

**Tivoli Netcool Support's
Guide to the
Message Bus Integration
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1 Introduction

The Message Bus integration is composed of a number of common components and two integration products:

1. Message Bus Gateway [**nco_g_xml**]
2. Message Bus Probe [**nco_p_message_bus** formally **nco_p_xml**]

This document is intended to supplement the products documentation and provide guidance for specific integrations.

Before reading this document it is recommended that the Message bus Probe and Gateway manuals are read.

This document does not discuss the SCALA integration used with Log Analytics.

Note: The **nco_p_message_bus** probe has replaced **nco_p_xml** probe.

1.1 Overview

This document is intended as a quick start to understanding the Message Bus gateway and probe

- Connection to the Apache ActiveMQ server [Transport JMS and MQTT]
- HTTP probe and gateway configuration [Transport HTTP]
- Other common probe examples
- General guidance
- Configuring the probe and gateway together [XML only]

The files and example configurations provided allow the user to test the solution with minimal configuration.

The probe and gateway are Java based integrations that use the common-transformer and common-transport modules.

Gateway supporting packages:

- gateway-libngjava
- **common-transformer**
- **common-transportmodule**
- common-sslutility (not windows)

Probe supporting packages

- probe-nonnative-base
- probe-sdk-java
- **common-transformer**
- **common-transportmodule**

It is therefore recommended that the probe and gateway configuration files are copied to custom locations to ensure that they are not overwritten, and to allow easy comparison with the default files following any package updates.

1.2 Capabilities

The message bus probe and gateway share a common transport module that allows them to connect to various services. Along with the generic probe solution, there are a number of specific customisations of the probe provided with the message bus probe package. In addition to these, specific probes have been produced that use the transport and transformer modules, such as the CISCO APIC probe.

For the Generic message bus integration, the following capabilities are available:

	Probe	Gateway
XML data	X	X
JSON data	X	
HTTP Transport	X	X
JMS	X	X
MQTT	X	X
Websocket	X	
Webhook	X	
Cometd	X	
KAFKA	X	
FILE	X	X
SOCKET		X

Notes:

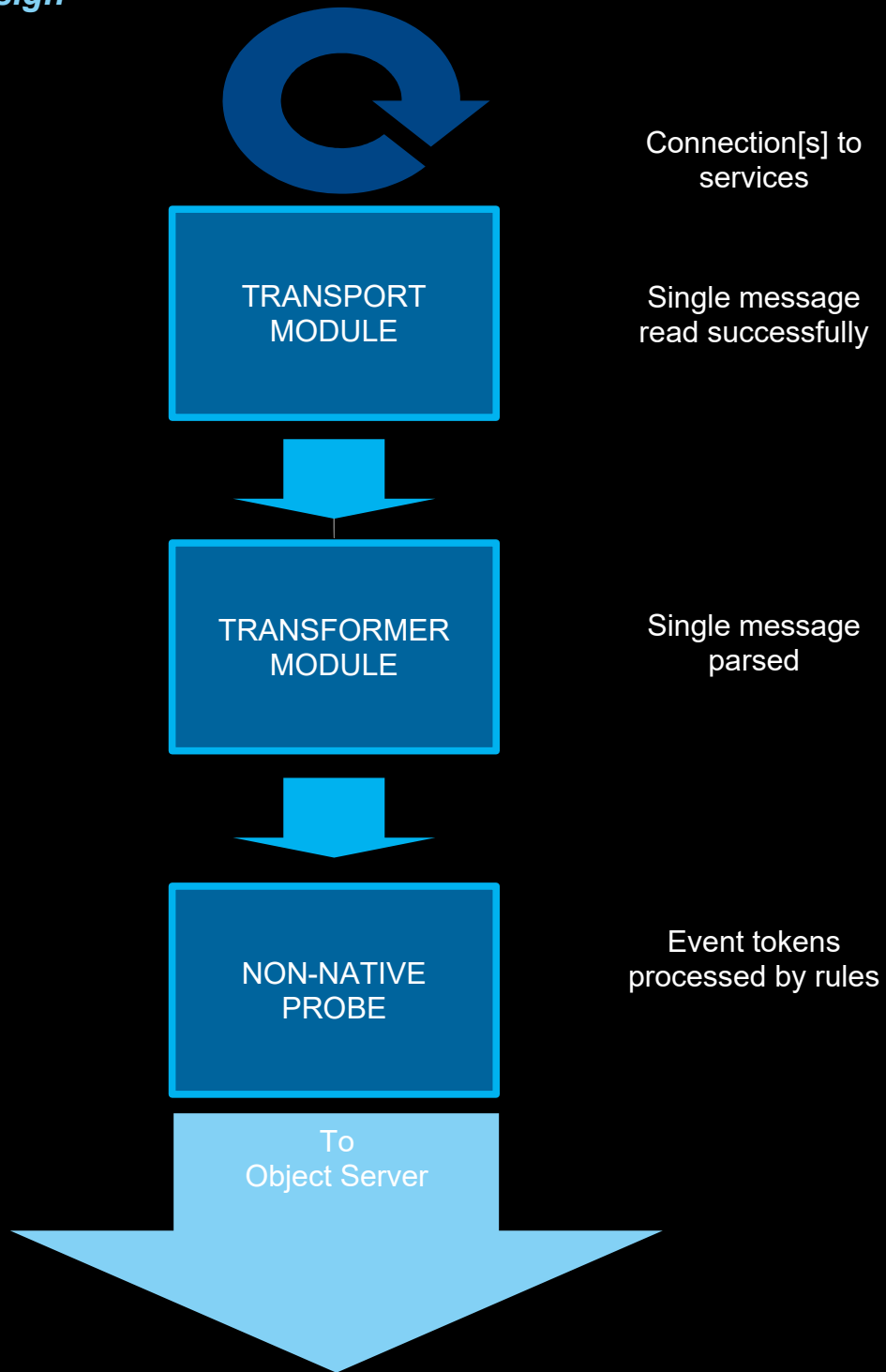
The Message bus probe covers both XML and JSON messages.

