IBM® Tivoli® Netcool/OMNIbus Generic Probe for TMF814 (V2.1, V3.0 and V3.5) (CORBA) 4.0

Reference Guide
July 28, 2016
Notice

Before using this information and the product it supports, read the information in Appendix A, “Notices and Trademarks,” on page 47.

Edition notice

This edition (SC27-5611-03) applies to version 4.0 of IBM Tivoli Netcool/OMNibus Generic Probe for TMF814 (V2.1, V3.0 and V3.5) (CORBA) and to all subsequent releases and notifications until otherwise indicated in new editions.

This edition replaces SC27-5611-02.

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About this guide

The following sections contain important information about using this guide.

Document control page

Use this information to track changes between versions of this guide.

The IBM Tivoli Netcool/OMNIbus Generic Probe for TMF814 (V2.1, V3.0 and V3.5) (CORBA) documentation is provided in softcopy format only. To obtain the most recent version, visit the IBM® Tivoli® Information Center:


<table>
<thead>
<tr>
<th>Document version</th>
<th>Publication date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC27-5611-00</td>
<td>July 5, 2013</td>
<td>First IBM publication.</td>
</tr>
</tbody>
</table>

Table 1. Document modification history
<table>
<thead>
<tr>
<th>Document version</th>
<th>Publication date</th>
<th>Comments</th>
</tr>
</thead>
</table>
| SC27-5611-02     | March 10, 2016  | Updated “Summary” on page 1 package version number to 3.0.  
Updated “SSL-based connectivity” on page 5.  
Added “Properties and command line options provided by the Java Probe Integration Library (probe-sdk-java) version 9.0” on page 26.  
Updated “Properties and command line options” on page 19.  
Added descriptions for the following properties: NotificationClientType, ORBDebug, ORBDebugFile, EnableSSL, KeyStore, KeyStorePassword, and SecurityProtocol.  
Updated “Known issues” on page 38 with new section on 32-bit nonnative binary support.  
Version 3 of the probe addresses the following enhancement requests:  
• **RFE 53160**: Support for processing a single StructuredEvent added. |
| SC27-5611-03     | July 28, 2016   | Updated “Summary” on page 1 package version number to 4.0.  
Added description for the ResyncAlarmObject property to “Properties and command line options” on page 19.  
Descriptions for $route_cc, $SNCState, $transmissionParameters, and $tpsToModify added to “Elements” on page 28.  
Version 4 of the probe addresses the following enhancement requests:  
• **RFE 82307**: Allow the user to configure the function calls for retrieving active alarms from EMS/NMS.  
• **APAR IT14347**: Provide support for the following object types: Layered ParameterList, SNC State, Route, and Termination Point Data List in incoming events. |

### Conventions used in this guide

All probe guides use standard conventions for operating system-dependent environment variables and directory paths.

#### Operating system-dependent variables and paths

All probe guides use standard conventions for specifying environment variables and describing directory paths, depending on what operating systems the probe is supported on.

For probes supported on UNIX and Linux operating systems, probe guides use the standard UNIX conventions such as $variable for environment variables and forward slashes (/) in directory paths. For example:

```
$OMNIHOME/probes
```
For probes supported only on Windows operating systems, probe guides use the standard Windows conventions such as %variable% for environment variables and backward slashes (\) in directory paths. For example:

%OMNIHOME%\probes

For probes supported on UNIX, Linux, and Windows operating systems, probe guides use the standard UNIX conventions for specifying environment variables and describing directory paths. When using the Windows command line with these probes, replace the UNIX conventions used in the guide with Windows conventions. If you are using the bash shell on a Windows system, you can use the UNIX conventions. 

**Note**: The names of environment variables are not always the same in Windows and UNIX environments. For example, %TEMP% in Windows environments is equivalent to $TMPDIR in UNIX and Linux environments. Where such variables are described in the guide, both the UNIX and Windows conventions will be used.

**Operating system-specific directory names**

Where Tivoli Netcool/OMNIbus files are identified as located within an arch directory under NCHOME or OMNIHOME, arch is a variable that represents your operating system directory. For example:

$OMNIHOME/probes/arch

The following table lists the directory names used for each operating system.  

**Note**: This probe may not support all of the operating systems specified in the table.

<table>
<thead>
<tr>
<th>Operating system</th>
<th>Directory name represented by arch</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX® systems</td>
<td>aix5</td>
</tr>
<tr>
<td>Red Hat Linux® and SUSE systems</td>
<td>linux2x86</td>
</tr>
<tr>
<td>Linux for System z</td>
<td>linux2s390</td>
</tr>
<tr>
<td>Solaris systems</td>
<td>solaris2</td>
</tr>
<tr>
<td>Windows systems</td>
<td>win32</td>
</tr>
</tbody>
</table>

**OMNIHOME location**

Probes and older versions of Tivoli Netcool/OMNIbus use the OMNIHOME environment variable in many configuration files. Set the value of OMNIHOME as follows:

- On UNIX and Linux, set $OMNIHOME to $NCHOME/omnibus.
- On Windows, set %OMNIHOME% to %NCHOME%\omnibus.

**Examples of log messages**

This guide includes examples of messages that can appear in the probe's log files. These examples omit the time and date stamp for clarity.
Chapter 1. Generic Probe for TMF814

The IBM Tivoli Netcool/OMNibus Generic Probe for TMF814 (V2.1, V3.0 and V3.5) (CORBA) acquires data from network management systems (NMS) and element management systems (EMS) using a TMF814 (V2.1, V3.0 or V3.5) Common Object Request Broker Architecture (CORBA) interface.

This guide contains the following sections:

• “Summary” on page 1
• “Installing probes” on page 2
• “Configuring the probe” on page 2
• “Firewall considerations” on page 4
• “SSL-based connectivity” on page 5
• “Running the probe” on page 6
• “Data acquisition” on page 6
• “Properties and command line options” on page 19
• “Elements” on page 28
• “Error messages” on page 35
• “ProbeWatch messages” on page 37
• “Known issues” on page 38

Summary

Each probe works in a different way to acquire event data from its source, and therefore has specific features, default values, and changeable properties. Use this summary information to learn about this probe.

The following table summarizes the probe.

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<th>Table 3. Summary</th>
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<tr>
<td>Probe target</td>
<td>Telecommunications network devices that comply with TMF814 V2.1, V3.0 or V3.5 standards.</td>
</tr>
<tr>
<td>Probe executable name</td>
<td>nco_p_generic_tmf814</td>
</tr>
<tr>
<td>Package version</td>
<td>4.0</td>
</tr>
<tr>
<td>Probe supported on</td>
<td>For details of supported operating systems, see the following Release Notice on the IBM Software Support website: <a href="http://www-01.ibm.com/support/docview.wss?uid=swg21653083">http://www-01.ibm.com/support/docview.wss?uid=swg21653083</a></td>
</tr>
<tr>
<td>Properties file</td>
<td>$OMNIHOME/probes/arch/generic_tmf814.props</td>
</tr>
<tr>
<td>Rules file</td>
<td>$OMNIHOME/probes/arch/generic_tmf814.rules</td>
</tr>
<tr>
<td>Requirements</td>
<td>For details of any additional software that this probe requires, refer to the description.txt file that is supplied in its download package.</td>
</tr>
</tbody>
</table>
## Installing probes

All probes are installed in a similar way. The process involves downloading the appropriate installation package for your operating system, installing the appropriate files for the version of Netcool/OMNIbus that you are running, and configuring the probe to suit your environment.

The installation process consists of the following steps:

1. **Downloading the installation package for the probe from the Passport Advantage Online website.**
   Each probe has a single installation package for each operating system supported. For details about how to locate and download the installation package for your operating system, visit the following page on the IBM Tivoli Knowledge Center:
   

2. **Installing the probe using the installation package.**
   The installation package contains the appropriate files for all supported versions of Netcool/OMNIbus. For details about how to install the probe to run with your version of Netcool/OMNIbus, visit the following page on the IBM Tivoli Knowledge Center:
   

3. **Configuring the probe.**
   This guide contains details of the essential configuration required to run this probe. It combines topics that are common to all probes and topics that are peculiar to this probe. For details about additional configuration that is common to all probes, see the *IBM Tivoli Netcool/OMNIbus Probe and Gateway Guide*.

## Configuring the probe

After installing the probe you need to make various configuration settings to suit your environment.

The following table outlines how to use the probe’s properties to configure the product’s features. Configuration of some features is mandatory for all installations. For those features set the properties to the correct values or verify that their default values are suitable for your environment. Further configuration is optional depending on which features of the probe you want to use.

### Table 3. Summary (continued)

<table>
<thead>
<tr>
<th>Connection method</th>
<th>CORBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multicultural support</td>
<td>Available</td>
</tr>
<tr>
<td>Peer-to-peer failover functionality</td>
<td>Available</td>
</tr>
<tr>
<td>IP environment</td>
<td>IPv4 and IPv6</td>
</tr>
</tbody>
</table>

**Federal Information Processing Standards (FIPS)**


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<table>
<thead>
<tr>
<th>Feature</th>
<th>Properties</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mandatory features:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CORBA connection method</td>
<td>IORFile NamingServiceHost NamingServicePort IORFile NamingContextPath</td>
<td>“Connecting to the CORBA interface” on page 7</td>
</tr>
<tr>
<td>Authentication</td>
<td>Password Username</td>
<td>“Authentication” on page 11</td>
</tr>
<tr>
<td>TMF release version in use</td>
<td>ReleaseTMF814</td>
<td>“Properties and command line options” on page 19</td>
</tr>
<tr>
<td><strong>Optional features:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resynchronization policy</td>
<td>InitialResync ResyncBatchSize ResyncProbableCauseFilter</td>
<td>“Alarm retrieval and synchronization” on page 12</td>
</tr>
<tr>
<td>Reconnection policy</td>
<td>RetryCount RetryInterval</td>
<td>“Reconnection and probe backoff strategy” on page 12</td>
</tr>
<tr>
<td>Inactivity policy</td>
<td>Inactivity</td>
<td>“Inactivity” on page 13</td>
</tr>
<tr>
<td>Heartbeat policy</td>
<td>HeartbeatInterval</td>
<td>“Heartbeat” on page 13</td>
</tr>
<tr>
<td>Support for Unicode and non-Unicode characters</td>
<td>EncodingStandard ORBCharEncoding ORBWCharDefault</td>
<td>“Support for Unicode and non-Unicode characters” on page 14</td>
</tr>
</tbody>
</table>
Table 4. Configuring the probe (continued)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Properties</th>
<th>See</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer-to-peer failover pair</td>
<td>MessageFile, Mode, PeerHost, PeerPort, PidFile, PropsFile, RulesFile</td>
<td>“Peer-to-peer failover functionality” on page 14</td>
</tr>
<tr>
<td>HTTP/HTTPS command interface</td>
<td>NHttpd.EnableHTTP, NHttpd.ListeningPort, NHttpd.ExpireTimeout</td>
<td>“Configuring the command interface” on page 15</td>
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<tr>
<td>Running multiple instances of the probe</td>
<td>ORBLocalPort, Name, MessageLog, PidFile, PropsFile, RulesFile</td>
<td>“Running the probe” on page 6</td>
</tr>
</tbody>
</table>

Firewall considerations

When using CORBA probes in conjunction with a firewall, the firewall must be configured so that the probe can connect to the target system.

Most CORBA probes can act as both a server (listening for connections from the target system) and a client (connecting to the port on the target system to which the system writes events). If you are using the probe in conjunction with a firewall, you must add the appropriate firewall rules to enable this dual behavior.

There are three possible firewall protection scenarios, for which you must determine port numbers before adding firewall rules:

1. If the host on which the probe is running is behind a firewall, you must determine what remote host and port number the probe will connect to.
2. If the host on which the target system is running is behind a firewall, you must determine the incoming port on which the probe will listen and to which the target system will connect.
3. If each host is secured with its own firewall, you must determine the following four ports:
   a. The outgoing port (or port range) for the probe.
   b. The hostname and port of the target system.
   c. The outgoing port on which the target system sends events if the probe is running as a client.
   d. The incoming port on which the probe listens for incoming events.

