HP Web Jetadmin Integration into HP OpenView Network Node Manager

Overview

Among the many functions that Enterprise Management Solutions such as HP OpenView Network Node Manager provide to IT administrators, the ability to maintain, monitor, and troubleshoot network nodes remains a high priority. It is important to provide accurate viewing of the network and quick identification of problems so they can be resolved before they escalate to a critical stage.

Enterprise Management Solutions can monitor the status and configuration of network elements such as routers, switches, servers, and printers, representing the status and logical layout of the network in a two or three-dimensional map (see Figure 1). However, to effectively manage printers, administrators require more detailed printer information to quickly resolve printer issues before they severely impact customer productivity. Ideally, administrators require the type of printer installation, configuration, maintenance, monitoring, and troubleshooting that a printer management solution such as HP Web Jetadmin can provide.

Fortunately, HP Web Jetadmin can integrate into Enterprise Management Solutions such as HP OpenView Network Node Manager. With the integration of HP Web Jetadmin into these Enterprise Management Solutions, Hewlett-Packard has extended the reach of these solutions to include complete printer management. From the same interface, network administrators can now access all of their Enterprise Management tools and the powerful functionality of HP Web Jetadmin.

HP Web Jetadmin can also be used to assist in configuring printers to forward critical and warning events (traps) into the Enterprise Management Solutions. The events can appear in the event logs or alarm browsers to proactively troubleshoot problems and solve them before they impact end users.

Without the Enterprise Management integration, an administrator would need to maintain two separate platforms for network management, one for printers (HP Web Jetadmin) and one for the rest of the network (the Enterprise Management platform). This means twice the setup, configuration, and maintenance of an integrated package, and the need to monitor two separate user interfaces for alarms.

Software “bridges” can be created for the Enterprise Network Node Manager, and more than likely other Enterprise...
Management Solutions such as CA Unicenter TNG or Tivoli NetView, to provide the “hooks” into HP Web Jetadmin to view more detailed printer information.

However, this paper will focus strictly on creating and customizing bridges and forwarding printer traps for HP OpenView Network Node Manager 6.4 only.

For information regarding HP Web Jetadmin integration into HP Systems Insight Manager, please read the technical brief titled “HP Web Jetadmin Integration for HP Systems Insight Manager”, found on the following HP Web site:

http://www.hp.com/go/wja_whitepapers

Creating a Bridge

HP Web Jetadmin integrates into the Network Node Manager framework through the use of a software bridge. The bridge provides a “hook” between the functionality of Network Node Manager and HP Web Jetadmin, providing an easy technique for users running Network Node Manager to switch to an HP Web Jetadmin view for any printer to gather more details.

A customized bridge can be easily created in Network Node Manager that allows for the launching of an HP Web Jetadmin Status page whenever a symbol is opened from a device map (see Figures 1 and 2).

To create a bridge, create a file named HPWJABridge.arf using a standard text editor such as Microsoft Notepad, and place it under the following subdirectory:

/Program Files/HP OpenView/registration/C

Appendix A contains a sample of a basic bridge as well as a more advanced one. Merely supply the name and port of the desired HP Web Jetadmin server where indicated.

Since HP Web Jetadmin supports all Standard Printer MIB compliant third party printers as well as HP printers, the bridge in the example defines expected printer attributes as “isPrinter”. Therefore, as long as the printer appears as a printer icon in the map and contains the “isPrinter” attribute, no matter which vendor, the printer can be configured to launch a separate HP Web Jetadmin Status window whenever the printer is opened from the Network Node Manager map. A raised box around the icon indicates it has been configured to launch HP Web Jetadmin (see Figure 1).

The bridge can also be modified (see second example in Appendix A) to add an entry under the Tools drop-down menu to launch HP Web Jetadmin, as well as an option to launch an HP Web Jetadmin Status Page for a device when right-clicking on the device in the map.

Bridge Configuration

To configure a device on the Network Node Manager map to use the bridge, right-click on the desired printer icon, then select Symbol Properties (see Figure 3). Change the Status Source to Symbol and select HPWebJetadminActions: WJALaunch from the Application Action list. Finally, select the Target Objects button and add the printer. As long as the printer matches the bridge criteria defined in the bridge file, the configuration should succeed.