The Message bus probe requires the property MessagePayload to be set to 'xml' for it to parse XML messages, which was the default behaviour of the nco_p_xml probe.

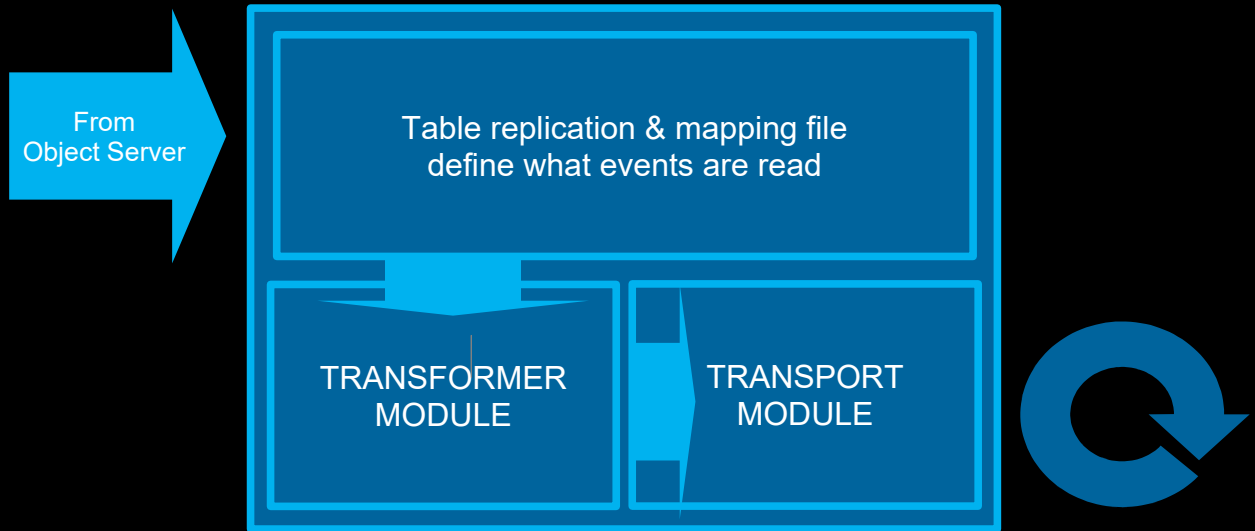
The Message bus [XML] Gateway uses a default parser for sending XML messages.

