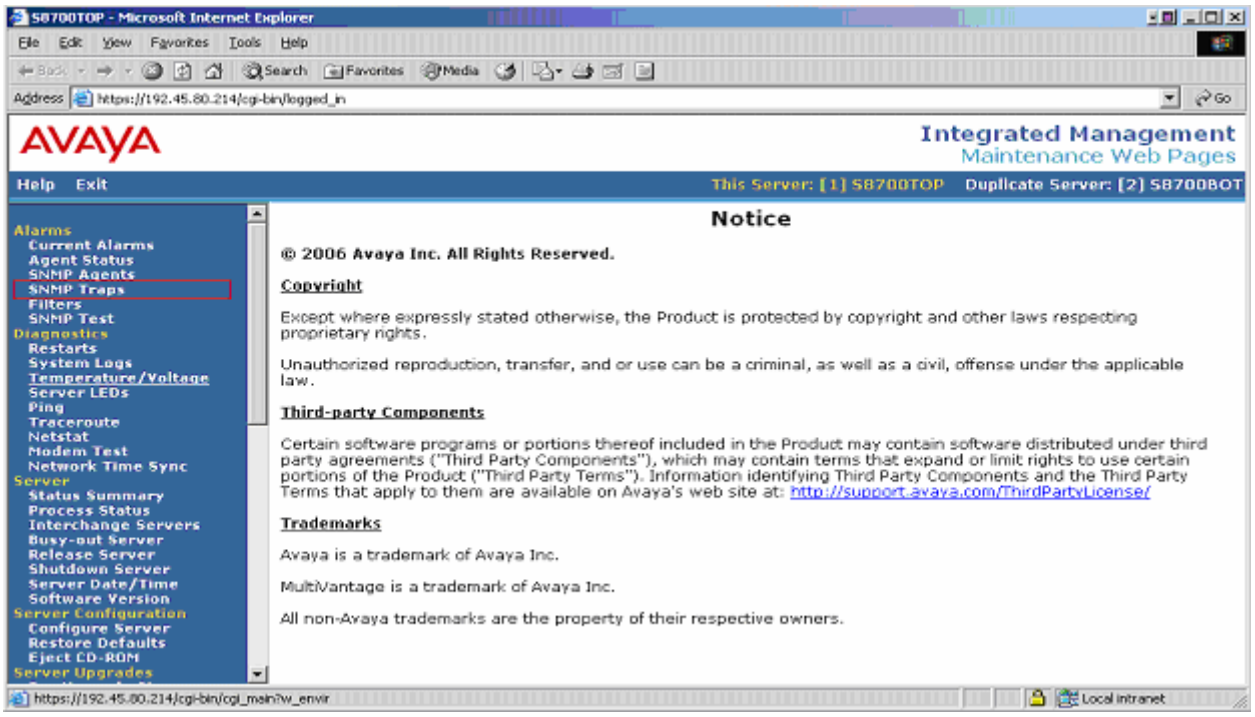
- Activating SNMP alarm notification on the Avaya S8300 and S8700 Media Servers.
- Allowing SNMP traps to be output from the Avaya Media Server on UDP port 162.
- Checking that Avaya alarms that should generate SNMP traps are being reported according to the alarm reporting options. The alarm reporting options are specified in the **set options** form accessible through the System Access Terminal (SAT). See reference [1] for a description of the **set options** form.

3.1. Configuring SNMP Trap Destinations

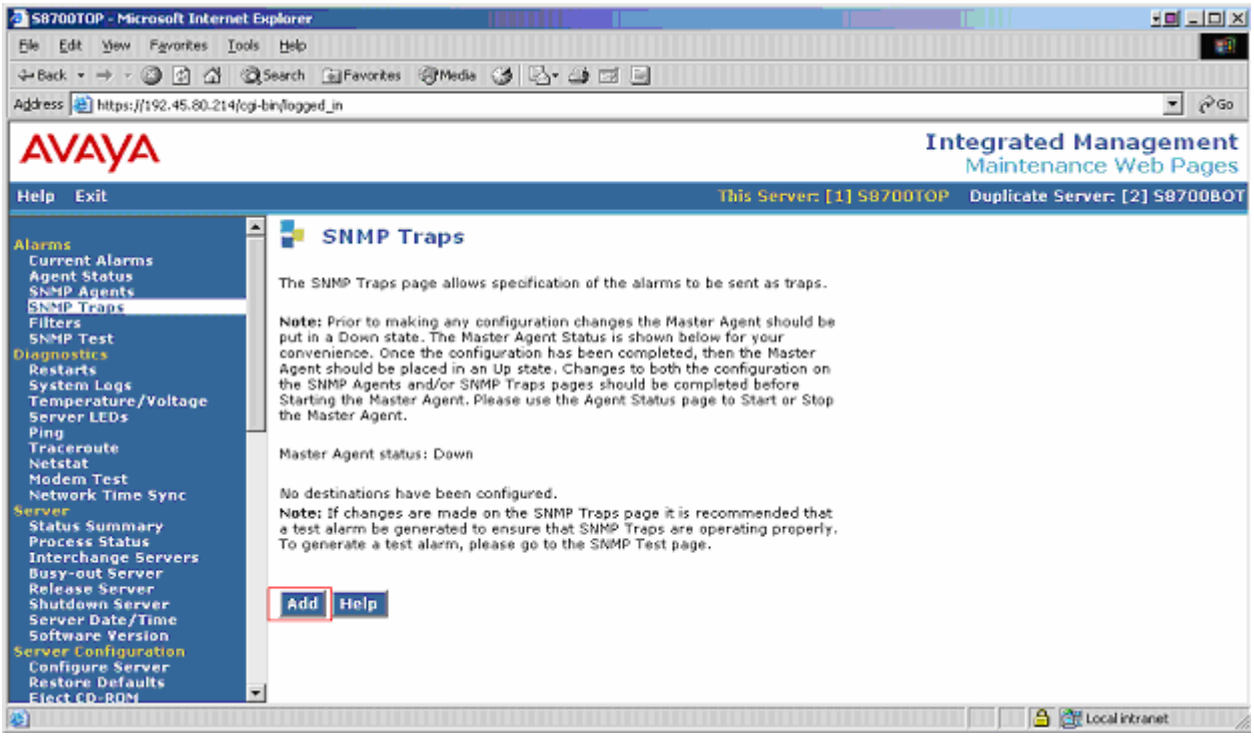
The SNMP trap destinations for the Avaya S8300 and S8700 Media Servers are configured through the server's web interface. To access the web interface, launch a web browser and connect to the media server by entering https://<media server IP address>. Supply the login and password for an account with super-user privileges. For an S8700 Media Server pair, the SNMP trap destinations need to be configured on each media server. Select **Launch Maintenance Web Interface** from the screen.