Note: Most, but not all, CORBA probes listen on the port specified by the ORBLocalPort property. The default value for this property is 0, which means that an available port is selected at random. If the probe is behind a firewall, the value of the ORBLocalPort property must be specified as a fixed port number.

CORBA probes that use EventManager or NotificationManager objects may use different hosts and ports from those that use NamingService and EntryPoint objects. If the probe is configured to get object references from a NamingService or EntryPoint object, you must obtain the host and port information.
from the system administrator of the target system. When you have this information, you can add the appropriate firewall rules.

SSL-based connectivity

IBM Tivoli Netcool/OMNibus Generic Probe for TMF814 (V2.1, V3.0 and V3.5) (CORBA) supports Secure Sockets Layer (SSL) connections. SSL connections provide additional security when the probe retrieves alarms from the target systems.

To enable SSL connections, obtain the required SSL certificates and the Trusted Authority certificate from the IBM Tivoli Netcool/OMNibus Generic Probe for TMF814 (V2.1, V3.0 and V3.5) (CORBA) server administrator. Add the certificates to a local Java™ keystore so that they can be referenced by the Keystore property.

Prerequisites

The following tools are available to create the keystore:

- The OpenSSL toolkit. This is available from http://www.openssl.org/.
- The IBM KeyMan utility. This is available from http://www.alphaworks.ibm.com/tech/keyman/download.
- The Keytool toolkit. This is available in the JRE package. The keytool can be found at example location:
  /opt/IBM/tivoli/netcool/platform/linux2x86/jre64_1.7.0/jre/bin/keytool

Converting the key and certificate into PKCS12 format

If you have a key and a certificate from the server in separate files, you must combine them into a single PKCS12 format file to load into a new keystore. To convert the server certificate into PKCS12 format, use the following OpenSSL toolkit command:

```
openssl pkcs12 -export -inkey key_file -in cert_file -out cert_pkcs12
```

Where

- `key_file` is the key file retrieved from the server.
- `cert_file` is the certificate retrieved from the server.
- `cert_pkcs12` is the combined file in PKCS12 format for loading into the keystore.

Creating the SSL keystore

To create a Java keystore, use the following steps:

1. Convert the server certificate to PKCS12 format using the following OpenSSL toolkit command:

   ```
   openssl pkcs12 -export -inkey server_key.pem -in server_ca.cer -out server_ca.pkcs12
   ```

2. Create the keystore using the KeyMan utility:

   a. Start the KeyMan utility.
   b. Click Create New and select the Keystore token option.
   c. Click File > Import and choose the server_ca.pkcs12 file that you created in step 1.
      This imports the keyEntry into the keystore.
   d. Click File > Import and choose the server_ca.cer certificate.
This imports the server certificate into the keystore.
e. Click File > Import and choose the client_ca.cer certificate.
This imports the client certificate into the keystore.
f. Click File > Save and enter a password and name for the keystore, for example trusted_keystore.jks.

Enabling SSL connections
To enable SSL-based connections between the probe and the Element Management System (EMS) server, make the following changes to the generic_tmf814.props file:
1. Set the EnableSSL property to true.
   When the EnableSSL property is set to true, the following properties are enabled:
   • KeyStore
   • KeyStorePassword
   • SecurityProtocol
2. Use the KeyStore property to specify the location and file name of the keystore file trusted_keystore.jks.
3. Use the KeyStorePassword property to specify a password for the keystore.
4. Encrypt the keystore file password using the nco_g_crypt utility.

Running the probe
Probes can be run in a variety of ways. The way you chose depends on a number of factors, including your operating system, your environment, and the any high availability considerations that you may have.
For details about how to run the probe, visit the following page on the IBM Tivoli Knowledge Center:

Data acquisition
Each probe uses a different method to acquire data. Which method the probe uses depends on the target system from which it receives data.
The Generic Probe for TMF814 acquires data from network management systems (NMS) and element management systems (EMS) that implement TMF814 and use a Common Object Request Broker Architecture (CORBA) interface. The probe connects to the NMS or EMS through the CORBA interface and receives events from the device. The probe then processes each event to create an alarm that it forwards on to the ObjectServer.
Data acquisition is described in the following topics:
• “Connecting to the CORBA interface” on page 7
• “Authentication” on page 11
• “Alarm retrieval and synchronization” on page 12
• “Reconnection and probe backoff strategy” on page 12
• “Inactivity” on page 13
• “Heartbeat” on page 13
• “Data stream capture” on page 13
• “Support for Unicode and non-Unicode characters” on page 14
• “Peer-to-peer failover functionality” on page 14
Connecting to the CORBA interface

The probe connects to the target system through a CORBA interface.

To complete the connection, the probe needs a reference to the EmsSessionFactory_I object. The following topics contain:

- A summary of the methods that the probe can use to obtain the reference to the EmsSessionFactory_I object.
- Instructions on how to configure the probe for each of those methods.
- Advice on how to use the messages in the log file to help confirm that you have configured the probe correctly or help you solve configuration problems.

Methods for obtaining a reference to the EmsSessionFactory_I object

The probe can obtain the object reference in one of two ways:

- Using an IOR file
- Using a Naming Service

Using an IOR file

When using Interoperable Object Reference (IOR) files, the probe obtains the reference to the EmsSessionFactory_I CORBA object from the IOR file specified in the IORFile property.

Using a Naming Service

As an alternative to an IOR file, the probe can use a Naming Service to obtain the reference to the EmsSessionFactory_I object. There are two ways that the probe can locate the Naming Service:

- By using the host name and port number of the Naming Service specified in the NamingServiceHost and NamingServicePort properties.
- By using the IOR file specified in the NamingServiceIORFile property.

The Naming Service then uses the value specified in the NamingContextPath property to obtain the reference to the EmsSessionFactory_I object.

Completing the connection sequence

Once the probe has obtained the reference to the EmsSessionFactory_I object, it logs in to the target system. It then creates an EMS session and queries the Subscriber and EMS Manager objects. The probe uses the Subscriber object to subscribe to real-time event notifications and the EMS Manager object to perform resynchronization operations.

Configuring the probe

Use the following procedure to configure the probe:

1. Decide on the method you want to use to obtain the reference to the EmsSessionFactory_I object.
2. Define values for the properties listed in the section for your chosen method.

IOR file

Set the IORFile property to the path for the Interoperable Object Reference (IOR) file used to connect to the target through CORBA. For example:

IORFile = "/opt/var/emssession.ior"
Locating the Naming Service using a specified host and port

Set the following properties:

- **NamingServiceHost**: Set this property to the name of the host server that provides the Naming Service.
- **NamingServicePort**: Set this property to the port on the host server to use to connect to the Naming Service.
- **NamingContextPath**: Set this property to the full path of the EmsSessionFactory_I interface on the target system.

The following article in the Service Management Connect (SMC) technical community on IBM developerWorks shows how to construct the value of this property:


For example:

```
NamingServiceHost = "nshost1"
NamingServicePort = "8054"
NamingContextPath = "TMF_MTNM.Class/TejasNetworks.Vendor/TejasNetworks/NORTH-CDG.EmsInstance/3.5.Version/TejasNetworks/NORTH-CDG.EmsSessionFactory_I"
```

Locating the Naming Service using an IOR file

Set the following properties:

- **NamingServiceIORFile**: Set this property to the path for the IOR file for the Naming Service.
- **NamingContextPath**: Set this property to the path of the EmsSessionFactory_I interface.

The following article in the Service Management Connect (SMC) technical community on IBM developerWorks shows how to construct the value of this property:


For example:

```
NamingServiceIORFile = "/opt/var/ns.ior"
NamingContextPath = "TMF_MTNM.class/test/EmsSessionFactory_I"
```

Messages in the log file

Use the probe's log file to confirm that you configured the probe correctly or to help you solve configuration errors. The following sections contain the messages that appear for various connection situations.

**Successful connection**

This example shows the messages that occur in the log file on successfully connecting to the target system through a Naming Service running on a specified host and port:

```
Debug: D-JPR-000-000: Attempting to get reference for interface object
Debug: D-JPR-000-000: Attempting to get object reference via ORBInitialHost and ORBInitialPort settings
Debug: D-JPR-000-000: Attempting to connect to Naming Service via host and port settings
Debug: D-JPR-000-000: Successfully connected
Debug: D-JPR-000-000: Attempting to resolve Naming Context to object reference
Debug: D-JPR-000-000: Successfully narrowed reference to Naming Context
Debug: D-JPR-000-000: Resolving Object reference:
```

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No properties configured

The following example shows the messages that appear in the log file when none of the CORBA properties are configured:

Warning: W-JPR-000-000: NamingContextPath is empty, please ensure you have set this property if you want to connect to CORBA via Naming service
Error: E-JPR-000-000: IOR Object is null. Please check your probe settings.
Error: E-JPR-000-000: Failed to get IOR Object : IOR Object is null.
ProbeException: IOR Object is null.

IORFile property refers to an incorrect or invalid IOR file

The following example shows the messages that appear in the log file when the IORFile property refers to an incorrect or invalid IOR file:

Information: I-JPR-000-000: Read IOR file /home/netcool/sim/dist/var/ems.ior
registerTarget ENTERING
registerTarget EXITING
Information: I-JPR-000-000: Converting string IOR to object reference :
IOR:000000000000003F49444C3A6D746E6D2E746D666F72756D2E6F72672F656D7353657373696F6E6163746F72795F493A312E3000000000000100000000000078000102000000000A3132372E30E31
2E310026250000001F53746166646172644E532F4E616D6553657373696E6754684578743A312E302E312E310028B80000001F373831363735333838382F04221F100E034A1016100630463814141B484C1B00000000020000000000000008000000004A41430000000100000024000000000501000100000002000100010001000F00010109000000020501000100010100
Information: I-JPR-000-000: Retrieveing EMS Session via IOR object...
Error: E-JPR-000-000: Failed to get IOR Object :
Error: E-JPR-000-000: Failed to connect: org.omg.CORBA.BAD_PARAM: vmcid: 0x0
minor code: 0 completed: No

Cannot connect when using the IORFile property

The following example shows the messages that can appear in the log file in these circumstances:

• Invalid host, port, or host and port specified in he IOR file
• Firewall issues
• The target system is not online

Information: I-JPR-000-000: Read IOR file /home/netcool/sim/dist/var/emsessionfactory.ior
Information: I-JPR-000-000: Converting string IOR to object reference :
IOR:000000000000003F49444C3A6D746E6D2E746D666F72756D2E6F72672F656D7353657373696E6163746F72795F493A312E3000000000000100000000000078000102000000000A3132372E30E31
2E310026250000001F53746166646172644E532F4E616D6553657373696E6754684578743A312E302E312E310084B80000001F373831363735333838382F04221F100E034A1016100630463814141B484C1B00000000020000000000000008000000004A41430000000100000024000000000501000100000002000100010001000F00010109000000020501000100010100
Information: I-JPR-000-000: Retrieveing EMS Session via IOR object...
Error: E-JPR-000-000: Failed to get interface version information:
org.omg.CORBA.TRANSIENT: initial and forwarded IOR inaccessible vmcid: IBM
minor code: E07 completed: No
Error: E-JPR-000-000: Failed to connect: org.omg.CORBA.TRANSIENT:
initial and forwarded IOR inaccessible vmcid: IBM
minor code: E07 completed: No

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Not all properties set when connecting through a Naming Service host and port

The following example shows the messages that can appear in the log file when connecting through a Naming Service using a specified host and port. In this instance one of the NamingServiceHost, NamingServicePort, and NamingContextPath properties has no value:

| Warning: W-JPR-000-000: NamingContextPath is empty, please ensure you have set this property if you want to connect to CORBA via Naming service |
| Error: E-JPR-000-000: IOR Object is null. Please check your probe settings. |
| Error: E-JPR-000-000: Failed to get IOR Object : IOR Object is null. |
| ProbeException: IOR Object is null. |

Properties have incorrect values when connecting through a Naming Service host and port