The Message bus [XML] Gateway with HTTP transport types, requires bufferSize to be set to 1 to send XML events to the Message bus probe.

1.3 Probe design



1.4 Gateway design



2 JMS Transport with Apache MQ

2.1 Overview

The key configuration files are;

- G_JMS.props** or **message_bus.props** : integration properties
- jmsTransport.properties** : JMS Connection details
- jndi.properties** : JNDI translation [Apache ActiveMQ]
- transformers.xml** : Token translation

Apache ActiveMQ class files:

- activemq-all-5.x.x.jar**

etc.

2.2 Requirements

The Message Bus probe and gateway include a number of supporting features that may be updated outside of the probe or gateway packages. Check to see if there are updates to the following components after installing the probe or gateway:

- common-transportmodule
- common-transformer

For the Gateway only:

- gateway-libngjava
- gateway-libngtkk

The version of java used is determined using the wrapper scripts. It may be necessary to alter these scripts or the environment scripts to set the correct version of Java for the installation.

FQDN is used to define the MQ server; It stands for the Fully Qualified DomainName of the Apache ActiveMQ server, but can also be the servers IP Address. The important configuration is that the systems are able communicate via TCP using the given name or IP Address.

At the time of writing the wmqtt.jar file was not included with the transport module and needed to be downloaded from the IBM support site separately, and is used when TransportType 'MQTT' is required.

2.3 Apache ActiveMQ server

The ActiveMQ product is a light-weight JMS server provided by Apache.

2.3.1 Downloading and installing

Download the product from the main web site;

```
http://activemq.apache.org/index.html
```

Install the product on an appropriate server.

2.3.2 Starting the ActiveMQ server

Configure the correct java environment for the version of ApacheMQ;

```
java -version
```

Start the main services

```
cd apache-activemq-5.13.0/bin
./activemq start
```

The administration server is started as;

```
./activemq-admin start
```

2.3.3 Create the default queue and topic

Using the correct hostname (localhost) login to the ActiveMQ server using a supported web browser;

```
http://localhost:8161/admin/
```

Note: Apache ActiveMQ servers can automatically create queues and topics.

2.4 Message Bus Gateway

2.4.1 Overview of configuration and jar files

\$OMNIHOME/gates/G_JMS:

- **G_JMS.props**
- xml.map
- xml.reader.tblrep.def
- xml.startup.cmd

\$OMNIHOME/gates/G_JMS/java

- **activemq-all-5.13.0.jar**
- **log4j-1.2.17.jar**
- **slf4j-log4j12-1.7.13.jar**
- **wmqtt.jar** [required for the MQTT transport method]

\$OMNIHOME/gates/G_JMS/conf

- **jmsTransport.properties**
- **mqttTransport.properties**
- **jndi.properties**
- **transformers.xml**

\$OMNIHOME/gates/java

- nco_g_xml.jar
- ngjava.jar

\$OMNIHOME/java/conf

addnvpair.xsl
cbe2nvpairs.xsl
fileTransport.properties
mqttTransport.properties
netcool2cbe.xsl
netcool2nvpairs.xsl
netcool2wef.xsl
wbe2nvpairs.xsl
wbep12nvpairs.xsl
wbm2nvpairs.xsl
wef2nvpairs.xsl

2.4.2 Setting the Java libraries

For the latest version of Netcool/OMNIbus the gateway may need to have the JRE_DIR defined to use the latest IBM Java.

If the Java library is not found the gateway reports:

error while loading shared libraries: libjvm.so: cannot open shared object file: No such file or directory

To modify the Java path:

```
e.g.
vi $NCHOME/omnibus/platform/linux2x86/bin/nco_g_xml.env

if [ -d ${BASE_JRE_DIR}/jre_1.6.7 ];
then
    JRE_DIR=${BASE_JRE_DIR}/jre_1.6.7
elif [ -d ${BASE_JRE_DIR}/jre_1.5.6 ];
then
    JRE_DIR=${BASE_JRE_DIR}/jre_1.5.6
...
:wq
```

2.4.3 Apache ActiveMQ CLASSPATH

The Apache ActiveMQ uses JNDI and requires the jndi.properties file to be in the CLASSPATH along with the required jar files.

e.g.