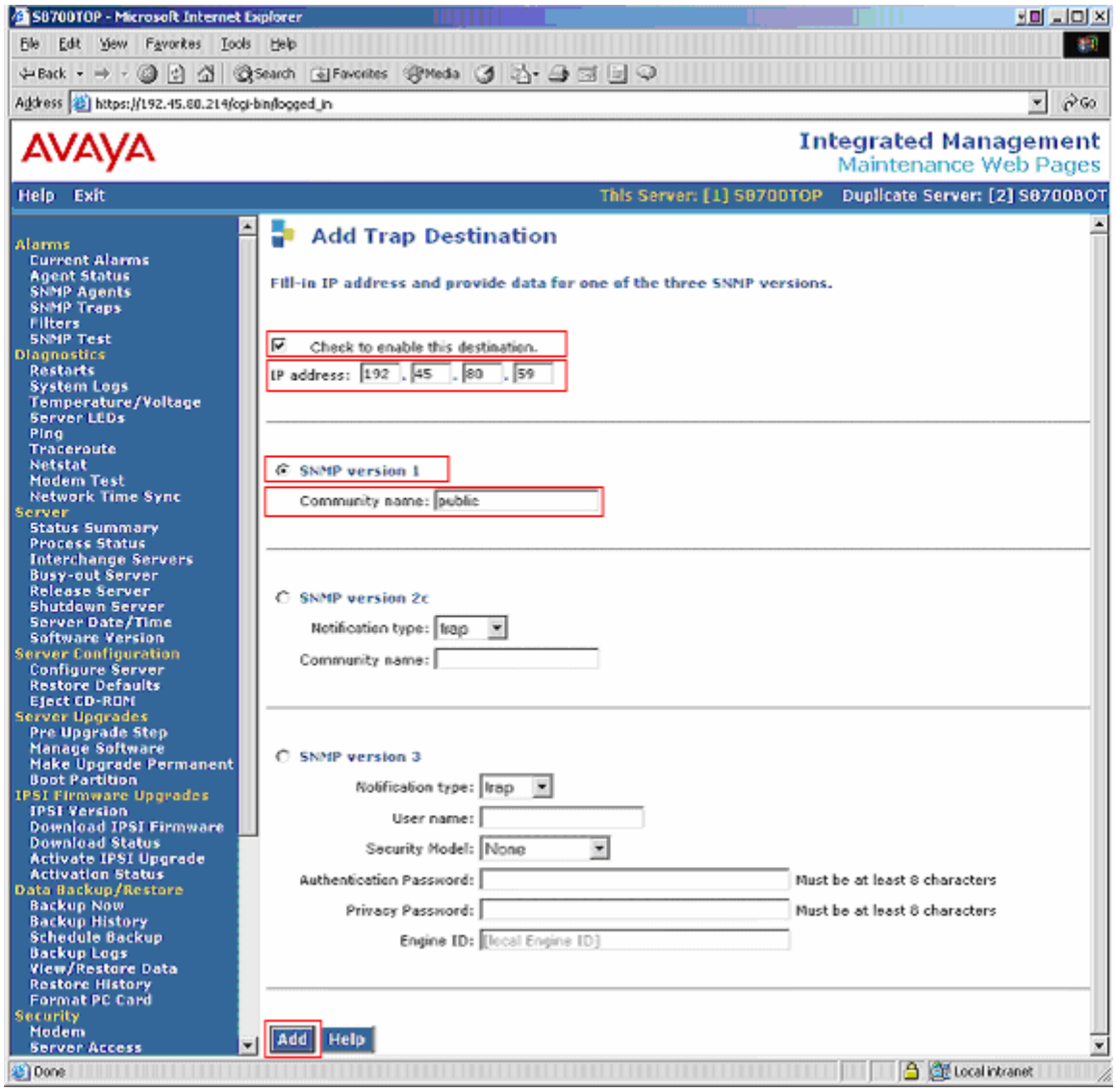
A main menu is presented along the left hand side of the screen. In the **Alarms** section, click on **SNMP Traps.**