If configuration fails, it is more than likely caused by a mismatch between the printer attributes and the criteria defined in the bridge file. To view the printer attributes, right-click the printer icon, and select Object Properties (see Figure 3). The Capabilities option will provide a list of attributes that describe the object...
Once the configuration succeeds, a separate HP Web Jetadmin Status window will appear when any printer is opened from the Network Node Manager map (see Figure 5).

**Bridge Operation**

Generally, the status of a network element is reflected by its color on the Network Node Manager map – green for up, red for down (see Figure 6). If a problem is detected on a printer, the administrator can easily switch to the HP Web Jetadmin Status view of the printer, which provides much more information than the standard Network Node Manager interface, by simply clicking on the device. A separate HP Web Jetadmin device Status window will appear, providing the ability to perform many tasks to assist in diagnosing and fixing any issues that exist. For example, typical functionality that HPWeb Jetadmin provides to solve
printer issues includes (see Figure 7):

- **Status** - display current status, front panel message, capabilities, properties, set printer online/offline.
- **Configuration** – a multitude of device, network, and security parameters can be configured, including a fully functional remote control panel for many printer models.
- **Diagnostics** – view additional device information such as serial number, page count, error log, Novell NetWare queue status, etc.
- **Reset Options** - power cycle printer, cold reset printer to factory defaults, reset NetWare connections.
- **Update** – upgrade the firmware version for both HP Jetdirect and printer.
- **Create Queue** – install a print queue using the Standard Port Monitor for Windows.
- **Test Page** – test basic functionality by forcing the printer to print an internal configuration page.
- **Print Jobs** – view most recent print jobs to have completed printing on the printer.
- **Disk Jobs** – view or delete any stored print jobs.
- **Alerts** – configure printer events to trigger e-mail messages to desired individuals.
- **Application Plug-ins** – additional functionality, such as the ability to manage fonts and macros through the Device Storage Manager, can be installed into HP Web Jetadmin and accessed for a printer.
- **NetWare** – create a Novell NetWare queue using queue server mode or remote printer mode.

Not all functionality will be available for all models of printers. To see a
matrix that matches HP printers and functionality that applies to each, read the technical brief titled “Supported Printer Features in HP Web Jetadmin”.

Alarms

Network Node Manager contains alarm browsers that filter device events based on acknowledgment, severity, time, source, message, and/or event type. The Alarm Categories window contains buttons corresponding to each of the alarm categories. While Network Node Manager defines a set of default categories, new categories can be created, and the alarms assigned to a category can be modified. The color of the push button reflects the most severe unacknowledged alarm in the category.

Traps

Fortunately, through the use of HP Web Jetadmin, printers can be instructed to send real-time SNMP traps whenever error conditions exist on the printers. A trap is a brief message explaining the type of problem and some relevant details such as event type, description, etc. The events will then appear in the Network Node Manager alarm browser, which operators will use to drill down to the root cause of the problem using the HP Web Jetadmin bridge.

HP Web Jetadmin has its own Alerts mechanism which configures itself in the trap destination list of the HP Jetdirect device and sends e-mail messages to desired recipients when problems occur on the printer.

HP Web Jetadmin can be used to also configure a printer to send traps directly into Network Node Manager to be displayed in the alarm browsers. HP Web Jetadmin can also be used to configure multiple printers simultaneously by selecting Configuration from the Device Tools drop-down menu while viewing either a group or selecting multiple devices from the list of All Devices.

Note: Some traps can occur very frequently on printers, such as Toner Low events. Be aware that Network Node Manager may receive a large number of traps. Fortunately, the frequency of reporting the event can be customized in Network Node Manager, as well as which events will appear in the alarm browser.
Using HP Web Jetadmin to configure printers to forward traps into Network Node Manager offers some distinct advantages, particularly with respect to alarming. First of all, all alarms can be viewed through the unified alarm views of Network Node Manager, eliminating the need to have two user interfaces running at the same time. Second, and perhaps more importantly, the range of automatic actions is vastly greater in Network Node Manager. With HP Web Jetadmin, the only automatic action possible is e-mail. With Network Node Manager, an administrator can configure any executable file, batch file or script to run in the event of a given alarm. So instead of relying on e-mail exclusively, an administrator can choose to page someone, trigger a helpdesk ticket through a ticketing system such as Remedy or Peregrine, or use any other means of notification that is possible through executables, batch files, or scripts.