The jndi.properties directory is added to the jars classpath:-

```
setenv CLASSPATH $OMNIHOME/java/conf
```

The CLASSPATH with MQTT would be:

```
setenv CLASSPATH $OMNIHOME/gates/G_JMS/conf
setenv CLASSPATH $OMNIHOME/gates/G_JMS/java/activemq-all-5.13.0.jar:$CLASSPATH
setenv CLASSPATH $OMNIHOME/gates/G_JMS/java/log4j-1.2.17.jar:$CLASSPATH
setenv CLASSPATH $OMNIHOME/gates/G_JMS/java/slf4j-log4j12-1.7.13.jar:$CLASSPATH
setenv CLASSPATH $OMNIHOME/gates/G_JMS/java/wmqtt.jar:$CLASSPATH
#EOF
```

For production usage you can use the gateways env file or the property Gate.Java.ClassPath to set the CLASSPATH, otherwise use the users environment. Create a different user per gateway type if more than one CLASSPATH is required.

You can also explicitly set the classpath in the gateways property file:

```
Gate.Java.ClassPath : '$CLASSPATH'
```

2.4.4 Properties file

```
Name : 'G_JMS'
MessageLog : '$OMNIHOME/log/G_JMS.log'
PropsFile : '$OMNIHOME/gates/G_JMS/G_JMS.props'
Gate.MapFile : '$OMNIHOME/gates/G_JMS/xml.map'
Gate.StartupCmdFile : '$OMNIHOME/gates/G_JMS/xml.startup.cmd'
Gate.Reader.TblReplicateDefFile : '$OMNIHOME/gates/G_JMS/xml.reader.tblrep.def'
Gate.XMLGateway.TransformerFile : '$OMNIHOME/gates/G_JMS/conf/transformers.xml'
Gate.XMLGateway.TransportFile : '$OMNIHOME/gates/G_JMS/conf/jmsTransport.properties'
Gate.XMLGateway.TransportType : 'JMS'
Gate.XMLGateway.MessageID : 'netcoolNVP'
#EOF
```

2.4.5 Transformers.xml file

The basic Transformers file would just contain the default transformer to the named topic 'netcool' via the MessageID defined in the properties file [netcoolINVP]:-

```
vi $OMNIOHME/gates/G_JMS/conf/transformers.xml
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <!-- Northbound (gateway) transformer definitions -->
  <tns:transformer name="netcoolNVP" type="northbound" endpoint="netcool"
    className="com.ibm.tivoli.netcool.integrations.transformer.EmptyTransformer">
    </tns:transformer>
  </tns:transformers>
```

2.4.6 jmsTransport.properties

```
vi $OMNIOHME/gates/G_JMS/conf/jmsTransport.properties
initialContextFactory=org.apache.activemq.jndi.ActiveMQInitialContextFactory
# JMS
providerURL=tcp://localhost:61616
# MQTT
#providerURL=tcp://localhost:1883
topicConnectionFactory=ConnectionFactory
#queueConnectionFactory=ConnectionFactory
topicName=netcool
#queueName=netcool
username=activemq
password=activemq
#EOF
```

2.4.7 jndi.properties

Note: The jndi.properties is not used in the current version of ApacheMQ but was used in earlier versions. It's configuration settings are included for completeness.

```
vi $OMNIOHME/gates/G_JMS/conf/jndi.properties
java.naming.factory.initial=org.apache.activemq.jndi.ActiveMQInitialContextFactory
java.naming.provider.url=vm://FQDN
connectionFactoryNames=ConnectionFactory
#queue.netcool=netcool
topic.netcool=netcool
#EOF
```

2.5 Message Bus Probe

The Message Bus probe reads data from the queue and parses the data to the object servers.