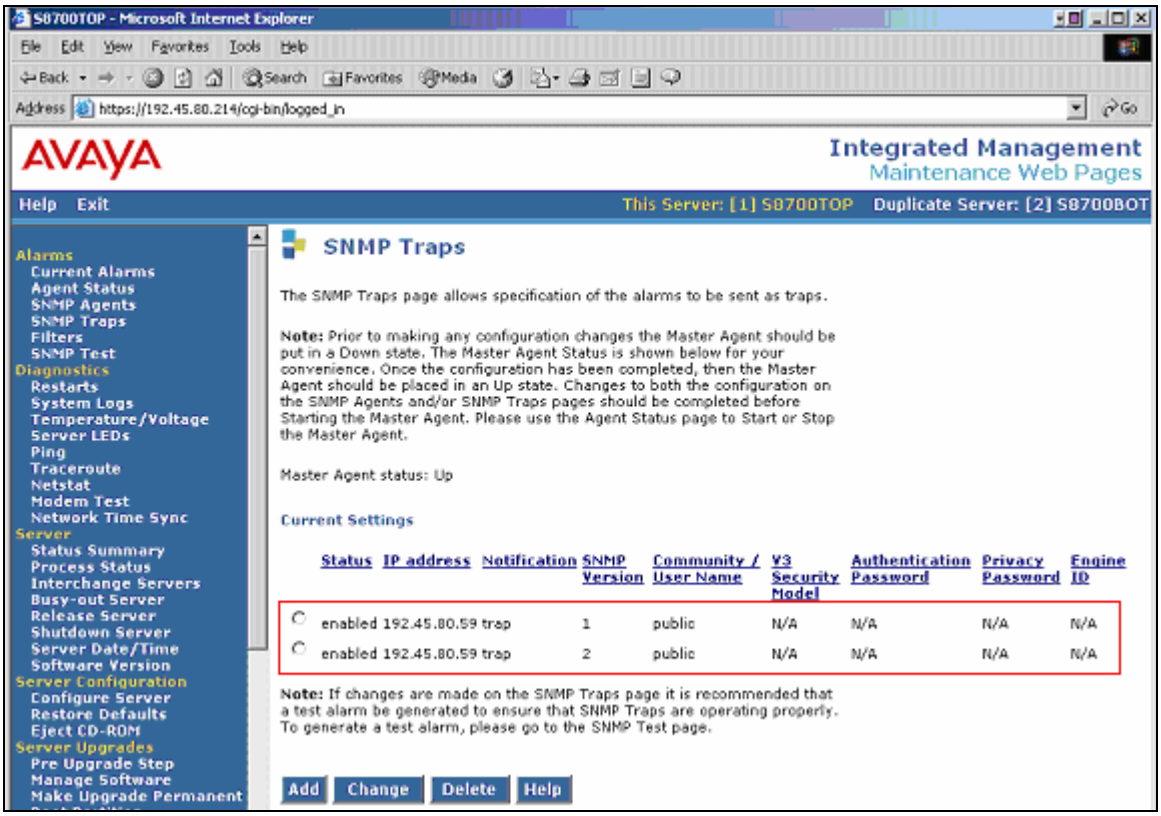
In the SNMP Traps page, click the **Add** button to add the trap destination and SNMP version.



In the **Add Trap Destination** screen, enter the IP address of the Netcool/OMNIbus server (i.e., 192.45.80.59) and enable this SNMP trap destination. To enable SNMP version 1, click the **SNMP version 1** box, and provide the community string for the **Community name** field. Click the **Add** button at the bottom of the screen to complete the trap configuration for SNMP version 1. To enable SNMP version 2c, click the **SNMP version 2c** box, select a **notification type**, and provide the community string for the **Community name** field. Click the **Add** button at the bottom of the screen to complete the trap configuration for SNMP version 2.



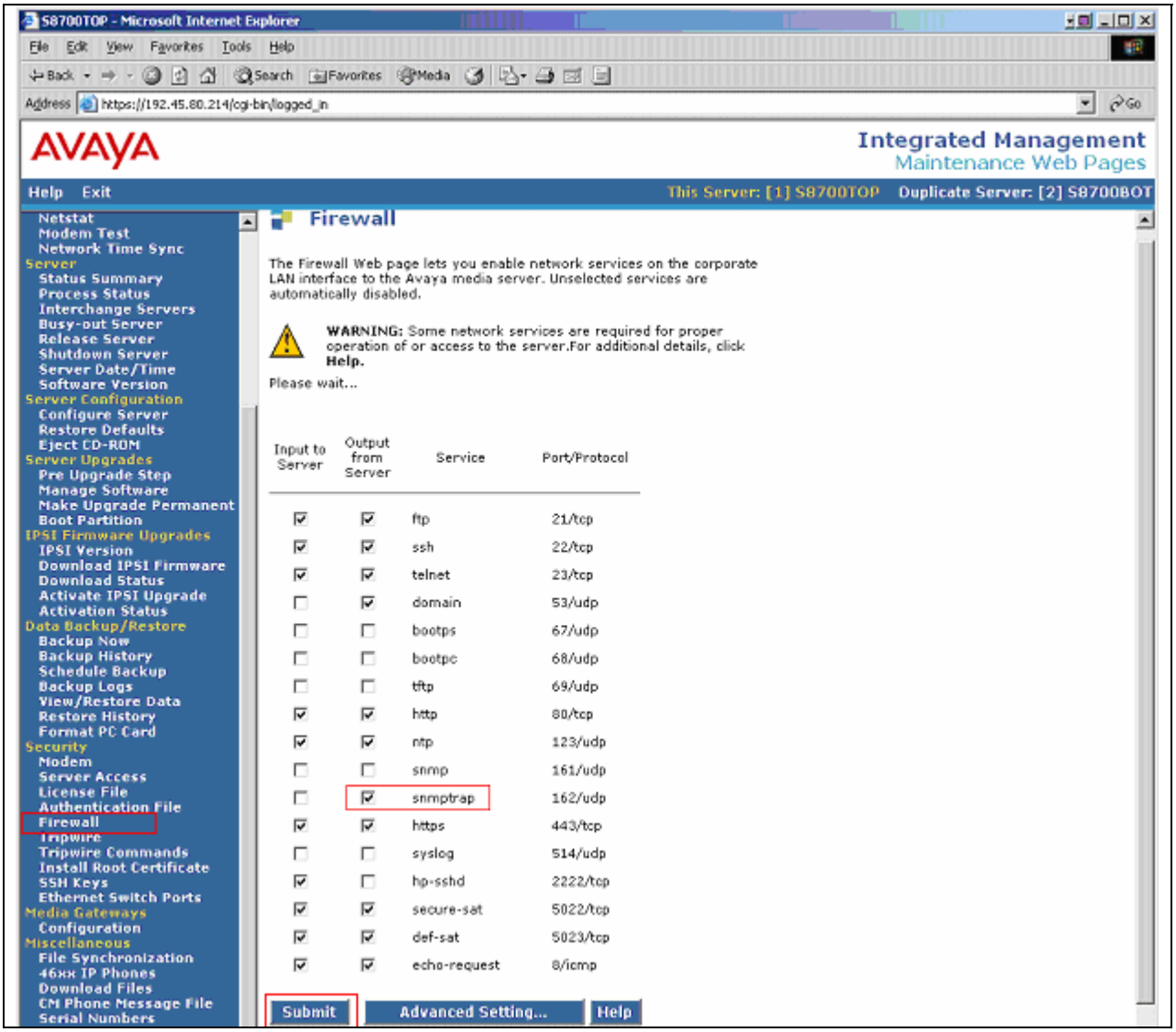
The following screen displays the trap information after the trap configuration is completed. The notification type field for version 2c is set to **trap**. The community name for version 1 and 2c is set to **public**.