The following example shows the messages that can appear in the log file when connecting through a Naming Service using a specified host and port. In this instance, one or more of the NamingServiceHost, NamingServicePort and NamingContextPath properties has an incorrect value, or the host, port, or path is inaccessible:


Firewall configuration preventing connection to a Naming Server host or port

The following example shows the messages that can appear in the log file when configuration problems with a firewall prevent connection to the host or server of a Naming Service:

| Debug: D-JPR-000-000: Resolving initial references to NamingService |
| Error: E-JPR-000-000: Failed to resolve initial references to the NamingService : NameService:org.omg.CORBA.TRANSIENT: java.net.ConnectException: Unable to connect:host=127.0.0.1,port=9765 vmcid: IBM minor code: E02 completed: No |
| Error: E-JPR-000-000: Failed to get IOR Object : org.omg.CORBA.ORBPackage.InvalidName: NameService:org.omg.CORBA.TRANSIENT: java.net.ConnectException: Unable to connect:host=127.0.0.1,port=9765 vmcid: IBM minor code: E02 completed: No |

Incorrect NamingContextPath or the Naming Server is offline

The following example shows the messages that can appear in the log file in these circumstances:

- An incorrect value for the NamingContextPath property means the ORB is unable to narrow the configured context path on the target system.
- The host server for the Naming Service is offline.

| Error: E-JPR-000-000: Failed to get the System reference from the naming service! : IDL:omg.org/CosNaming/NamingContext/NotFound:1.0 |
| Error: E-JPR-000-000: Failed to resolved to Naming Context : |
IORFile or NamingServiceIORFile specifies an incorrect path

The following example shows the messages that can appear in the log file when the path specified by the IORFile or NamingServiceIORFile is incorrect and the probe cannot find the IOR file:

```
Error: E-JPR-000-000: Failed to get object from Naming Service IOR file:
Failed to find file /home/netcool/sim/dist/var/em.ior:
java.io.FileNotFoundException: /home/netcool/sim/dist/var/em.ior
```

NamingServiceIORFile specifies an incorrect IOR file or the IOR is incorrect

The following example shows the messages that appear in the log file when the value of the NamingServiceIORFile property refers to an incorrect IOR file or to a file that specifies and incorrect IOR:

```
Error: E-JPR-000-000: Failed to connect to the NamingService:
Error: E-JPR-000-000: Failed to resolve to the naming context:
org.omg.CORBA.BAD_PARAM: vmcid: 0x0 minor code: 0 completed: No
Error: E-JPR-000-000: Failed to get IOR Object:
com.ibm.tivoli.netcool.ommibus.probe.ProbeException:
org.omg.CORBA.BAD_PARAM: vmcid: 0x0 minor code: 0 completed: No
Error: E-JPR-000-000: Failed to connect:
com.ibm.tivoli.netcool.ommibus.probe.ProbeException:
com.ibm.tivoli.netcool.ommibus.probe.ProbeException:
org.omg.CORBA.BAD_PARAM:
```

Authentication

Once the probe has obtained a reference to the EmsSessionFactory_I object, it logs in to the target using the values stored in the Username and Password properties. The value of the Password property can be plain text or an AES encrypted password. To encrypt a password, use the nco_keygen utility to create a key file and then use the nco_aes_crypt utility to encrypt the password using the key file.

Detailed instructions on how to encrypt a property value, such as Password are in the IBM Tivoli Netcool/OMNibus Installation and Deployment Guide. The following example shows how to encrypt the password:

1. Use nco_keygen to create a key file; for example:
   `$NCHOME/omnibus/bin/nco_keygen -o $NCHOME/omnibus/probes/key_file`
2. Set the value of the probe's ConfigKeyFile property to the file path of the key file; for example:
   ConfigKeyFile: "$NCHOME/omnibus/probes/key_file"
3. Set the value of the probe's ConfigCryptoAlg property to AES:
   ConfigCryptoAlg: "AES"
4. Use nco_aes_crypt to encrypt the password; for example:
   `$NCHOME/omnibus/bin/nco_aes_crypt -c AES -k key_file password`
5. Set the value of the probe's Password property to the encrypted string generated by nco_aes_crypt; for example:
   Password: "@44:U/ccVZ0K+ftc7gZTV33Yx2f0De5v46RZzEbvqEpE=@"
Alarm retrieval and synchronization

On startup, the probe can retrieve active alarms from the EMS and do so regularly if required. The probe uses the CORBA push model to receive new alarms as the EMS generates them.

Startup and initial synchronization

At startup, the probe retrieves a list of all active alarms from the EMS if the InitialResync property is set to true. When the property is set to false, the probe does not receive the existing alarms.

Alarm retrieval

Once the probe has received any existing alarms, it connects to the Subscriber object and uses the CORBA notification push model to receive new alarms from the EMS. The probe receives those alarms as they are generated at the EMS.

The probe parses each alarm it receives and forwards it to the ObjectServer.

Resynchronization

The probe can resynchronize with the EMS periodically. The frequency of any resynchronization is determined by the value of the ResyncInterval property. When the property has a value of 0, which is the default value, the probe never resynchronizes. Any other value of ResyncInterval defines the interval, in seconds, between successive resynchronization operations. For each operation the probe receives a list of all active alarms in the same way as it does at startup. The probe then resumes waiting for new alarms from the EMS.

During resynchronization operations, the probe receives alarms in batches when the ResyncBatchSize property has a positive value (the default value is 100). The minimum batch size is 1.

Resynchronization filters

You can apply filters during a resynchronization operation to limit the number of alarms returned from the EMS. The probe provides two properties that enable you to define filters:

• ResyncProbableCauseFilter
• ResyncSeverityFilter

You can use either filter individually or both filters together.

The filters define values for alarms to exclude from a resynchronization operation when they contain a particular value. For example, if you set ResyncSeverityFilter to the value PS_MINOR, all alarms with that severity setting are excluded from the resynchronization operation.

Reconnection and probe backoff strategy

Use the RetryCount and RetryInterval properties to specify how the probe reacts if the connection to the target system is lost or cannot be established.

Use the RetryCount property to specify whether the probe attempts to reconnect to the target system. Setting the property to 0, the default value, means that the probe does not try to reconnect and simply shuts down. Any other, positive value specifies the number of times the probe tries to reconnect before shutting down.

Use the RetryInterval property to specify the number of seconds between each attempt to reconnect to the target system. Setting the property to 0 means that the probe uses an exponentially increasing interval between connection attempts. First the probe waits 1 second, then 2 seconds, then 4 seconds, and so on up to a maximum of 4095 seconds. If this limit, or the number of connection attempts is reached, the probe shuts down.
Inactivity
The probe can disconnect from the target system and shut down if there is no event activity for a predefined amount of time.

You can use the **Inactivity** property to specify how long, in seconds, the probe waits before disconnecting from the target system and shutting down. If the probe receives no events during that time, it disconnects from the target system and shuts down. To ensure that the probe never disconnects from the target system, set the value of the property to 0, which is the default value.

Heartbeat
The probe can disconnect from the target system if the connection between them becomes unavailable.

You can use the **HeartbeatInterval** property to specify whether the probe periodically checks that the connection to the target system is available and how often it performs that check. The probe shuts down if it detects that the connection to the target system is unavailable.

When the **HeartbeatInterval** property has a value of 0 the probe does not check the availability of the connection. Any other positive value defines the number of seconds between each check of the connection’s availability.

**Note**: Once the probe shuts down it may restart again, depending on the value set for the **RetryCount** property. If the value set for **RetryCount** is 0, the probe does not restart. For any other positive value the probe follows the reconnection policy. See “Reconnection and probe backoff strategy” on page 12 for more information.

To check the connection to the target system, the probe sends a ping command (using the TMF standard function EmsSession_I_ping) and waits for a response from the target system.

The probe also disconnects from the target system if it receives an endSession request from the NMS. This may occur if the target system restarts or is shut down.

Data stream capture
The probe can capture the stream of binary data from the TMF814 device and store it in a file. The data can be used for debugging purposes, to develop new features for the probe, or to pass onto other management systems that require the same data.

To capture the data stream in log files, use the following procedure:

1. Set the value of the **StreamCapture** property to 1.
2. Set the value of the **StreamCaptureFilePath** property to the full path of a directory to hold the files of data.

**Notes**:
- Specify the full path of the directory. For example:
  `/opt/tivoli/netcool/omnibus/var`
- You cannot include variables such as `$OMNIHOME` in the directory path.
- The directory must exist. The probe does not create the directory if it does not exist.

3. If the probe is running, restart the probe.

The probe now writes stream data to the specified directory. The probe creates two types of file: one contains resynchronization data and the other contains notification data. The names for these files have the following format:

- Resynchronization data file:
  `resync-timestamp-n.evtraw`
- Notification data file:
  `notif-timestamp-n.evtraw`
In both file names `timestamp` is the time of day when the file was created, in milliseconds and `n` is a sequence number for the file. The number increases by one for each file that is created.

Example:
```
notif-137111893172-0.evtraw
```

The probe creates a separate file for each event it receives from the endpoint.

**Note:** Capturing the data stream to a log file generates a lot of data, consuming a lot of disk space and other system resources. So use this feature with caution. As soon as you no longer require the capture of data, set the value of the `StreamCapture` property to 0 and restart the probe.

### Support for Unicode and non-Unicode characters

The probe can process multibyte characters and so can display both Unicode and non-Unicode characters.

Use the following procedure to set up the probe to process multibyte characters:

1. Ensure that the EMS is configured to send data in UTF-8 format.
2. Set the appropriate locale on the system that runs the probe by changing the values of the `LANG` and `LC_ALL` environment variables. For example, to set the locale to simplified Chinese, use the following commands:
   ```
   export LANG=zh_CN.utf8
   export LC_ALL=zh_CN.utf8
   ```
3. Set the following properties of the probe:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>EncodingStandard</code></td>
<td>UTF-8</td>
</tr>
<tr>
<td><code>ORBCharEncoding</code></td>
<td>UTF8</td>
</tr>
<tr>
<td><code>ORBWChardefault</code></td>
<td>UTF16</td>
</tr>
</tbody>
</table>

4. Configure the ObjectServer to enable the insertion of data that uses UTF-8 encoding. The *IBM Tivoli Netcool/OMNibus Administration Guide* shows how to create, configure, and run an ObjectServer in UTF-8 mode.

5. Run the probe or restart it, if it is already running.

### Peer-to-peer failover functionality

The probe supports failover configurations where two probes run simultaneously. One probe acts as the master probe, sending events to the ObjectServer; the other acts as the slave probe on standby. If the master probe fails, the slave probe activates.

While the slave probe receives heartbeats from the master probe, it does not forward events to the ObjectServer. If the master probe shuts down, the slave probe stops receiving heartbeats from the master and any events it receives thereafter are forwarded to the ObjectServer on behalf of the master probe. When the master probe is running again, the slave probe continues to receive events, but no longer sends them to the ObjectServer.

#### Example property file settings for peer-to-peer failover

You set the peer-to-peer failover mode in the properties files of the master and slave probes. The settings differ for a master probe and slave probe.

**Note:** In the examples, make sure to use the full path for the property value. In other words replace `$OMNIHOME` with the full path. For example: `/opt/IBM/tivoli/netcool`.

The following example shows the peer-to-peer settings from the properties file of a master probe:
The following example shows the peer-to-peer settings from the properties file of the corresponding slave probe:

Server      :    "NCOMS"
RulesFile   :    "slave_rules_file"
MessageLog  :    "slave_log_file"
PeerHost    :    "master_hostname"
PeerPort    :    6789 # [communication port between master and slave probe]
Mode        :    "slave"
PidFile     :    "slave_pid_file"

Command line interface

The probe is supplied with a command line interface (CLI) that allows you to manage the probe while it is running.

You can also use the CLI to manage the probe over an HTTP/HTTPS connection.

Managing the probe over an HTTP/HTTPS connection

IBM Tivoli Netcool/OMNibus Version 7.4.0 (and later) includes a facility for managing the probe over an HTTP/HTTPS connection. This facility uses the nco_http utility supplied with Tivoli Netcool/OMNibus.