In order to control the settings for the Message Bus probe, create an `nco_p_message_bus` probe directory in the `$OMNIHOME/probes/java` directory, adding copies of the required files;

e.g.

Copy files from the default location `$OMNIHOME/java/conf` to the probe specific configuration directory

- `jndi.properties` [needs to be created]
- `jmsTransport.properties`
- `transformers.xml`

Ensure that the required jar files [e.g. `activemq-all-*.*.jar`] are installed in the probe specific configuration directory so that the non-native probe environment script can detect them.

2.5.1 CLASSPATH

For the latest non-native probe the `nco_p_message_bus.env` script can be used to set the CLASSPATH;

```
vi $NCHOME/omnibus/probes/java/nco_p_message_bus.env
# Add on required jar files for Apache ActiveMQ
export jarfile
CLASSPATH=${OMNIHOME}/probes/java/${PROGRAM}:${CLASSPATH}
CLASSPATH=${CLASSPATH}:${OMNIHOME}/probes/java/${PROGRAM}/log4j-1.2.17.jar
CLASSPATH=${CLASSPATH}:${OMNIHOME}/probes/java/${PROGRAM}/slf4j-log4j12-1.7.13.jar
# Uncomment for the MQTT transport
#CLASSPATH=${CLASSPATH}:${OMNIHOME}/probes/java/${PROGRAM}/wmqtt.jar
CLASSPATH=${CLASSPATH}:${OMNIHOME}/probes/java/${PROGRAM}/activemq-all-5.13.0.jar
# DEBUGGING
echo "CLASSPATH= " $CLASSPATH
echo $CLASSPATH | awk -F\: '{for(i=1;i<=NF;i++)print $i}' | while read jarfile
do
echo $jarfile
done
#EOF
:wq
```

The probe specific directory `$NCHOME/omnibus/probes/java/nco_p_message_bus` will now contain;

- `activemq-all-5.13.0.jar`
- `wmqtt.jar` [if required]
- `log4j-1.2.17.jar`
- `slf4j-log4j12-1.7.13.jar`
- `jmsTransport.properties`
- `transformers.xml`
- `jndi.properties`

2.5.2 Message Bus probe properties file

```
# JMS Transport
TransportType      : 'JMS'
MessagePayload     : 'xml'
TransportFile      : '$OMNIHOME/probes/java/nco_p_message_bus/jmsTransport.properties'
# MQTT Transport
#TransportType     : 'MQTT'
#TransportFile     : '$OMNIHOME/probes/java/nco_p_message_bus/mqttTransport.properties'
TransformerFile    : '$OMNIHOME/probes/java/nco_p_message_bus/transformers.xml'
#EOF
```

Note: **\$OMNIHOME** should be expanded to the full path.

2.5.3 Transformers.xml file

The basic Transformers file just contains the default southbound transformer to the named topic 'netcool' as defined in the transport properties file:-

```
vi $OMNIHOME/probes/java/nco_p_message_bus/transformers.xml
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<!-- Southbound (probe) transformer definitions -->
<tns:transformer name="netcool2nvpairs" type="southbound" endpoint="netcool"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
<tns:property name="xsltFilename" type="java.lang.String" value="$OMNIHOME/java/conf/netcool2nvpairs.xsl"
description="XSLT file for converting Netcool events to name/value pairs"/>
</tns:transformer>
</tns:transformers>
```

2.5.4 jmsTransport.properties

```
vi $OMNIHOME/probes/java/nco_p_message_bus/jmsTransport.properties
initialContextFactory=org.apache.activemq.jndi.ActiveMQInitialContextFactory
providerURL=tcp://FQDN:61616
queueName=netcool
queueConnectionFactory=ConnectionFactory
username=activemq
password=activemq
#EOF
```

2.5.5 jndi.properties

Note: The jndi.properties is not used in the current version of ApacheMQ but was used in earlier versions. It's configuration settings are included for completeness.

```
vi $OMNIHOME/probes/java/nco_p_message_bus/jndi.properties
java.naming.factory.initial=org.apache.activemq.jndi.ActiveMQInitialContextFactory
java.naming.provider.url=vm://FQDN
connectionFactoryNames=ConnectionFactory
queue.netcool=netcool
#EOF
```