The **SNMP Traps** configuration allows the Avaya Media Server to send traps for alarms raised by Avaya Communication Manager and alarms related to the media server's operating system and support software. Avaya Communication Manager running on the S8700 Media Server detects internal failures in the G650 Media Gateway and sends all traps when it controls a G650 Media Gateway. Avaya Communication Manager running on the S8300 Media Server detects internal failures in the G350 Media Gateway and sends all traps to the SNMP trap destination.

3.2. Firewall Configuration

The firewall in the Avaya Media Server must allow SNMP traps to be sent on UDP port 162. Click on the **Firewall** option in the Security section of the menu to display the Firewall page. Click on the **Output from Server** checkbox (2nd column) for **snmptrap 162/udp** and click the **Submit** button to submit the form. This is the only port that needs to be enabled for the media server to send SNMP traps. For an S8700 Media Server pair, the Firewall configuration should be performed on each media server.



3.3. Configuring Alarm Reporting Options

Ensure that the alarms the customer would like to have reported to Netcool/OMNIbus have not been downgraded to a warning alarm; otherwise, these alarms will not be reported via an SNMP trap. Log in to the Avaya Communication Manager SAT, and enter the **set options** command to display the ALARM REPORTING OPTIONS form, and check the Major and Minor columns for each alarm type. In summary, if the Major or Minor column is set to **[w]**arning, **[r]**eporting, or **[n]**o, then that alarm type has either been downgraded to warning severity or alarm reporting has been suppressed. However, if the column is set to **[y]**es or **[m]**inor, then an SNMP trap is sent. See reference [1] for more details on the **set options** form.

```
set options                                                  Page   1 of  22
                            ALARM REPORTING OPTIONS

                                                        Major   Minor
                                 On-board Station Alarms: y     y
                                Off-board Station Alarms: y     y
                  On-board Trunk Alarms (Alarm Group 1): y     y
                 Off-board Trunk Alarms (Alarm Group 1): y     y
                  On-board Trunk Alarms (Alarm Group 2): w     w
                 Off-board Trunk Alarms (Alarm Group 2): w     w
                  On-board Trunk Alarms (Alarm Group 3): w     w
                 Off-board Trunk Alarms (Alarm Group 3): w     w
                  On-board Trunk Alarms (Alarm Group 4): w     w
                 Off-board Trunk Alarms (Alarm Group 4): w     w
                           On-board Adjunct Link Alarms: y     y
                          Off-board Adjunct Link Alarms: y     y
                             Off-board MASI Link Alarms:       y
                                   Off-board DS1 Alarms: y     y

                            Off-board TCP/IP Link Alarms: y     y
                                Off-board Alarms (Other): y     y
                            Off-board ATM Network Alarms:       y
```

Page 2 of the set options form continues with the alarm reporting options for other alarm types, such as Signaling Group alarms.

```
set options                                                  Page   2 of  22
                            ALARM REPORTING OPTIONS

                                                        Major   Minor
                        Off-board Firmware Download Alarms:       y
                          Off-board Signaling Group Alarms:       y
                                        Remote Max Alarms:        y
```

4. Avaya G350 Media Gateway Configuration

This section describes the procedure for configuring the Avaya G350 Media Gateway to report alarms to an SNMP trap destination. As a default, the Avaya G350 Media Gateway forwards all alarms to the media server. In the compliance test, the Avaya G350 Media Gateway registered with the Avaya S8300 Media Server, which was configured as an independent call server (i.e., not a Local Survivable Processor). All alarms were sent to the Avaya S8300 Media Server (192.45.81.11). An administrator may configure another SNMP trap destination by using the following command:

G350-001(super)# snmp-server host <host-addr> <traps|informs> <v1|v2c> <community-name>

The following screen, obtained from the Command Line Interface of the Avaya G350 Media Gateway, displays the SNMP trap configuration used for the compliance test.

```
G350-001(super)# sh snmp

Authentication trap disabled

Community-Access     Community-String
----------------     ----------------
read-only            *****
read-write           *****



SNMPv3 Notifications Status
---------------------------
Traps:  Enabled
Informs:  Enabled         Retries: 3   Timeout: 3 seconds




SNMP-Rec-Address Model  Level   Notification   Trap/Inform      User name
---------------- ----- ------- --------------- ----------- -------------------
192.45.81.11      v1   noauth  all              trap       ReadCommN
 UDP port: 162 DM
```

5. IBM Tivoli Netcool/OMNIbus Configuration

This section describes the procedure for configuring the Netcool/OMNIbus Event Management System to capture SNMP traps. The steps required are:

- Install the Flex license key file
- Install the Netcool Knowledge Library (NCKL) and the Avaya Integration Module for Netcool (IMN)
- Configure the Netcool Probe to receive SNMP traps on UDP port 162
- Configure the Netcool ObjectServer
- Start the Netcool/OMNIbus applications in Windows Services
- Start the Netcool Desktop application to view alerts in the ObjectServer.