The HTTP/HTTPS command interface replaces the Telnet-based command line interface used in previous version of IBM Tivoli Netcool/OMNibus.

The following sections show:

• How to configure the command interface.
• The format of the nco_http command line.
• The format of the individual probe commands.
• The messages that appear in the log files.
• How to store frequently-used commands in a properties file.

For more information on the HTTP/HTTPS command interface and the utilities it uses, see the chapter on remotely administering probes in the IBM Tivoli Netcool/OMNibus Probe and Gateway Guide.

Configuring the command interface

To configure the HTTP/HTTPS command interface, set the following properties in the probe’s property file:

NHttpd.EnableHTTP: Set this property to True.
NHttpd.ListeningPort: Set this property to the number of the port that the probe uses to listen for HTTP commands.

Optionally, set a value for the following property as required:

NHttpd.ExpireTimeout: Set this property to the maximum elapsed time (in seconds) that and HTTP connection remains idle before it is disconnected.

The IBM Tivoli Netcool/OMNibus Probe and Gateway Guide contains a full description of these and all properties for the HTTP/HTTPS command interface.
Format of the nco_http command line

The format of the nco_http command line to send a command to the probe is:

```
$OMNIHOME/bin/nco_http -uri probeuri:probeport/probes/generic_tmf814 -datatype application/json -method post -data '{"command":"command-name","params": [command-parameters]}'
```

Where:

- `probeuri` is the URI of the probe.
- `probeport` is the port that the probe uses to listen for HTTP/HTTPS commands. Specify the same value as that set for the `NHttp.ListeningPort`.
- `command-name` is the name of the command to send to the probe. The following command names are available:
  - `ackAlarm`
  - `help`
  - `resync`
  - `resyncFilter`
  - `stop`
  - `unackAlarm`

- `command-parameters` is a list of zero or more command parameters. For commands that have no parameters, this component is empty. The command descriptions in the following section define the parameters that each takes.

Commands supported by the probe over HTTP/HTTPS

The following sections define the structure of the JSON-formatted commands that you can send to the probe. There is an example of each command.

All the examples use a probe URI of http://test1.example.com and a HTTP listening port of 6789.

**ackAlarm**

Use the `ackAlarm` command to acknowledge an alarm.

The format of the `-data` option for the `ackAlarm` command is:

```
-data '{"command":"ackAlarm", "params": [{"alarmId":"alarm1", "emsId":"EMS1", "managedElementId":"ME1", "username":"root"}]}
```

Where:

- `alarmId` is the identifier stored in the alarm's `emsAlarmId` field.
- `emsId` is the identifier stored in the alarm's EMS field.
- `managedElementId` is the identifier stored in the alarm's ManagedElement field.
- `username` is the user name of the user acknowledging the alarm (the default is root).

The following example acknowledges the alarm with the following characteristics:

- Alarm Identifier: alarm1
- EMS Identifier: EMS1
- Managed Element Identifier: ME1
- Username: root

```
$OMNIHOME/bin/nco_http -uri http://test1.example.com:6789/probes/generic_tmf814 -datatype application/json -method POST -data '{"command":"ackAlarm", "params": [{"alarmId":"alarm1", "emsId":"EMS1", "managedElementId":"ME1", "username":"root"}]}'
```
**help**

Use the **help** command to receive help information about the HTTP/HTTPS command interface.

The format of the -data option for the **help** command is:

```bash
-data '{"command":"help","params":[]}'
```

The following command returns help information:

```bash
```

The response from the probe includes the following message:

```json
Information: I-UNK-104-002: {"response":Available commands: ackAlarm(alarmId String,emsId String,managedElementId String,username String), unackAlarm(alarmId String,emsId String,managedElementId String,username String), resync(), resyncFilter(excludeSeverity String,excludePbCause String), stop() ","status":"200"}
```

**resync**

Use the **resync** command to perform a resynchronization with the endpoint using the value specified by the **ResyncSeverityFilter** and **ResyncProbableCauseFilter** properties.

The format of the -data option for the **resync** command is:

```bash
-data '{"command":"resync", "params":[]}'
```

The following example resynchronizes the probe:

```bash
```

**resyncFilter**

Use the **resyncFilter** command to perform a resynchronization using a custom filter.

The format of the -data option for the **resyncFilter** command is:

```bash
-data '{"command":"resyncFilter","params":["excludeSeverity":sev=severities", "excludePbCause":pbCause=probable-causes"]}'
```

Where:

- **severities** is a list of severities to exclude when the probe resynchronizes with the CORBA interface. Separate each entry in the list with a semicolon.
- **probable-causes** is a list of probable causes to exclude when the probe resynchronizes with the CORBA interface. Separate each entry in the list with a semicolon.

The following example resynchronizes the probe an excludes alarms with a severity of PS_CLEARED or PS_WARNING:

```bash
$OMNIHOME/bin/nco_http -uri http://test1.example.com:6789/probes/generic_tmf814 -datatype application/JSON -method POST -data '{"command":"resyncFilter", "params":["excludeSeverity":sev=PS_CLEARED;PS_WARNING", "excludePbCause":pbCause="]}'
```

**stop**

Use the **stop** command to shut down the probe.

The format of the -data option for the **stop** command is:

```bash
-data '{"command":"stop", "params":[]}'
```
The following example stops the probe:
```
```

**unackAlarm**

Use the `unackAlarm` command to clear an alarm.

The format of the `-data` option for the `unackAlarm` command is:
```
-data '{"command":"unackAlarm", "params": [{"alarmId": "alarmId", "emsId": "emsId", "managedElementId": "managedElementId", "username": "username"}]}'
```

The parameters have the same meanings as they do for the “ackAlarm” on page 16 command.

The following example “unacknowledges” (clears) the alarm with the same characteristics as the example of the “ackAlarm” on page 16 command:
```
$OMNIHOME/bin/nco_http -uri http://test1.example.com:6789/probes/generic_tmf814 -datatype application/JSON -method POST -data '{"command":"unackAlarm", "params": [{"alarmId": "alarm1", "emsId": "EMS1", "managedElementId": "ME1", "username": "root"}]}'
```

**Messages in the log file**

The nco_http utility can make extensive entries in the probe's log file indicating the progress of each operation. These messages can help isolate problems with a request, such as a syntax problem in a command.

To obtain the detailed log information, set the probe's `MessageLevel` property to `debug`. This enables the logging of the additional information that tracks the progress of a command's execution. For example, the following shows the progress of a `resync` command:

```
Information: I-UNK-000-000: NSProbeBidirCB: Thread id is 0x94d9008
{command:resync.params:[]}
Information: I-UNK-000-000: Probewatch: Starting the resynch of alarm list
Debug: D-UNK-000-000: Rules file processing took 28 usec.
Debug: D-UNK-000-000: Flushing events to object servers
Debug: D-UNK-000-000: Flushing events to object servers
executeCommand ENTERING
checkParams ENTERING
checkParams EXITING
checkParams EXITING
Information: I-UNK-000-000: Probewatch: Finished the resynch of alarm list
```

These messages can also help to isolate problems with a command. For example, the following shows the log messages for an `unackAlarm` command that contained an invalid alarm identifier.

```
Information: I-UNK-000-000: NSProbeBidirCB: Thread id is 0x9ec8b48
{"command":"unackAlarm","params": [{"alarmId": "abcd","emsId": "EMS1", "managedElementId": "ME1", "username": "root"}]}
executeCommand ENTERING
checkParams ENTERING
checkParams EXITING
checkParams EXITING
Debug: D-JPR-000-000: Unacknowledge alarm with alarm ID: abcd on EMS: ME1, and username: root
Information: I-JPR-000-000: There are 1 alarms that failed to be unacknowledged.
```
Storing commands in the nco_http properties file

You can use the nco_http utility's properties file ($OMNIHOME/etc/nco_http.props) to hold frequently used command characteristics.

If you have a particular command that you send to the probe regularly, you can store characteristics of that command in the nco_http properties file. Once you have done that, the format of the nco_http command line is simplified.

You can use the one or more of the following nco_http properties to hold default values for the equivalent options on the nco_http command line:

- Data
- DataType
- Method
- URI

Specify the value of each property in the same way as you would on the command line. Once you have these values in place you do not need to specify the corresponding command line switch unless you want to override the value of the property.

The following is an example of the use of the properties file and the simplification of the nco_http command that results. In this example, the nco_http properties file contains the following values (note that line breaks appear for presentational purposes only; when editing the properties use one line for each property value):

```
Data : '{"command":"ackAlarm", "params":[{"alarmId":"alarm1", "emsId":"EMS1", "managedElementId":"ME1", "username":"root"}]}'
DataType : 'application/JSON'
Method : 'POST'
```

To use this set of values use the following nco_http command:

```
$OMNIHOME/bin/nco_http -uri http://test1.example.com:6789
```

Properties and command line options

You use properties to specify how the probe interacts with the device. You can override the default values by using the properties file or the command line options.

The following table describes the properties and command line options specific to this probe. For information about common properties and command line options, see the IBM Tivoli Netcool/OMNIbus Probe and Gateway Guide.