**Configuring Network Node Manager to Recognize Traps**

In order for Network Node Manager to recognize the traps sent to it from devices, the trap definitions must be defined in the trapd.conf file. If HP Jetdirect traps are not defined, Network Node Manager will still display them because it will recognize them as part of the ENTERPRISES enterprise. However, the events will not be displayed with informative text such as they would if definitions are defined. For example, Figure 15 depicts three different events, each with and without definitions defined.

The trapd.conf file contains definitions for the handling of SNMP traps generated by SNMP agents. It includes information on how to format the log and what action to take, if any, upon receiving an event. The formats are also used to present messages in the alarm browser. The primary method for modifying the trapd.conf definitions is through the Options, Event Configuration item of Network Node Manager, although it is possible (but not recommended) to edit the trapd.conf file with a text editor.

Trap events can be created/edited by selecting Options, Event Configuration in Network Node Manager (see Figure 9). Enterprises and events can be created, and actions can be defined for those events.

An enterprise must first be created before events can be created. To create an enterprise, select Edit, Enterprise, New (see Figure 10). Enter the name of an enterprise e.g. net-printer. Assign an ID to the enterprise. In the case of HP printers, use the Object Identifier .1.3.6.1.4.1.11.2.3.9.1 This generalDeviceStatus object is sent in a UDP SNMPv1 Trap packet, along with a 5 digit-trap value each
time an event occurs on the printer. Appendix B contains a table of common 5-digit trap values sent when events occur on HP printers.

To create an event to be assigned to this enterprise, highlight the enterprise from the list, then select Edit, Events, New (see Figure 11). A New Event Wizard will launch, allowing for defining several parameters. On the first screen, under Specific Trap Number, enter the desired 5-digit trap number that corresponds to an event from the table in Appendix B. Enter an Event Name and Description that matches the desired event.

The second screen allows for selecting sources (devices) to which the event will apply. The default is to select All Sources, but individual devices can also be entered or selected from the map.

The third screen allows for defining which alarm browser will contain the event, the severity of the event, and the message that will appear in the event log (see Figure 12). This same message will appear in the alarm browser as well (see Figure 13). Additional examples of events and how they are displayed in the alarm browser can be found in Appendix C.

The final screens will allow for defining a command to be executed when the event occurs or for a popup message to appear, and for specifying destinations to which
events can be forwarded. Destinations include remote managers, other management hosts, or a combination of both.

Once all configuration settings are completed, the settings will be written to the trapd.conf file. When the events occur on the printers configured to send traps to Network Node Manager, the desired alarm browser container will display the event as defined (see Figure 13).

To determine more information pertaining to the printer event displayed in the alarm browser, or to potentially fix the issue that is occurring on the printer, double-click on the event in the alarm browser. The Network Node Manager map will appear, with the device containing the error highlighted. Now double-click on the highlighted device to launch HP Web Jetadmin.

**Troubleshooting Alarms**

If the printer events are not appearing in the alarm browser, there are several troubleshooting steps that can be taken to determine why.

From a Command Prompt, create a telnet session to the desired printer to determine if the IP address of the machine running Network Node Manager is contained in the Trap Destination List of the HP Jetdirect device (see Figure 14). If the IP address is present, confirm that the port is 162 (or matches the port to which Network Node Manager is listening).