All the components were installed and configured by an IBM engineer, prior to the compliance test.

5.1. Install Flex License Key File

Obtain the Flex license keys from IBM Technical Support and copy it to the license.lic file in the C:\Program Files\Netcool\common\license\etc directory. Verify that there is only one file with the .lic extension in this directory. Edit the file and verify the information on the SERVER line in the file. This line should specify the hostname (or IP address) and MAC address of the server where the Flex License Manager is running. The Flex License Manager communicates with other Netcool/OMNIbus applications on TCP port 27000. The format of the SERVER line is: **SERVER <Hostname/IP Address> <MAC Address> 27000**

The following screen displays the content of a sample license file. Restart the Flex License Manager after copying the license file to the aforementioned directory. The license manager log file, license.log, is located in the C:\Program Files\Netcool\common\license\log directory and can aid in troubleshooting problems where the Netcool applications fail to start.

Note: The license keys are generated for the MAC address of the NIC on the Netcool/OMNIbus server.

```
SERVER 192.45.80.59 000cf1aa51ce 27000
VENDOR netcool
USE_SERVER
FEATURE nco_event_nt netcool 20030430 11-apr-2004 10 ck=209 \
SIGN=3B282736318A
FEATURE nco_ove_nt netcool 20030430 11-apr-2004 10 ck=187 \
SIGN=FF63BF9C160E
FEATURE nco_users_nt netcool 20030430 11-apr-2004 10 ck=25 \
SIGN=CF68BF4E400C
FEATURE nco_nco_nt netcool 20030430 11-apr-2004 10 ck=194 \
SIGN=A607F092429C
FEATURE nco_p_mttrapd netcool 20030430 11-apr-2004 10 ck=147 \
SIGN=8B52B50A887C
FEATURE nco_objserv netcool 20030430 11-apr-2004 10 ck=161 \
```

```
SIGN=2B56AF767778
FEATURE nco_ov_nt netcool 20030430 11-apr-2004 10 ck=170 \
SIGN=D0B9EB709AD6
```

5.2. Install the Netcool Knowledge Library (NcKL) and the Avaya Integration Module for Netcool

The traps that the Avaya Media Servers and Gateways are capable of sending are defined in the Avaya SNMP MIBs. The IBM Tivoli Netcool Technology Program has developed an integration package that is available from IBM Technical Support. The integration package has been tested and validated by IBM Tivoli release engineering, and the package and documentation are available from the IBM Open Process Automation Library (OPAL). The rules file defines how the probe should process Avaya event data to create meaningful Netcool/OMNIbus alerts, and the lookup file assigns values to variables used in the rules file.

The Netcool Knowledge Library installation instructions are described in detail in the installation document that comes with the package. The datasheet for the Avaya Communication Manager IMN describes the required steps to include the rules and lookup files from the integration into the Netcool Knowledge Library.

5.3. Configure the Netcool SNMP Probe

The Probe properties file defines the environment in which the probe runs. For example, it includes the location of the rules file, the UDP port on which SNMP traps are received, and the ObjectServer name, amongst other parameters. The mttrapd.props property file contains all of the probe's default parameter settings (lines commented out) and is located in the C:\Program Files\Netcool\etc\rules directory. To override a value, add a line at the end of the file with the parameter name, followed by a colon, and then the parameter value. The following screen shows an example of the **RulesFile** parameter being overridden.

Verify that all of the default settings are being used, including UDP port 162, the ObjectServer name "NCOMS", and the default path to the rules file. The default probe rules file is called mttrapd.rules and it is located in the C:\Program Files\Netcool\etc\rules directory.

Note: The probe must be configured to read the snmptrap.rules file in the Netcool Knowledge Library directory. The default path for the Netcool Knowledge Library is C:\Program Files\Netcool\etc\rules.

```
##############################################################################
#
# Add your settings here
#
##############################################################################

RulesFile: 'C:\\Program Files\\Netcool\\etc\\rules\\snmptrap.rules'
```

5.4. Configure the Netcool ObjectServer

To access the Server Editor, select **Start→Programs→Netcool OMNIbus→System Utilities→ Server Editor**. The ObjectServer configuration specifies the host name (or IP address) and port number that the Probe and the Desktop clients should use to establish a connection to the ObjectServer. Two entries, indexed by the ObjectServer's name (e.g., NCOMS), were created during the installation and should be checked for appropriate values. The ObjectServer's configuration details can be updated through the **Server Editor**. There should be two entries in the Server Editor for the ObjectServer, a client entry and a listener entry. The client entry, highlighted in **Figure 2,** specifies the host name (or IP address) and port number that the SNMP Probe and Desktop clients should use to connect to the ObjectServer. The Listener entry, highlighted in **Figure 3**, is used by the ObjectServer to respond to client requests. For the client and listener entries, the IP address of the server machine, 192.45.80.59 and TCP port number 4100 were specified.