<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EnableSSL</td>
<td></td>
<td>Use this property to specify whether SSL connectivity between the probe and the EMS server is enabled or disabled. This property takes the following values: true: SSL connectivity between the probe and the EMS server is enabled. false: SSL connectivity between the probe and the EMS server is disabled. The default is false.</td>
</tr>
<tr>
<td>Property name</td>
<td>Command line option</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **EncodingStandard** | **string** | **-encodingstandard string** | Use this property to specify the character encoding standard that the probe uses. Possible values for this property are:  
- ISO-8859-1: This sets the encoding standard to Latin Alphabet 1.  
- UTF-8: This sets the encoding standard to UTF-8.  
The default is: ISO-8859-1 |
| **IORFile**       | **string** | **-iorfile string** | Use this property to specify the path of the Interoperable Object Reference (IOR) file used to connect to the target through the CORBA interface. If you do not provide a value for this property, use the **NamingContextPath** with the **NamingServiceHost** and **NamingServicePort** properties or the **NamingServiceIORFile** property to define the Naming Service to use instead.  
The default is "". |
| **KeyStore**      | **string** | **-keystore string** | Use this property to specify the location of the keystore file that contains the client certificate for SSL and the trusted authority certificate.  
The default is "". |
| **KeyStorePassword** | **string** | **-keystorepasswordstring** | Use this property to specify the password required to access the certificate defined in the **Keystore** property.  
The default is "". |
| **NamingContextPath** | **string** | **-nspath string** | Use this property to specify the location of the object in the Naming Service. If using a Naming Service to connect to the CORBA interface, always set this property.  
The default is "". |
<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NamingServiceHost string</td>
<td>-nshost string</td>
<td>Use this property to specify the name of the host that runs the Naming Service. If you do not use the IORFile property define the location of the Naming Service using this property, together with the NamingServicePort and NamingContextPath properties, or the NamingServiceIORFile and NamingContextPath properties. The default is: &quot;&quot;.</td>
</tr>
<tr>
<td>NamingServiceIORFile string</td>
<td>-nsiorfile string</td>
<td>Use this property to specify the location of the IOR file that contains the root context of the Naming Service. If you do not provide a value for the IORFile property, use this property and the NamingContextPath property or the NamingServiceHost, NamingServicePort, and NamingContextPath properties to define the Naming Service to use to obtain the reference to the EmsFactorySession_I object. The default is: &quot;&quot;.</td>
</tr>
<tr>
<td>NamingServicePort integer</td>
<td>-nsport integer</td>
<td>Use this property to specify the port on the host defined by NamingServiceHost through which to connect to the Naming Service. If you do not use the IORFile property, use this property, together with the NamingServiceHost property and NamingContextPath property, or the NamingServiceIORFile and NamingContextPath properties. The default is: 0.</td>
</tr>
<tr>
<td>NotificationClientType string</td>
<td>-notificationclienttype</td>
<td>Use this property to define the probe subscription for notification service. SEQUENCE_EVENT: The probe will receive a sequence of StructuredEvent. STRUCTURED_EVENT: The probe will receive a single StructuredEvent during every notification cycle. The default is: SEQUENCE_EVENT.</td>
</tr>
<tr>
<td>Property name</td>
<td>Command line option</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| ORBCharEncoding  
*string* | -orncharencoding  
*string* | Use this property to specify the native character encoding set that the Object Request Broker (ORB) uses for character data. Possible values for this property are:  
ISO8859_1  
UTF8  
The default is: ISO8859_1. |
| ORBDebug  
*string* | -orbdebug  
*string* | Use this property to enable ORB debugging.  
true: ORB debugging is enabled.  
false: ORB debugging is disabled.  
The default is false. |
| ORBDebugFile  
*string* | -orbdebugfile  
*string* | Use this property to specify the ORB debugging log file.  
The default is "". |
| ORBLocalHost  
*string* | -orbllocalhost  
*string* | Use this property to specify the local host used by the server-side ORB to place the server's host name or IP address into the IOR of a remote object.  
The default is: "". |
| ORBLocalPort  
*integer* | -orblocalport  
*integer* | Use this property to specify the local port that the ORB listens on for connections from the probe.  
The default is: 0 (the ORB selects a port at random). |
| ORBWCharDefault  
*string* | -orbwchardefault  
*string* | Use this property to specify the wide character (wchar) set that the IBM ORB uses when communicating with other ORBs that do not publish a wchar set. Possible values for this property are:  
UCS2  
UTF16  
The default is: UTF16. |
<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Password</strong></td>
<td>-password string</td>
<td>Use this property to specify the password of the account to use when logging in to the target system. The password can be in plain text or encrypted using the AES algorithm. Always define a value for this property and the <strong>Username</strong> property. The default is: &quot;&quot;.</td>
</tr>
</tbody>
</table>
| **ReleaseTMF814**| -releasetmf814 string | Use this property to specify the version of TMF that the probe should implement. Possible values for this property are:  
  V2.1  
  V3.0  
  V3.5  
The default is: V3.0. |
<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ResyncAlarmObject</td>
<td>-resyncalarmobject</td>
<td>Use this property to specify the objects against which the alarms retrieved during resynchronization are raised. Possible values for this property are: AllEMSAndME: All active alarms for EMS itself and all network elements under the control of this EMS are retrieved. This makes the probe request all of the active alarms and threshold crossing alerts (TCAs) that are under the control of the EMS (both those raised by the network elements and those raised by the EMS itself). AllEMSSystem: All active alarms for EMS itself only are retrieved, excluding alarms for all network elements managed by this EMS. This makes the probe request all of the active alarms and TCAs for the EMS itself. AllEMSAndME, AllEMSSystem: All active alarms for EMS itself and all network elements under the control of this EMS are retrieved, but in a non-TMF-standard way. In contrast to the AllEMSAndME property value which is to retrieve the same set of alarms, this property makes probe override the default standard-compliant way. <strong>Note</strong>: This property value caters for whichever EMS implementing getAllEMSAndMEActiveAlarms() operation in a non-TMF-standard way which returns no alarms for EMS itself, but only alarms for network elements being managed. The default is: AllEMSAndME.</td>
</tr>
<tr>
<td>ResyncBatchSize</td>
<td>-resyncbatchsize</td>
<td>Use this property to specify the maximum number of alarms contained in each batch that the probe receives during a resynchronization operation. The minimum value of this property is 1. The default is: 100.</td>
</tr>
<tr>
<td>Property name</td>
<td>Command line option</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| ResyncProbableCauseFilter  | -resyncpbcausefilter string | Use this property to specify a list of probable causes to exclude when the probe resynchronizes with the CORBA interface. Separate each entry in the list with a semicolon. For example: pbCause1;pbCause2;pbCause3 The default is: " ".
| ResyncSeverityFilter       | -resyncseverityfilter string | Use this property to specify a list of severities that the probe excludes when resynchronizing with the CORBA interface. Separate each entry in the list with a semicolon. The severity values you can include are:  
  - PS_INDETERMINATE  
  - PS_CRITICAL  
  - PS_MAJOR  
  - PS_MINOR  
  - PS_WARNING  
  - PS_CLEARED  
The default is: " ".  
**Note:** If the AlarmResyncObject property is set to AllEMSSystem, the ResyncSeverityFilter property is not used by the probe.
| SecurityProtocol           | -securityprotocol string | Use this property to specify the security protocol used.  
The default is TLSv1.2. |
| StreamCapture              | -streamcapture integer | Use this property to specify whether the stream capture feature is enabled. The values this property can have are:  
  - 1: The probe uses the stream capture feature.  
  - 0: The probe does not use the stream capture feature.  
The default is: 0.  
**Note:** If you set the value of this property to 1, define a value for the StreamCaptureFilePath property as well.
Properties and command line options provided by the Java Probe Integration Library (probe-sdk-java) version 9.0

All probes can be configured by a combination of generic properties and properties specific to the probe.

The following table describes the properties and command line options that are provided by the Java Probe Integration Library (probe-sdk-java) version 9.0.

**Note**: Some of the properties listed may not be applicable to your probe.

### Table 5. Properties and command line options (continued)

<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>StreamCaptureFilePath</td>
<td>-streamcapturefilepath string</td>
<td>Use this property to specify the directory where the probe stores the input data stream. The default is: &quot;&quot;. See “Data stream capture” on page 13 for more information on how to use this property.</td>
</tr>
<tr>
<td>Username</td>
<td>-username string</td>
<td>Use this property to specify the account to use when logging in to the target system. Always define a value for this property and the Password property. The default is: &quot;&quot;.</td>
</tr>
</tbody>
</table>

### Table 6. Properties and command line options

<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CommandPort integer</td>
<td>-commandport integer</td>
<td>Use this property to specify the port to which users can Telnet to communicate with the probe using the Command Line Interface (CLI) supplied. The default is 6970.</td>
</tr>
<tr>
<td>CommandPortLimit integer</td>
<td>-commandportlimit integer</td>
<td>Use this property to specify the maximum number of Telnet connections that can be made to the probe. The default is 10.</td>
</tr>
</tbody>
</table>
| DataBackupFile string       | -databackupfile string       | Use this property to specify the path to the file that stores data between probe sessions. The default is "". **Note**: Specify the path relative to $OMNIHOME/var.
<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DisconnectionTimeout</strong> integer</td>
<td>-disconnectiontimeout integer</td>
<td>Use this property to specify the maximum time, in seconds, for probe disconnection before shutting down the probe forcefully. The default is 15.</td>
</tr>
<tr>
<td><strong>HeartbeatInterval</strong> integer</td>
<td>-heartbeatinterval integer</td>
<td>Use this property to specify the frequency (in seconds) with which the probe checks the status of the host server. The default is 1.</td>
</tr>
<tr>
<td><strong>Inactivity</strong> integer</td>
<td>-inactivity integer</td>
<td>Use this property to specify the length of time (in seconds) that the probe allows the port to receive no incoming data before disconnecting. The default is 0 (which instructs the probe to not disconnect during periods of inactivity).</td>
</tr>
<tr>
<td><strong>InactivityAction</strong> string</td>
<td>-inactivityaction string</td>
<td>Use this property to specify the action the probe takes when inactivity timeout is reached. SHUTDOWN: Sends a ProbeWatch message to notify user and shuts down the probe. CONTINUE: Sends a ProbeWatch message to notify user and do not shut down the probe. The default is SHUTDOWN.</td>
</tr>
<tr>
<td><strong>InitialResync</strong> string</td>
<td>-initialresync string</td>
<td>Use this property to specify whether the probe requests all active alarms from the host server on startup. This property takes the following values: false: The probe does not request resynchronization on startup. true: The probe requests resynchronization on startup. For most probes, the default value for this property is false. If you are running the JDBC Probe, the default value for the InitialResync property is true. This is because the JDBC Probe only acquires data using the resynchronization process.</td>
</tr>
</tbody>
</table>
**Table 6. Properties and command line options (continued)**

<table>
<thead>
<tr>
<th>Property name</th>
<th>Command line option</th>
<th>Description</th>
</tr>
</thead>
</table>
| **MaxEventQueueSize** integer | -maxeventqueue sizeinteger | Use this property to specify the maximum number of events that can be queued between the non native process and the ObjectServer. The default is 0.  
*Note*: You can increase this number to increase the event throughput when a large number of events is generated. |
| **ResyncInterval** integer | -resyncinterval integer | Use this property to specify the interval (in seconds) at which the probe makes successive resynchronization requests.  
For most probes, the default value for this property is 0 (which instructs the probe to not make successive resynchronization requests).  
If you are running the JDBC Probe, the default value for the ResyncInterval property is 60. This is because the JDBC Probe only acquires data using the resynchronization process. |
| **RetryCount** integer | -retrycount integer | Use this property to specify how many times the probe attempts to retry a connection before shutting down. The default is 0 (which instructs the probe to not retry the connection). |
| **RetryInterval** integer | -retryinterval integer | Use this property to specify the length of time (in seconds) that the probe waits between successive connection attempts to the target system. The default is 0 (which instructs the probe to use an exponentially increasing period between successive connection attempts, for example, the probe will wait for 1 second, then 2 seconds, then 4 seconds, and so forth). |

**Elements**

The probe breaks event data down into tokens and parses them into elements. Elements are used to assign values to ObjectServer fields; the field values contain the event details in a form that the ObjectServer understands.