2.5.6 Windows Considerations

Windows does not allow the CLASSPATH to be set easily, therefore the nco_p_message_bus.bat file will need to be edited.

e.g.

```
set APACHEMQ_CLASSPATH=c:/apachemq/log4j-1.2.14.jar;c:/apachemq/slf4j-log4j12-1.5.11.jar;c:/apachemq/activemq-all-5.5.1.jar;c:/apachemq/

REM *** args to execute the probe

set PROGARGS=javaw -Xrs -cp %PROBE_CLASSPATH%;%NSPROBE_CLASSPATH%;%TRANSPORT_CLASSPATH%;%TRANSFORMER_CLASSPATH%;%APACHEMQ_CLASSPATH% nco_p_message_bus
```

Where the directory 'c:/apachemq' contains the required jar files for the Apache ActiveMQ server, jndi.properties and jmsTransport.properties.

2.5.7 Sending events

In the example configuration, events can be sent using the 'Send' feature available on the Apache ActiveMQ GUI. Start the probe from the command and login to the Apache ActiveMQ server. Check the number of consumers is '1' in the Queue monitor tab window. Select the 'Send' tab, and enter 'netcool' as the Destination. Enter a valid XML string into the Message body section. Click 'send' and review the probes debug log file.

2.6 Message Bus Probe : MQTT example

The MQTT transport method can be used to provide an active alarm event stream. However, for the resynchronisation of events from the queue, the ActiveMQ server needs to be configured to provide a resend service.

2.6.1 message_bus.props

```
TransportType      : 'MQTT'
MessagePayload     : 'xml'
TransformerFile    : '$NCHOME/omnibus/probes/java/nco_p_message_bus/transformers.xml'
TransportFile      : '$NCHOME/omnibus/probes/java/nco_p_message_bus/mqttTransport.properties'
#EOF
```

2.6.2 mqttTransport.properties

In the example the MQTT service was added to run locally, so 'localhost' was used:

```
connectionURL=tcp://localhost:1883
clientId=MQTTClient
topicName=netcool
keepAlive=30
cleanStart=false
#EOF
```

When cleanStart is set to false all the events on the topic are read since the client, given by the clientId, was last connected.

2.6.3 transformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <!-- Southbound (probe) transformer definitions -->
  <tns:transformer name="netcool2nvpairs" type="southbound" endpoint="netcool"
    className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
    <tns:property name="xsltFilename" type="java.lang.String" value="$
{OMNIHOME}/java/conf/netcool2nvpairs.xsl" description="XSLT file for converting Netcool events to name/value
pairs"/>
  </tns:transformer>
</tns:transformers>
#EOF
```

2.6.4 jndi.properties

The jndi.properties is not used in the current version of ApacheMQ but was used in earlier versions. It's configuration settings are included for completeness.

```
java.naming.factory.initial=org.apache.activemq.jndi.ActiveMQInitialContextFactory
java.naming.provider.url=vm://FQDN
connectionFactoryNames=ConnectionFactory
topic.netcool=netcool
#EOF
```

2.6.5 Required jar files

The `$NCHOME/omnibus/probes/java/nco_p_message_bus` directory would contain the following files:

```
wmqtt.jar  
activemq-all-5.7.0.jar  
log4j-1.2.17.jar  
slf4j-log4j12-1.6.6.jar  
  
jndi.properties  
mqttTransport.properties  
transformers.xml
```

Where **wmqtt.jar** is the WebSphere MQTT client jar and needs to be added to the `nco_p_message_bus.env` file:

```
vi $NCHOME/omnibus/probes/java/nco_p_message_bus.env  
# Add on required jar files for Apache ActiveMQ  
CLASSPATH=${OMNIHOME}/probes/java/${PROGRAM}:$CLASSPATH  
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/log4j-1.2.14.jar  
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/slf4j-log4j12-1.5.11.jar  
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/wmqtt.jar  
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/activemq-all-5.5.1.jar  
echo "CLASSPATH= " $CLASSPATH  
#EOF  
:wq
```

3 HTTP Transport with XML

3.1 XML Gateway

3.1.1 G_HTTP.props