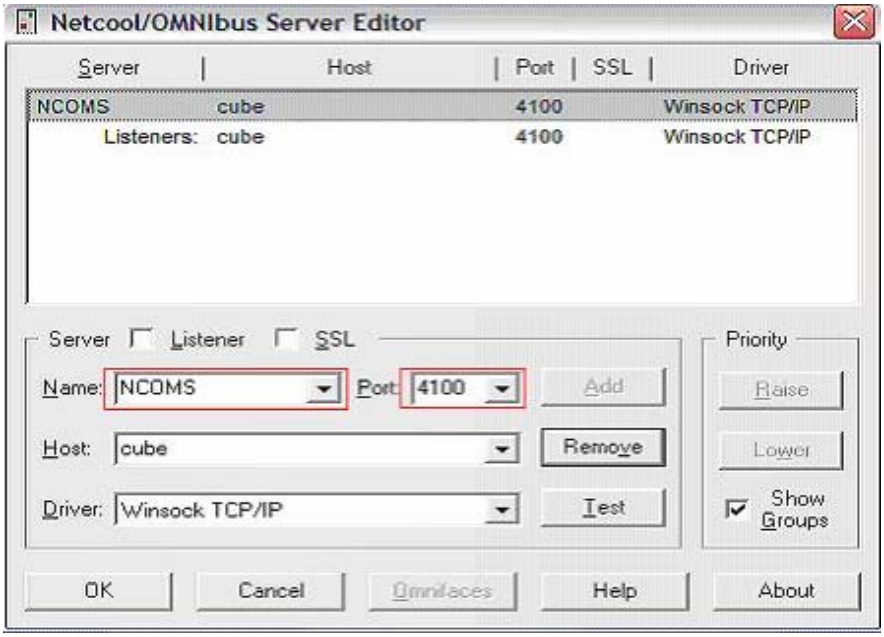


Figure 2: Server Editor (Client Entry)

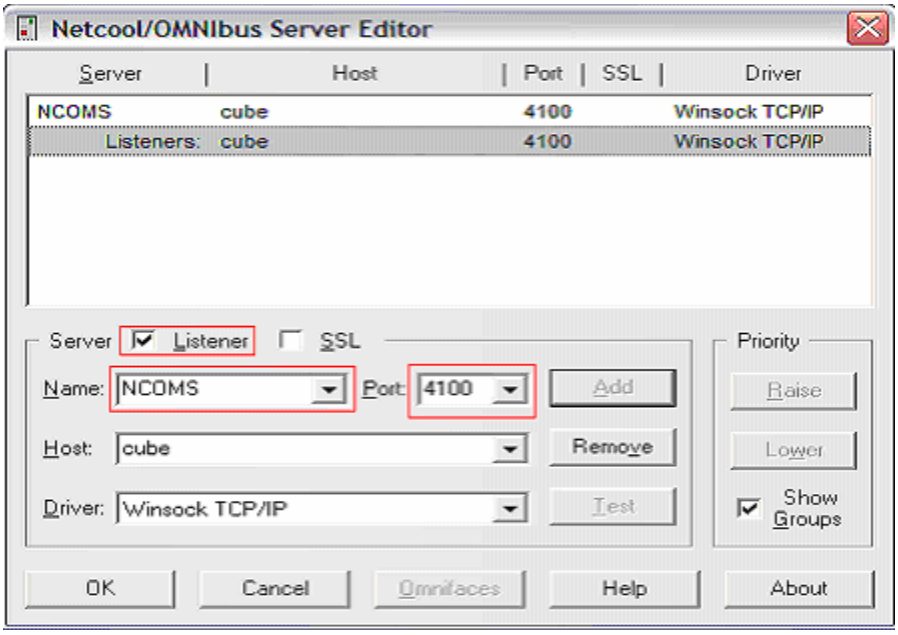


Figure 3: Server Editor (Listener Entry)

5.5. Start the Netcool/OMNIbus Applications

After the installation of the Netcool/OMNIbus software, the following three Components are added to the Windows Services.

- NCO MTTrapD Probe
- NCO Object Server
- Netcool Flex License Manager

These software components need to be running, as indicated by the **started** state in **Figure 4**, to capture and view SNMP traps. To check the process, navigate to **Start → Settings → Control Panel**, select **Administrative Tools**, and select **Services**. To start the applications manually, they must be started in the following order: Flex License Manager, Object Server, and then MTTrapD Probe. If any of the Netcool/OMNIbus applications fail to start, check the license key file.

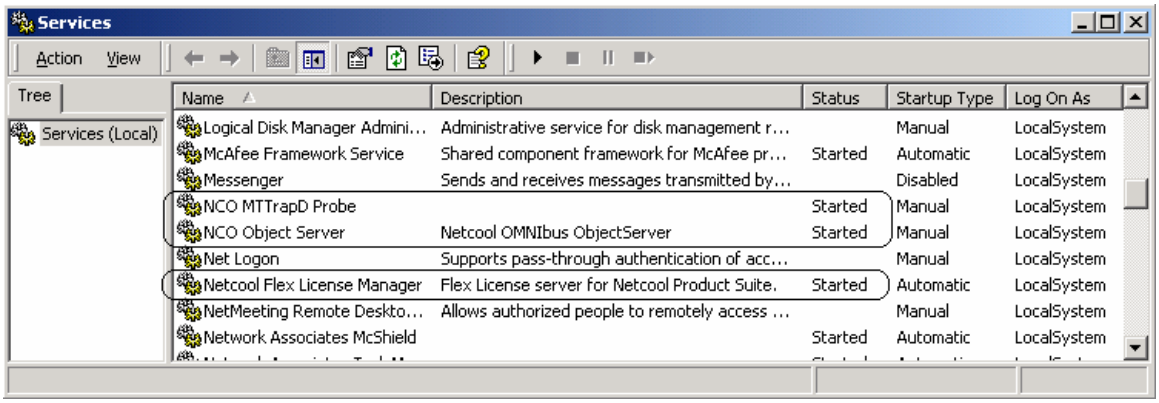


Figure 4: Netcool/OMNIbus Applications in Windows Services

5.6. Start the Event List Application

The alert or event information stored in the Netcool ObjectServer can be viewed through the Event List application in the Desktop Tools. To start the Event List application, select **Start→Programs→Netcool OMNIbus→Event List**. Log in with the appropriate username and password. In the Event List Login window, specify the ObjectServer to connect to, which is NCOMS in this case. Click on the **OK** button.