The following tables describe the elements that the Generic Probe for TMF814 generates. Not all the elements described are generated for each event; the elements that the probe generates depends upon the event type. The data type and, where applicable, enumeration values for these elements are defined in the TMF814 standard.
<table>
<thead>
<tr>
<th>Element name</th>
<th>Element description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$acknowledgeIndicaton</td>
<td>This element indicates the acknowledgement status of the alarm. The possible values are:</td>
</tr>
<tr>
<td></td>
<td>• AI_EVENT_ACKNOWLEDGED</td>
</tr>
<tr>
<td></td>
<td>• AI_EVENT_UNACKNOWLEDGED</td>
</tr>
<tr>
<td>$attributeList</td>
<td>A list of attributes and their values associated with the event.</td>
</tr>
<tr>
<td>$DomainName</td>
<td>This element identifies the TMF specification that defines the received event. For example:</td>
</tr>
<tr>
<td></td>
<td>tmf_mtnm</td>
</tr>
<tr>
<td>$edgePointRelated</td>
<td>This element indicates whether the event applies to a termination point that is an edge point. The element has the following possible values:</td>
</tr>
<tr>
<td></td>
<td>• true</td>
</tr>
<tr>
<td></td>
<td>• false</td>
</tr>
<tr>
<td>$emsTime</td>
<td>This element indicates the time at which the alarm was reported by the EMS.</td>
</tr>
<tr>
<td>$EventName</td>
<td>This element indicates the name of the event.</td>
</tr>
<tr>
<td>$EventType</td>
<td>This element indicates the type of the event.</td>
</tr>
<tr>
<td>$groupName</td>
<td>This element indicates the name of the group for this event.</td>
</tr>
<tr>
<td>$isClearable</td>
<td>This element indicates whether the alarm can be cleared. The possible values are:</td>
</tr>
<tr>
<td></td>
<td>• true</td>
</tr>
<tr>
<td></td>
<td>• false</td>
</tr>
<tr>
<td>$layerRate</td>
<td>This element indicates the layer to which the alarm applies.</td>
</tr>
<tr>
<td>$nativeEMSName</td>
<td>This element contains the name of the object reporting the alarm, as displayed in the EMS user interface.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong>: Object names must not contain brackets. If brackets are passed to the $nativeEMSName element as part of an object name, the node field in the event list is not filled.</td>
</tr>
<tr>
<td>$neTime</td>
<td>This element indicates the time at which the error occurred in the network element.</td>
</tr>
<tr>
<td>Element name</td>
<td>Element description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>$notificationID</td>
<td>This element contains the unique identifier of the alarm. This is derived from the serial number of the alarm as used by the EMS.</td>
</tr>
<tr>
<td>$objectName_AID</td>
<td>This element contains the identifier of the alert associated with this object.</td>
</tr>
<tr>
<td>$objectName EMS</td>
<td>This element contains the name of the EMS that the alarm relates to.</td>
</tr>
<tr>
<td>$objectName_Equipment</td>
<td>This element contains the identification of the equipment that the EMS is part of.</td>
</tr>
<tr>
<td>$objectName_EquipmentHolder</td>
<td>This element contains the identification of the equipment holder for the EMS.</td>
</tr>
<tr>
<td>$objectNameManagedElement</td>
<td>This element contains the identifier of the managed element that the alert relates to.</td>
</tr>
<tr>
<td>$objectType</td>
<td>This element contains the type of network object that the alert relates to.</td>
</tr>
<tr>
<td>$perceivedSeverity</td>
<td>This element contains the severity of the alert as perceived by the EMS.</td>
</tr>
<tr>
<td>$route_cc</td>
<td>This element holds the content of all the route_cc elements.</td>
</tr>
<tr>
<td>$route_cc_count</td>
<td>This element contains the number of cross-connect entries in the specification of this route.</td>
</tr>
<tr>
<td>$route_ccentry number_active</td>
<td>This element indicates whether the route is active. This element can take one of the following values: true, false.</td>
</tr>
<tr>
<td>$route_ccentry number_direction</td>
<td>This element indicates the direction of data flow. This element can take one of the following values: UNIdirectional: From the source termination point to the sink termination point. BIdirectional: A two-way communication from and to both termination points.</td>
</tr>
<tr>
<td>Element name</td>
<td>Element description</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| $route_ccentry number_ccType | This element indicates the type of connection. This element can take the following values:  
  - ST_SIMPLE  
  - ST_ADD_DROP_A  
  - ST_ADD_DROP_Z  
  - ST_INTERCONNECT  
  - ST_DOUBLE_INTERCONNECT  
  - ST_DOUBLE_ADD_DROP  
  - ST_OPEN_ADD_DROP  
  - ST_EXPLICIT |
| $route_ccentry number_additionalInfo | This element contains a comma-separated list of the route parameters. |
| $SNCState | This element contains the SNC state of the event. This element can take the following values:  
  - SNCS_PENDING: The SNC has been created by an NMS and has not been activated by any NMS; or the SNC has been successfully deactivated by an NMS.  
  - SNCS_ACTIVE: The SNC is not in pending state, a route has been assigned to the SNC and all cross-connects for the SNC are active in the network.  
  - SNCS_PARTIAL: The SNC is not in pending state, and either a route has not been assigned to the SNC, or not all of the cross-connects of the SNC are active in the network.  
  - SNCS_NONEXISTENT: This is used to report SNCs that have been deleted. |
| $tpsToModify | This element holds the content of all the tpsToModify elements. |
| $tpsToModify_tpd_count | This element contains the total number of termination point data items in this termination point data list. |
| $tpsToModify_tpdindex_tpName | This element contains the name of the termination point in the form of comma separated of name-value pairs. |
| $tpsToModify_tpdindex_tpMappingMode | This element contains mapping mode for the termination point. One of below values:  
  - TM_NA  
  - TM_NEITHER_TERMINATED_NOR_AVAILABLE_FOR_MAPPING  
  - TM_TERMINATED_AND_AVAILABLE_FOR_MAPPING |
### Table 7. Elements specific to events (continued)

<table>
<thead>
<tr>
<th>Element name</th>
<th>Element description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$tpsToModify_tpdindex_transmissionParamsLayersCount</td>
<td>This element contains total number of layers with different rates for the current termination point data.</td>
</tr>
<tr>
<td>$tpsToModify_tpdindex_transmissionParamsLayersRateindex_rate_name_paramsCount</td>
<td>This element contains number of transmission parameters for the current termination point data and this named layer.</td>
</tr>
<tr>
<td>$tp_name_transmissionParamsLayersRate_number_name</td>
<td>This element contains the value of this parameter.</td>
</tr>
<tr>
<td>$tpsToModify_tpdindex_ingressTrafficDescriptorName</td>
<td>This element contains an ingress (incoming) traffic descriptor or transmission descriptor in the form of comma separated name-value pairs.</td>
</tr>
<tr>
<td>$tpsToModify_tpdindex_egressTrafficDescriptorName</td>
<td>This element contains an egress (outgoing) traffic descriptor or transmission descriptor in the form of comma separated name-value pairs.</td>
</tr>
<tr>
<td>$transmissionParameters</td>
<td>This element holds the content of all the transmissionParameters elements.</td>
</tr>
<tr>
<td>$transmissionParameters_layersCount</td>
<td>This element contains the total number of layers with different rates.</td>
</tr>
<tr>
<td>$transmissionParameters_layerRate_number_paramsCount</td>
<td>This element contains number of transmission parameters for this named layer.</td>
</tr>
<tr>
<td>$transmissionParameters_layerRate_number_param_name</td>
<td>This element contains the value of the transmission parameter for the named layer and the named parameter.</td>
</tr>
</tbody>
</table>

### Table 8. Elements specific to protection switch events

<table>
<thead>
<tr>
<th>Element name</th>
<th>Element description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$protectedE</td>
<td>This identifies the protected equipment when the switch is made.</td>
</tr>
<tr>
<td>$protectedTP</td>
<td>This element identifies the protected termination point when the switch occurred.</td>
</tr>
<tr>
<td>$ProtectionType</td>
<td>This element identifies the type of the protection switch</td>
</tr>
<tr>
<td>$switchAwayFromE</td>
<td>This element identifies the source equipment where the switch is being made.</td>
</tr>
<tr>
<td>$switchAwayFromTP</td>
<td>This element identifies the source termination point where the switch is being made</td>
</tr>
<tr>
<td>$switchReason</td>
<td>This element indicates why the switch occurred.</td>
</tr>
</tbody>
</table>
### Table 8. Elements specific to protection switch events (continued)

<table>
<thead>
<tr>
<th>Element name</th>
<th>Element description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$switchToE</td>
<td>This element identifies the destination equipment where the switch is being made.</td>
</tr>
<tr>
<td>$switchToTP</td>
<td>This element identifies the destination termination point where the switch is being made.</td>
</tr>
</tbody>
</table>

### Table 9. Elements specific to alarms

<table>
<thead>
<tr>
<th>Element name</th>
<th>Element description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$additionalInfo</td>
<td>This element contains additional information about the alarm.</td>
</tr>
<tr>
<td>$additionalText</td>
<td>This element contains a brief description of the problem being reported by the alarm.</td>
</tr>
<tr>
<td>$affectedTPList</td>
<td>This element identifies list of termination points affected by the problem being reported.</td>
</tr>
<tr>
<td>$affectedPTPs</td>
<td>This element displays the list of termination points affected by the problem being reported.</td>
</tr>
<tr>
<td>$nativeProbableCause</td>
<td>This element indicates the probable cause as given in the EMS user interface.</td>
</tr>
<tr>
<td>$probableCause</td>
<td>This element contains the probable cause of the alarm.</td>
</tr>
<tr>
<td>$probableCauseQualifier</td>
<td>This element contains the qualifier used to classify the alarm type.</td>
</tr>
</tbody>
</table>
| $rcaIndication               | This element indicates whether an alarm is a root alarm. This alarm has the following possible values:  
                                    | True (The alarm is a root alarm)  
                                    | False (The alarm is a common alarm)                                                                                                                   |
| $serviceAffecting            | This element indicates whether the alarm has affected the service.                                                                                     |
| $X.733::AdditionalInformation | This element indicates the ITU-T X733 additional information of the event. This consists of a list of up to five elements:  
                                               | • $X733::AdditonalInfo_AlarmNO  
                                               | • $X733::AdditionalInfo_DEVICE_LABEL  
                                               | • $X733::AdditionalInfo_DeviceIP  
                                               | • $X733::AdditionalInfo_Label  
                                               | • $X733::AdditionalInfo_UserLabel                                                                                                                     |
| $X.733::BackUpObject         | This element identifies the object that provides back-up services for the object that is the subject of an event.                                      |
### Table 9. Elements specific to alarms (continued)

<table>
<thead>
<tr>
<th>Element name</th>
<th>Element description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X.733::BackedUpStatus</td>
<td>This element indicates whether the object that is the subject of an event has been backed-up. It has the following possible values: BACKED_UP, NOT_BACKED_UP. When the attribute has the value BACKED_UP, the value of the $X.733::BackUpObject identifies the back-up object.</td>
</tr>
<tr>
<td>$X.733::CorrelatedNotifications</td>
<td>This element contains a list of root alarms that cause correlative alarms. This alarm has the following possible values: • soSource (This field is always empty) •notifIDs (For correlative alarms this field displays the serial number of the root alarm. For example, if alarm A causes alarm B, and alarm B causes alarm C this field will display alarm C along with the serial numbers of alarm A and alarm B.)</td>
</tr>
<tr>
<td>$X.733::EventType</td>
<td>This element contains the alarms classified into the following six basic types according to the ITU-T X.733: • communicationsAlarm • qualityofServiceAlarm • equipmentAlarm • processingErrorAlarm • securityAlarm • environmentalAlarm</td>
</tr>
<tr>
<td>$X.733::MonitoredAttributes</td>
<td>This element displays identifies one or more attributes of the managed object and their corresponding values at the time of the event.</td>
</tr>
<tr>
<td>$X.733::ProposedRepairActions</td>
<td>This element contains one or more proposed repair actions suggested by the EMS when it knows the probable cause and can suggest solutions to the event.</td>
</tr>
<tr>
<td>$X.733::SpecificProblems</td>
<td>This element identifies further refinements of the probable cause of an event.</td>
</tr>
<tr>
<td>$X.733::TrendIndication</td>
<td>This element compares the severity of the current alarm with that of all outstanding alarms raised for the object and indicates whether the severity has increased, decreased, or stayed the same.</td>
</tr>
</tbody>
</table>
Table 10. Elements specific to threshold crossing alerts

<table>
<thead>
<tr>
<th>Element name</th>
<th>Element description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$granularity</td>
<td>This element contains the details of the threshold that has been crossed.</td>
</tr>
<tr>
<td>$pmLocation</td>
<td>This element indicates the pmLocation where the threshold has been crossed.</td>
</tr>
<tr>
<td>$pmParameterName</td>
<td>This element contains the pmParameter that has crossed the threshold.</td>
</tr>
<tr>
<td>$thresholdType</td>
<td>This element indicates whether a threshold was set for the log report.</td>
</tr>
<tr>
<td>$unit</td>
<td>This element contains the faulty program unit.</td>
</tr>
<tr>
<td>$value</td>
<td>This element contains the threshold value.</td>
</tr>
</tbody>
</table>

Error messages

Error messages provide information about problems that occur while running the probe. You can use the information that they contain to resolve such problems.

The following table describes the error messages specific to this probe. For information about generic error messages, see the IBM Tivoli Netcool/OMNibus Probe and Gateway Guide.