If the device is configured to send traps to the proper destination, use the SNMP MIB Browser tool in Network Node Manager, found under the Tools drop-down menu, to determine if the HP Jetdirect device is sending SNMPv1 traps (see Figure 15). Enter the IP address of the printer under Name or address, then enter the following OID under MIB Object ID to walk the tree:

```
.1.3.6.1.4.1.11.2.13.1.2
```

If the .5.1 parameter (or 5.2, 5.3, depending on which entry is the one matching Network Node Manager) has a value of 0, then it is configured for SNMPv1 traps. If the value is 1, then the HP Jetdirect device is sending SNMPv2 traps, which will not be parsed correctly by Network Node Manager using the net-printer enterprise. Use the telnet session to delete the entry if it is set to send SNMPv2 traps, then add the entry again using either telnet or HP Web Jetadmin, which will default to SNMPv1.
If the device is configured correctly to send SNMPv1 traps, use a sniffer or network trace software such as Microsoft Network Monitor to determine if the traps are indeed being sent by the printer. Traps will appear as UDP packets.

Finally, commands exist in Network Node Manager to display all received traps, send traps, etc. Use the Network Node Manager Help functions to learn more about native troubleshooting tools.

Summary

With the integration of HP Web Jetadmin into Enterprise Management Solutions, Hewlett-Packard has extended the reach of these solutions to include complete printer management. From the same interface, network administrators can now access all of their Enterprise Management tools and the powerful functionality of HP Web Jetadmin. In addition, critical and caution events can appear in the event logs or alarm browsers of Enterprise Management Solutions to proactively troubleshoot problems and solve them before they impact end users.

Support/Services

The information contained within this document is provided “as is”. The solutions provided are examples only, with no official testing conducted or support provided on these solutions. However, for assistance pertaining to general HP Web Jetadmin or HP OpenView Network Node Manager issues, contact regional support centers found at the following location: www.hp.com, select Contact HP, Technical Support.
Appendix A

Sample of a simple HPWJABridge.arf file

Merely substitute the host name or IP address of the desired HP Web Jetadmin machine under *WJA machine* in the url.

This file as defined above will cause the device Status page of HP Web Jetadmin to be launched for a device when double-clicking on the device in the Network Node Manager map. Additionally, this file can be altered (below) to include HP Web Jetadmin as an available item when right-clicking on a device (popup) or from the *Tools* drop-down menu.

Sample of an advanced HPWJABridge.arf file
## Appendix B

<table>
<thead>
<tr>
<th>Trap ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10031</td>
<td>Checking Printer</td>
</tr>
<tr>
<td>35037</td>
<td>Page Punt (error 21)</td>
</tr>
<tr>
<td>35076</td>
<td>Memory Out (error 20)</td>
</tr>
<tr>
<td>40010</td>
<td>Toner Out</td>
</tr>
<tr>
<td>40019</td>
<td>Output Full</td>
</tr>
<tr>
<td>40021</td>
<td>Cover Open</td>
</tr>
<tr>
<td>40026</td>
<td>Tray Missing</td>
</tr>
<tr>
<td>40038</td>
<td>Toner Low</td>
</tr>
<tr>
<td>40050</td>
<td>Generic Error</td>
</tr>
<tr>
<td>40051</td>
<td>Fatal Error</td>
</tr>
<tr>
<td>40052</td>
<td>Scanner Failure</td>
</tr>
<tr>
<td>40059</td>
<td>Main Motor Failure</td>
</tr>
<tr>
<td>40079</td>
<td>Offline</td>
</tr>
<tr>
<td>40090</td>
<td>Envelope Connection Error</td>
</tr>
<tr>
<td>40124</td>
<td>Duplex Connection Error</td>
</tr>
<tr>
<td>41002</td>
<td>Tray 1 Load Paper</td>
</tr>
<tr>
<td>41202</td>
<td>Tray 2 Load Paper</td>
</tr>
<tr>
<td>41302</td>
<td>Tray 3 Load Paper</td>
</tr>
<tr>
<td>41502</td>
<td>Tray 4 Load Paper</td>
</tr>
<tr>
<td>44001</td>
<td>Paper Jam - Input</td>
</tr>
<tr>
<td>44002</td>
<td>Paper Jam - Output</td>
</tr>
<tr>
<td>44003</td>
<td>Paper Jam - Top Cover</td>
</tr>
<tr>
<td>44004</td>
<td>Paper Jam - Duplexer</td>
</tr>
</tbody>
</table>
Appendix C

The three events below displayed with and without definitions in the trapd.conf file.