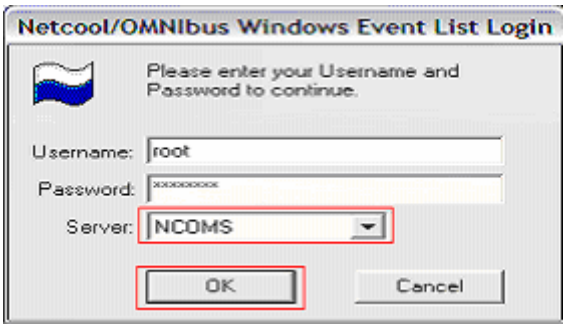


Figure 5: Event List Login Window

After logging in, the Monitor Box window is displayed, as shown in **Figure 6**. The Monitor Box window contains monitor boxes that represent a list of events that match a particular criteria or filter. A monitor box is identified by its name located at the top of each monitor box, such as "All Events" or events captured in the "Last 10 Min…". To view the event information for a particular monitor box, click on the ellipsis button. The Event List illustrated in **Figure 7** is displayed.

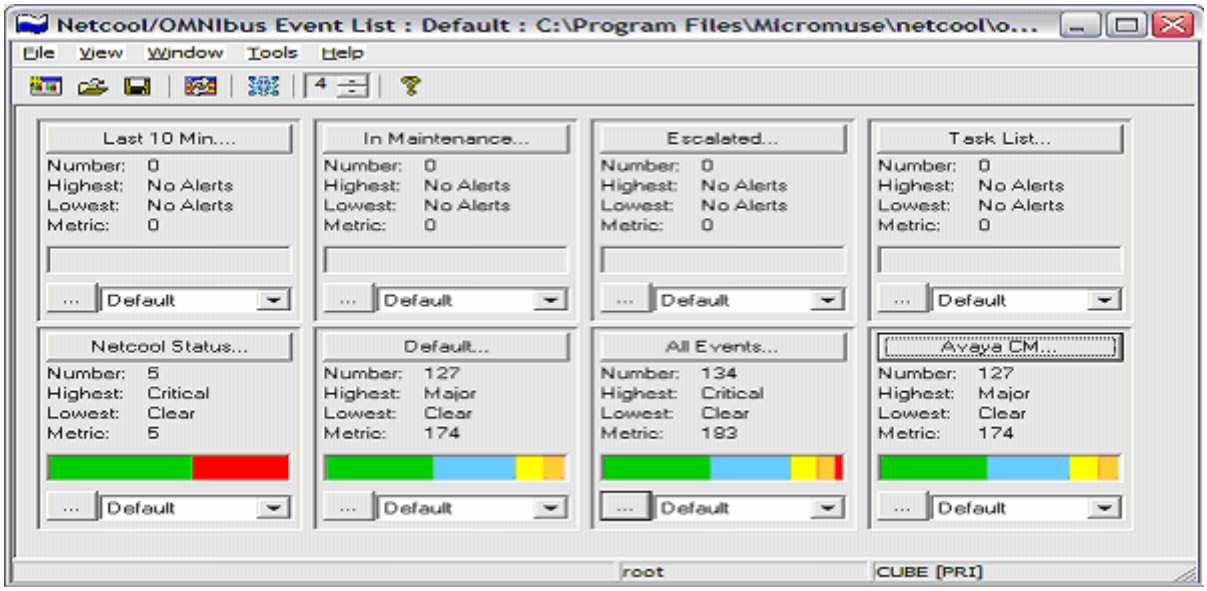


Figure 6: Event List - Monitor Box Window

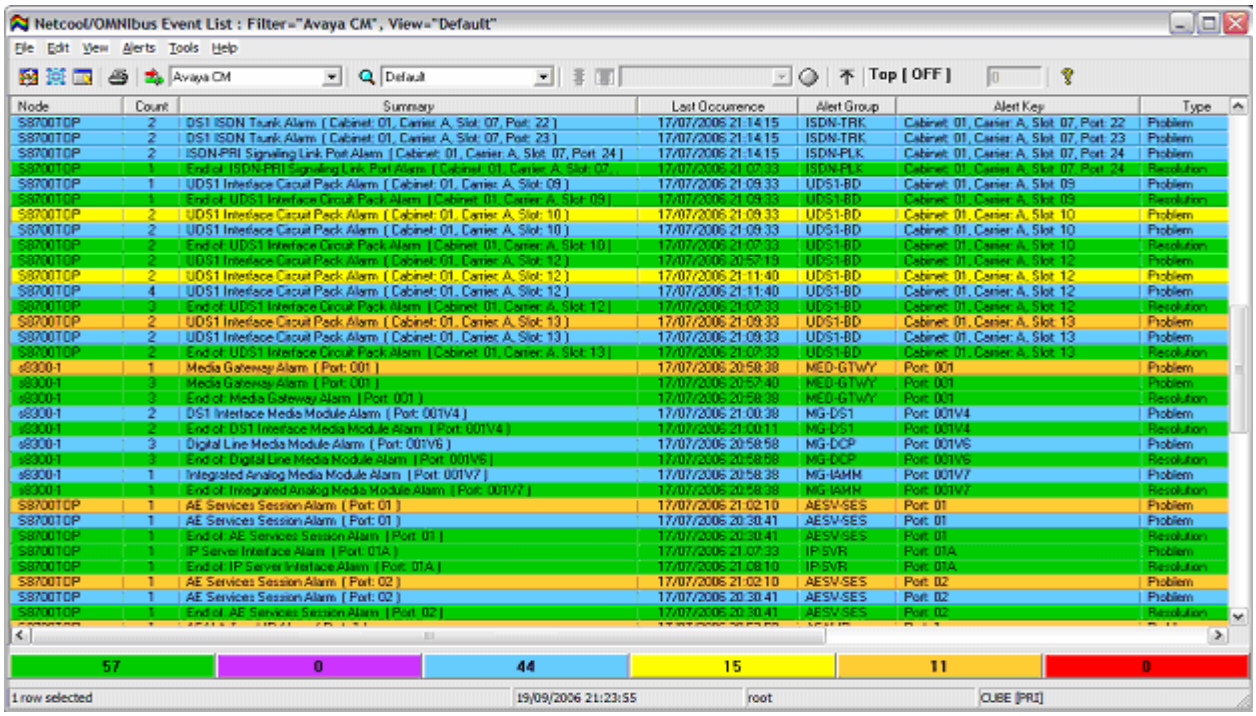


Figure 7: Event List Window

The Event List displays event information in a scrollable list that is color-coded based on the severity of the alert or event. The colors and severity levels supported by Netcool/OMNIbus are summarized in **Table 1**. Events captured by the Netcool Probe are assigned a severity in the rules file generated in Section 5.2. For more information on using the Event List application, refer to reference [5].

Severity	Description	Desktop Color
5	Critical	Red
4	Major	Orange
3	Minor	Yellow
2	Informational	Blue
1	Indeterminate	Purple
0	Clear	Green

Table 1: Netcool/OMNIbus Severity Levels

6. Interoperability Compliance Testing

The objective of the interoperability compliance test was to verify that the Netcool/OMNIbus Event Management System could receive v1 and v2c SNMP traps from the Avaya G350 Media Gateway, Avaya S8300 and S8700 Media Servers. The collected SNMP traps were viewed with the Netcool Event List application.

6.1. General Test Approach

All test cases were performed manually. The general test approach used for the compliance testing included:

- Generating v1 and v2c SNMP traps from the Avaya S8300 and S8700 Media Servers.
- Using a protocol analyzer to verify that SNMP traps were sent from the Avaya Media Servers to the Netcool/OMNIbus system.
- Viewing the SNMP traps with the Netcool Desktop application.

6.2. Test Results

All tests were completed successfully. Netcool/OMNIbus successfully captured and processed the event information sent by the Avaya Media Servers and Gateways using v1and v2c SNMP traps. Importing the Avaya SNMP MIBs using a Netcool rules file is necessary to achieve interoperability between the Avaya Media Servers and Gateways and Netcool/OMNIbus. The customer should contact IBM Technical Support for assistance in developing the trap rules.

7. Verification Steps

To verify the network management solution using the Netcool/OMNIbus Event Management System to capture SNMP traps from the Avaya Media Servers and Gateways, the following steps were performed:

- Check IP communication between the Avaya Media Servers and Gateways and Netcool/OMNIbus server using the "ping" command.
- Verify that the Netcool/OMNIbus applications are running under Windows Services.
- Generate an event or alarm, such as restarting the Master SNMP Agent on the web interface, from each Avaya Media Server and Gateway and verify that the SNMP trap was received. A protocol analyzer may be used to verify that the Avaya Media Server sent the SNMP trap to the Netcool/OMNIbus server.

If the event or alarm is not displayed in the Netcool Event List, check the following items:

- Check that the Event List application is not incorrectly filtering out events/alarms.
- Check that the alarm reporting options in the Avaya Communication Manager **set options** form are allowing the appropriate alarms to be reported.
- Check the SNMP trap destinations in the Avaya Media Servers and Gateways.
- Check that the firewall in the Avaya Media Server is allowing SNMP traps to be sent on UDP port 162.
- Check that the SNMP Probe is listening for SNMP traps on UDP port 162.
- Using a protocol analyzer, check whether the SNMP trap is sent to the Netcool/OMNIbus server.

8. Support

Technical support for the IBM Tivoli Netcool/OMNIbus Event Management System can be obtained by contacting the IBM Technical support via the support link at askibm@vnet.ibm.com or by calling the support telephone number at 1-800-IBM-SERV (1-800-426-7378).

9. Conclusion

These Application Notes illustrate the configuration steps required to enable the IBM Tivoli Netcool/OMNIbus Event Management System to monitor a network of Avaya Media Servers and Gateways for significant events and alarms. Compliance testing was successful as Netcool/OMNIbus captured v1 and v2c SNMP traps sent by the Avaya Media Servers and Gateways. Netcool/OMNIbus also processed the event information and displayed it in a meaningful way.

10. Additional References

This section references the Avaya and IBM Tivoli product documentation relevant to these Application Notes. The following Avaya product documentation can be found at http://support.avaya.com.

[1] Maintenance Alarms for Avaya Communication Manager 3.1, Media Gateways and Servers, Issue 2, February 2006, 03-300430
[2] Maintenance Commands for Avaya Communication Manager 3.1, Media Gateways and Servers, Issue 2, February 2006, 03-300431

The following IBM Tivoli product documentation was referenced during the interoperability compliance test. To acquire the following documentation, contact IBM technical support.

[3] Netcool/OMNIbus 7.0.6 Installation and Deployment Guide
[4] Netcool/OMNIbus 7.0.6 Administration Guide
[5] Netcool/OMNIbus 7.0.6 User Guide
[6] Micromuse Standards for Probe Rules Files

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya Developer*Connection* Program at devconnect@avaya.com.