Table 11. Error messages

<table>
<thead>
<tr>
<th>Error</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm alarmID Error in acknowledge.</td>
<td>The probe could not acknowledge the alarm specified in the ackAlarm command to the HTTP/HTTPS command interface.</td>
<td>Check that the you have specified the parameters for the command correctly, in particular the alarm identifier.</td>
</tr>
<tr>
<td>Error in filtered resynchronization</td>
<td>An error occurred while processing the resyncFilter command to the HTTP/HTTPS command interface.</td>
<td>Check that you have specified the command correctly, in particular the attributes of the filter.</td>
</tr>
<tr>
<td>Error in resynchronization</td>
<td>An error occurred while processing the resync command to the HTTP/HTTPS command interface.</td>
<td>Check that you have specified the command correctly. Also check that the values of the ResyncProbableCause and ResynchSeverityFilter are correctly specified.</td>
</tr>
<tr>
<td>Failed to convert IOR to object</td>
<td>The probe failed to convert an IOR into an object reference.</td>
<td>Check that the value of the IORFile property is correct and up to date. Also, make sure that the target system is running correctly.</td>
</tr>
<tr>
<td>Error</td>
<td>Description</td>
<td>Action</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Failed to get active alarms</td>
<td>The probe received an exception while trying to retrieve active alarms from the EMS manager.</td>
<td>Check the properties related to resynchronization, in particular the filter properties. Check that the target system is running correctly and that there is not an IDL type mismatch.</td>
</tr>
<tr>
<td>Failed to get EMS Manager reference</td>
<td>The probe is unable to retrieve an EMS Manager reference from the target system.</td>
<td>Check that the target system is running and that there is not an IDL file mismatch.</td>
</tr>
<tr>
<td>Failed to get next iterated alarm batch</td>
<td>The probe is unable to retrieve the next batch of active alarms.</td>
<td>Check there is not an IDL file mismatch or contact IBM Support.</td>
</tr>
<tr>
<td>Failed to narrow manager reference</td>
<td>The probe is unable to narrow the EMS Manager reference from the target system.</td>
<td>Check that the target system is running correctly and that there is not an IDL file mismatch.</td>
</tr>
<tr>
<td>Failed to retrieve TMF814 Release</td>
<td>The probe was unable to retrieve the TMF814 release.</td>
<td>The probe could not retrieve the value of the TMF814 release. Check the value of the ReleaseTMF814 property and adjust as necessary. In addition, make sure that the properties file has not become corrupted.</td>
</tr>
<tr>
<td>Failed to start</td>
<td>The probe is unable to start due to an environment problem or an unsupported TMF814 release.</td>
<td>Check that all properties have the correct, and valid, values as defined in “Properties and command line options” on page 19.</td>
</tr>
<tr>
<td>Cannot parse attribute attribute-name with type [type]</td>
<td>The probe cannot parse the attribute named in the error message.</td>
<td>Check that the attribute is a supported type and is compliant with the TMF814 standard. Refer to the elements that the probe supports. You can also contact IBM Software Support for assistance.</td>
</tr>
<tr>
<td>Failed to close file ior_file</td>
<td>The probe failed to close the specified IOR file.</td>
<td>Check that the IOR file is in the correct place, defined by the NamingServiceIORFile property or the IORFile property. In addition, check that the directory that holds the file is not set to read only.</td>
</tr>
<tr>
<td>Loading TMF814 jar release: UNKNOWN from path file-path</td>
<td>The ReleaseTMF814 property has an incorrect, unrecognized value. This message may occur with Failed to start.</td>
<td>Ensure the property has one of the values defined in “Properties and command line options” on page 19.</td>
</tr>
</tbody>
</table>
Table 11. Error messages (continued)

<table>
<thead>
<tr>
<th>Error</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stream capture fails</td>
<td>The probe was not able to capture raw event data.</td>
<td>Check that the value of the StreamCaptureFilePath property is a valid file path and that the path exists.</td>
</tr>
<tr>
<td>Unsupported TMF814 release</td>
<td>The ReleaseTMF814 property has an incorrect, unrecognized value.</td>
<td>Ensure the property has one of the values defined in “Properties and command line options” on page 19.</td>
</tr>
<tr>
<td>Unable to get EMS session</td>
<td>The probe is unable to connect to the target EMS session.</td>
<td>Check that the Username and Password properties contain the correct values for accessing the target system. In addition, check that the target system is running correctly.</td>
</tr>
<tr>
<td>Unable to ping the EMS session</td>
<td>The probe is unable to poll the target system during heartbeat checking.</td>
<td>Check that the target system is running correctly.</td>
</tr>
</tbody>
</table>

**ProbeWatch messages**

During normal operations, the probe generates ProbeWatch messages and sends them to the ObjectServer. These messages tell the ObjectServer how the probe is running.

The following table describes the ProbeWatch error messages that the probe generates. For information about generic ProbeWatch messages, see the *IBM Tivoli Netcool/OMNibus Probe and Gateway Guide*.

Table 12. ProbeWatch messages

<table>
<thead>
<tr>
<th>ProbeWatch message</th>
<th>Description</th>
<th>Triggers/causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ClientSession event loss occurred</td>
<td>The EMS has failed to push one or more events to the probe. As a result the probe is now out of synchronization with the EMS.</td>
<td>The EMS indicated that events are being lost and that it is not able to provide the relevant notifications.</td>
</tr>
<tr>
<td>ClientSession event loss cleared</td>
<td>The EMS has restored service and can now provide the relevant events to the probe. On reception of this notification the probe can now resynchronize with the EMS.</td>
<td>The EMS indicated that the event loss period is over and that it is able to provide the relevant notifications once more.</td>
</tr>
<tr>
<td>Starting the resynch of the alarm list</td>
<td>The probe has begun to resynchronize the alarm list.</td>
<td>The occurrence of a resynchronization operation.</td>
</tr>
<tr>
<td>Finished resynch of the alarm list</td>
<td>The probe has completed resynchronizing the alarm list.</td>
<td>Completion of the resynchronization of the alarm list.</td>
</tr>
</tbody>
</table>
Table 12. ProbeWatch messages (continued)

<table>
<thead>
<tr>
<th>ProbeWatch message</th>
<th>Description</th>
<th>Triggers/causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHUTDOWN. No events received for $n$ seconds</td>
<td>The probe has shut down due to inactivity.</td>
<td>The probe has not received any events for $n$ seconds and so is shutting down. The value of the <strong>Inactivity</strong> property determines the value of $n$.</td>
</tr>
</tbody>
</table>

**Known issues**

**Limitation in the HTTP/HTTPS command interface for TMF814 V2.1 devices**

The `ackAlarm` and `unackAlarm` commands of the HTTP/HTTPS command interface are not available for devices that implement TMF814 V2.1. This is due to a limitation in the IDL for that version of TMF814.

**Error messages from HTTP/HTTPS command interface**

When you use nco_http to send commands, it returns a number of messages. These messages include the following:

- **Warning:** W-UNK-103-001: HTTP Server returned an error: 0 Internal Server Error

You can ignore this message because the command completes successfully as subsequent messages show.

**Misleading response to incorrect HTTP/HTTPS commands**

When there are errors in a command sent over the HTTP/HTTPS command interface, a misleading error message is returned. If the command contains the wrong number of parameters, the following message appears in the log file:

- **Information:** I-UNK-104-002: 
  
  ```json
  \{"response": "Parameter set [alarmId] may not be used with 'unackAlarm", "status": "400"
  ```

If a command is missing a single quotation mark (') or a double quotation mark ("), the following messages appear in the log file:

- **Warning:** W-ETC-004-060: Undefined argument: params[]
- **Fatal:** F-UNK-102-002: Failed to process arguments (-52: Undefined argument)

**Null properties**

The probe’s properties file allows you to set values for the following properties. However, those properties have no effect as the features they correspond to are not implemented in this release of the probe.

- `DataBackupFile`
- `RotateEndpoint`
Chapter 2. Migrating from existing probes

There are a number of IBM Tivoli Netcool/OMNIbus probes that monitor TMF-814 compliant systems:

- Probe for Alcatel-Lucent NaviScore 9.1
- Probe for Huawei T2000 (CORBA)
- Probe for Nokia-Siemens TNMS (CORBA)
- Probe for ECI Lightsoft (CORBA)

The Generic Probe for TMF814 can also monitor the same systems. This chapter contains guidance on how to migrate from one of the existing probes to the generic probe. The migration procedure has the following stages:

1. Ensure the generic probe contains all the features of the existing probe that you need.
2. Determine any additional features of the generic probe that you want to use.
3. Install the generic probe.
4. Migrate the properties file.
5. Customize the rules file.
6. Run and test the generic probe.
7. Optimize property values and the rules file.

Note: Where possible, carry out the migration in a test environment or a simulation of the production environment so that the work does not interfere with the production environment. Change over to using the Generic Probe for TMF814 in production once you are sure that it behaves in the same way as the probe it is replacing.

Comparison of probe features

All probes have some features in common, others are specific to the generic probe or to one of the existing, product-specific probes.

Common features

The following features are common to all the TMF814 probes:

<table>
<thead>
<tr>
<th>Functional category</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting to the CORBA interface</td>
<td>Connect through an IOR file.</td>
</tr>
<tr>
<td></td>
<td>Connect through a Naming Service host and port.</td>
</tr>
<tr>
<td></td>
<td>Connect through a Naming Service IOR file.</td>
</tr>
<tr>
<td>Resynchronization</td>
<td>Retrieve alarms from the system on startup before receiving new alarms.</td>
</tr>
<tr>
<td></td>
<td>Retrieve alarms using a severity filter.</td>
</tr>
<tr>
<td></td>
<td>Retrieve alarms in batches.</td>
</tr>
</tbody>
</table>
Table 13. Features common to all TMF814 probes (continued)

<table>
<thead>
<tr>
<th>Functional category</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data acquisition</td>
<td>Authentication with the NMS or EMS using a username and password.</td>
</tr>
<tr>
<td></td>
<td>Ability to receive alarms and notifications.</td>
</tr>
<tr>
<td></td>
<td>Heartbeat status check.</td>
</tr>
<tr>
<td></td>
<td>Inactivity timeout.</td>
</tr>
<tr>
<td></td>
<td>Reconnection and probe backoff.</td>
</tr>
<tr>
<td></td>
<td>Support for Unicode and non-Unicode characters.</td>
</tr>
</tbody>
</table>

Features specific to the Generic Probe for TMF814

The Generic Probe for TMF814 has the following additional features that are not present in one or more of the product-specific probes:

- “Resynchronization with a probable cause filter” on page 40
- “Resynchronization at intervals” on page 40
- “Data stream capture” on page 40
- “HTTP/HTTPS command interface” on page 40

Resynchronization with a probable cause filter

All TMF814 probes provide a means of resynchronizing with the NMS or EMS using a severity filter. In addition, the generic probe can use a probable cause filter when retrieving alarms, specified by the `ResyncProbableCauseFilter` property. “Alarm retrieval and synchronization” on page 12 has more information on resynchronization and the use of filters.

Resynchronization at intervals

In addition to the initial resynchronization with the NMS or EMS, the generic probe also has the ability to resynchronize at regular intervals, specified by the `ResyncInterval` property. “Alarm retrieval and synchronization” on page 12 has more information on resynchronization at intervals.

Data stream capture

The generic probe can capture the stream of binary data and store it in a file specified by the `StreamCapture` and `StreamCaptureFilePath` properties. The data can then be used for debugging purposes, to develop new features, or to pass on to other management systems that require the same data. “Data stream capture” on page 13 has more information on data stream capture.

HTTP/HTTPS command interface

For sites that use Netcool/OMNIbus 7.4 and later, the generic probe has a HTTP/HTTPS command interface. This enables you to send commands to the probe in JSON over a HTTP or HTTPS connection. Commands are available to acknowledge and clear alarms, and perform a resynchronization. “Managing the probe over an HTTP/HTTPS connection” on page 15 has more information on the interface, how to configure it, and the format of the commands. There are also examples of each command.

Features not available in the Generic Probe for TMF814

The Probe for Huawei T2000 (CORBA) has a number of features that are not currently available in the generic probe:
• Event synchronization with the ObjectServer
• EMS Server failover
• Persistence notification

Before deploying the Generic Probe for TMF814 ensure that you do not require any of these features.

Migration procedure

Use this procedure to replace a system-specific probe with the generic probe.

• “Determining the features to use” on page 41
• “Installing the Generic Probe for TMF814” on page 41
• “Migrating properties” on page 41
• “Customizing the rules file” on page 43
• “Running and testing the probe” on page 46
• “Optimizing property values and the rules file” on page 46

Determining the features to use

Determine which features of the Generic Probe for TMF814 you require to adequately replace the system-specific probe.

Use the information in Chapter 1, “Generic Probe for TMF814,” on page 1 and in “Comparison of probe features” on page 39 to determine the features that you want to implement in the generic probe. Start by determining the features that provide the functionality that the system-specific probe gives you. Then, decide which of the new features specific to the generic probe you want to use, if any. Take careful note of the requirements of each feature and the information you need to implement them.

Installing the Generic Probe for TMF814

Follow the advice in “Installing probes” on page 2 to download and install the generic probe in to a test environment.

Migrating properties

Determine the values required for the properties file of the generic probe. As shown in “Configuring the probe” on page 2 there are two groups of properties:

• Required settings that all installations of the probe must have.
• Optional settings that related to features that are not mandatory.

Use the properties file for the system-specific probe to set the correct values in the generic probe.

Required settings

The required settings relate to the following:

• CORBA connection method
• Authentication
• TMF release version in use

There are two ways of connecting to the CORBA interface, as shown in “Connecting to the CORBA interface” on page 7. From the implementation in the system specific probe, determine which you want to use on the generic probe and set the properties accordingly. Note that the names of properties for using a Naming Service to establish the connection differ in the generic probe, as the following table shows:
Copy the values for the authentication properties from the system-specific properties file to the file for the generic probe.

The **ReleaseTMF814** property is found only in the generic probe. Set this property to the version of the TMF814 standard that the NMS or EMS implements.

**Optional settings**

Optional settings relate to features of the probe that a site may decide to use or not, as their business requires:
- Resynchronization policy
- Reconnection policy
- Inactivity policy
- Heartbeat policy
- Support for Unicode and non-Unicode characters
- Peer-to-peer failover pair
- HTTP/HTTPS command interface
- Running multiple instances of the probe

The table in “Configuring the probe” on page 2 lists the properties associated with each feature. For features that you use in the system-specific probe, set the values of the generic probe properties to appropriate values. For features that you do not use in the system-specific probe, or that the system-specific probe does not provide, decide on the values to use and set the generic properties file accordingly. Follow the advice in the sections referenced in the configuration table for details of how to set the properties.

Note that the generic probe uses different names for some properties to those used in the system-specific probes, as the following table shows:

<table>
<thead>
<tr>
<th>System-specific property</th>
<th>Generic property</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgentHeartbeat</td>
<td>HeatbeatInterval</td>
</tr>
<tr>
<td>ExcludeSeverityCleared</td>
<td>ResyncSeverityFilter</td>
</tr>
<tr>
<td>ExcludeSeverityCritical</td>
<td></td>
</tr>
<tr>
<td>ExcludeSeverityIndeterminate</td>
<td></td>
</tr>
<tr>
<td>ExcludeSeverityMajor</td>
<td></td>
</tr>
<tr>
<td>ExcludeSeverityMinor</td>
<td></td>
</tr>
<tr>
<td>ExcludeSeverityWarning</td>
<td></td>
</tr>
<tr>
<td>Resynch</td>
<td>InitialResync</td>
</tr>
<tr>
<td>ResynchBatchSize</td>
<td>ResyncBatchSize</td>
</tr>
<tr>
<td>Retry</td>
<td>RetryCount</td>
</tr>
<tr>
<td></td>
<td>RetryInterval</td>
</tr>
</tbody>
</table>
Table 15. Properties with different names in the generic probe (continued)

<table>
<thead>
<tr>
<th>System-specific property</th>
<th>Generic property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeout</td>
<td>Inactivity</td>
</tr>
</tbody>
</table>

In particular notice that there is no direct correspondence between the properties that filter alarms by severity. From the system-specific probe’s properties file, determine the severities that you want to filter and then construct the appropriate value for the ResyncSeverityFilter property of the generic probe. “Properties and command line options” on page 19 defines the format for the value of the ResyncSeverityFilter property.

Customizing the rules file

Edit the rules file for the generic probe to:

- Apply any vendor-specific enrichment or filtering that the generic rules file does not provide.
- Migrate custom rules from the system-specific rules file to the generic rules file.
- Apply changes to the @ClassID, @Manager, and lookup tables as required.

Note: The generic probe may not be able to parse certain attributes if the vendor does not follow the TMF814 standard or has implemented their own types that are not TMF814 compliant.

Attributes

There are some differences in the names or values of attributes between the system-specific probes and the generic probe. The following table indicates where there are differences, and shows the element that the TMF814 standard defines. Be sure to make the necessary changes if you copy over rules from the system-specific rules file.

Table 16. Differences in rules file attributes

<table>
<thead>
<tr>
<th>TMF814 element name</th>
<th>System-specific probes</th>
<th>Generic probe</th>
</tr>
</thead>
<tbody>
<tr>
<td>event_name</td>
<td>$event_name</td>
<td>$EventName</td>
</tr>
<tr>
<td>event_type.domain_name</td>
<td>$domain_name</td>
<td>$DomainName</td>
</tr>
<tr>
<td>objectName</td>
<td>$name</td>
<td>$objectName_name</td>
</tr>
<tr>
<td></td>
<td>For example: $AID, $EMS, $ManagedElement.</td>
<td>For example: $objectName_AID, $objectName_EMS, $objectName_ManagedElement.</td>
</tr>
<tr>
<td>groupName</td>
<td>$name</td>
<td>$groupName_name</td>
</tr>
<tr>
<td>acknowledgeIndication</td>
<td>Not available in the system-specific probes.</td>
<td>$acknowledgeIndication</td>
</tr>
<tr>
<td>attributeList</td>
<td>$attributeList= &quot;attributes;&quot;</td>
<td>$attributeList_name= &quot;value&quot;</td>
</tr>
<tr>
<td></td>
<td>Here, attributes is a list of attribute/value pairs with a comma separating each pair. For example: $attributeList=&quot;a=1, b=2, c=3;&quot;</td>
<td>For example: attributeList_a=&quot;1&quot; attributeList_b=&quot;2&quot; attributeList_c=&quot;3&quot;</td>
</tr>
<tr>
<td>TMF814 element name</td>
<td>System-specific probes</td>
<td>Generic probe</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------</td>
<td>---------------</td>
</tr>
</tbody>
</table>
| protectedTP         | $protectedTP= "terminationpoints;"  
Here, *terminationpoints* is a list of termination points and their values separated by commas. For example: $protectedTP="a=1, b=2, c=3;"  
For example: 
$protectedTP_a="1"  
$protectedTP_b="2"  
$protectedTP_c="3"  |
| switchToTP          | $switchToTP= "terminationpoints;"  
Here, *terminationpoints* is a list of termination points and their values separated by commas. For example: $switchToTP="a=1, b=2, c=3;"  
For example: 
$switchToTP_a="1"  
$switchToTP_b="2"  
$switchToTP_c="3"  |
| switchAwayFromTP    | $switchAwayFromTP= "terminationpoints;"  
Here, *terminationpoints* is a list of termination points and their values separated by commas. For example: $switchAwayFromTP="a=1, b=2, c=3;"  
For example: 
$switchAwayFromTP_a="1"  
$switchAwayFromTP_b="2"  
$switchAwayFromTP_c="3"  |
| switchAwayFromE     | $switchAwayFromE= "equipmentlist;"  
Here, *equipmentlist* is a list of equipment attributes and their values separated by commas. For example: $switchAwayFromE="a=1, b=2, c=3;"  
For example: 
$switchAwayFromE_a="1"  
$switchAwayFromE_b="2"  
$switchAwayFromE_c="3"  |
| switchToE           | $switchToE= "equipmentlist;"  
Here, *equipmentlist* is a list of equipment attributes and their values separated by commas. For example: $switchToE="a=1, b=2, c=3;"  
For example: 
$switchToE_a="1"  
$switchToE_b="2"  
$switchToE_c="3"  |
| protectedE          | $protectedE= "equipmentlist;"  
Here, *equipmentlist* is a list of equipment attributes and their values separated by commas. For example: $protectedE="a=1, b=2, c=3;"  
For example: 
$protectedE_a="1"  
$protectedE_b="2"  
$protectedE_c="3"  |
<table>
<thead>
<tr>
<th>TMF814 element name</th>
<th>System-specific probes</th>
<th>Generic probe</th>
</tr>
</thead>
</table>
| performanceValue    | Not available in the system-specific probes. | $performanceValue\_pmParameter  
$performanceValue\_pmLocation  
$performanceValue\_intervalStatus  
$performanceValue\_unit  
$performanceValue\_value |
| thresholdValue       | Not available in the system-specific probes. | $thresholdValue\_pmParameter  
$thresholdValue\_pmLocation  
$thresholdValue\_intervalStatus  
$thresholdValue\_unit  
$thresholdValue\_value |
| affectedTPLList      | $affectedTPLList= "terminationpoints;"  
Here, terminationpoints is a list of termination point names and their values separated by commas. For example: $affectedTPLList="a=1, b=2, c=3;" | $affectedTPLList\_name= "value"  
For example: $affectedTPLList\_a="1"  
$affectedTPLList\_b="2"  
$affectedTPLList\_c="3" |
| additionalInfo       | $name | $additionalInfo\_name |
| X.733::SpecificProblems | $X.733::SpecificProblems\_n |
| X.733::BackUpObject  | $name | $X.733::BackUpObject\_name |
| X.733::Correlated Notifications | $X.733::Correlated Notifications\_n= "Sources: source\_namen= source\_valuen,...; NotificationIds: notifIdn,...;"  
Here, n is an integer greater than or equal to zero. | $X.733::Correlated Notifications\_n= "Sources: source\_namen= source\_valuen,...; NotificationIds: notifIdn,...;" |
| X.733::MonitoredAttributes | $name | $X.733::Monitored Attributes\_name |
| X.733::ProposedRepair Actions | $X.733::ProposedRepair Actions\_n | $X.733::ProposedRepair Actions\_n |
| X.733::AdditionalInfo | $name | $X.733::AdditionalInfo\_name |
Running and testing the probe

Run the probe and ensure it is communicating with the NMS or EMS correctly.

To run and test the probe:

1. Start the probe from the command line, specifying the minimum message level of debug and that an initial resynchronization is to occur. For example:

   `$OMNIHOME/probes/nco_p_generic_tmf814 -messagelog stdout -messagelevel debug -initialresync true`

2. Ensure that the probe connects to the target system successfully. Look for the following message in the probe’s log file:

   Information: I-JPR-000-000: Probe connected

If the probe fails to connect:

- Check and adjust the properties related to setting up a connection. See “Connecting to the CORBA interface” on page 7 for information on the connection properties and how to set them.
- Ensure that any firewall between the probe host and the NMS or EMS is configured to allow traffic to pass from one end to the other in both directions.

3. Check that the probe successfully synchronizes with the NMS or EMS. Look for messages similar to the following in the probe’s log file:

   Debug: D-JPR-000-000: Send request for active alarms
   Debug: D-JPR-000-000: Successfully retrieved batch of 100 resync alarms.
   Information: I-JPR-000-000: Parsing alarm
   Debug: D-JPR-000-000: Resync alarms will be returned in batches, using iterator
   Debug: D-JPR-000-000: Fetching batch of alarms

   Troubleshoot any synchronization errors, including the values of the synchronization properties. See “Alarm retrieval and synchronization” on page 12 for information on synchronization.

4. Check that the probe correctly parses alarms with the Event Processor. Check for any unsupported types for event parsing. For example:

   Debug: D-UNK-000-000: [Event Processor] nativeProbableCause: HP_REI
   Debug: D-UNK-000-000: [Event Processor] neTime: 20120626071005.0Z
   Debug: D-UNK-000-000: [Event Processor] EventName:
   Debug: D-UNK-000-000: [Event Processor] notificationId:
   Debug: D-UNK-000-000: [Event Processor] perceivedSeverity: 1
   Debug: D-UNK-000-000: [Event Processor] DomainName: tmf_mtnm
   Debug: D-UNK-000-000: [Event Processor] probableCauseQualifier: 1-79
   Debug: D-UNK-000-000: [Event Processor] objectTypeQualifier:
   Debug: D-UNK-000-000: [Event Processor] layerRate: 15

5. Check the log file for errors that occur from parsing unsupported types of event. For example:

   Cannot parse event attribute 'X.733:CorrelatedNotifications' with type [19]
   and content description: Sequence

   Check also for attributes having a null value or one that shows as 'UNKNOWN'.

6. Check that events appear in the Event List and that they contain the expected elements and values.

   Modify the rules file if the values in the Event List do not meet your requirements.

Optimizing property values and the rules file

As a result of testing the probe, make any changes and optimizations necessary to the properties file and the rules file. Then test the probe again. Repeat this process until the probe behaves correctly and the Event List contains all the expected events with all the required elements and values.
Appendix A. Notices and Trademarks

This appendix contains the following sections:

- Notices
- Trademarks

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