```
Gate.XMLGateway.TransportType      : 'HTTP'
Gate.Reader.Server                 : 'NCOMS2'
Name                               : 'G_HTTP'
MessageLog                        : '$OMNIHOME/log/G_HTTP.log'
PropsFile                         : '$OMNIHOME/gates/G_HTTP/G_HTTP.props'
Gate.MapFile                      : '$OMNIHOME/gates/G_HTTP/xml.map'
Gate.StartupCmdFile               : '$OMNIHOME/gates/G_HTTP/xml.startup.cmd'
Gate.Reader.TblReplicateDefFile   : '$OMNIHOME/gates/G_HTTP/xml.reader.tblrep.def'
Gate.XMLGateway.TransformerFile   : '$OMNIHOME/gates/G_HTTP/transformers.xml'
Gate.XMLGateway.TransportFile     : '$OMNIHOME/gates/G_HTTP/httpTransport.properties'
Gate.XMLGateway.MessageID        : 'netcoolEvents'
```

3.1.2 httpTransport.properties

The transport properties file only need to contain the client URL.

```
clientURL=http://localhost:12345
#EOF
```

3.1.3 transformers.xml

The transformers file only need to contain the northbound transformer, with the correct MessageID.

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <!-- Northbound (gateway) transformer definitions -->
  <tns:transformer name="netcoolEvents" type="northbound" endpoint="http://localhost:12345"
className="com.ibm.tivoli.netcool.integrations.transformer.EmptyTransformer">
  </tns:transformer>
</tns:transformers>
```

3.2 Message Bus Probe

3.2.1 message_bus.props

```
Server           : 'NCOMS1'
TransportType    : 'HTTP'
MessagePayload   : 'xml'
TransformerFile  : '/opt/IBM/tivoli/netcool/omnibus/probes/nco_p_message_bus/transformers.xml'
TransportFile    : '/opt/IBM/tivoli/netcool/omnibus/probes/nco_p_message_bus/httpTransport.properties'
#EOF
```

3.2.2 httpTransport.properties

The Message Bus probe acts as a server and listens for HTTP messages on a given port, as defined in the transport properties using a URL type syntax:

```
serverPort=http:12345
#EOF
```

3.2.3 transformers.xml

The transformers only needs one southbound endpoint definition with the endpoint being defined as a URL type string as given in the transport properties.

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://localhost"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <!-- Southbound (probe) transformer definitions -->
  <tns:transformer name="netcool2nvpairs" type="southbound" endpoint="http:12345"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
    <tns:property name="xsltFilename" type="java.lang.String" value="$
{OMNIHOME}/java/conf/netcool2nvpairs.xsl" description="XSLT file for converting Netcool events to name/value
pairs"/>
  </tns:transformer>
</tns:transformers>
```

Probe Examples

The following chapters cover how to use the message bus probe
in various common configurations

3.3 WebSphere

The following WebSphere example is provided as additional information to the Message Bus [XML] Probe manual.

3.3.1 WebSphere JNDI Binding

WebSphere uses the JNDI bindings directory to connect to the WebSphere MQ servers. In the `jmsTransport.properties` you can set this directory as the provider URL.

e.g.

```
providerURL=file:///opt/IBM/tivoli/netcool/omnibus/probes/java/nco_p_message_bus/jndi
```

Where the directory 'jndi' includes the `.bindings` JNDI file for the WebSphere servers the probe needs to connect to.

3.3.2 CLASSPATH

In order for the WebSphere MQ server to be accessed using WebSphere JNDI ensure the following jars are copied to the probe servers java directory:

For example in the `$OMNIHOME/probes/java/nco_p_message_bus.env` file extend the CLASSPATH to include the WebSphere MQ required jar files:

```
CLASSPATH=${OMNIHOME}/probes/java/${PROGRAM}:$CLASSPATH
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/providerutil.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/fscontext.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/dnhbcore.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/jms.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/com.ibm.mq.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/com.ibm.mqjms.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/com.ibm.mq.jmqi.jar
#EOF
```

3.3.3 Log file messages

When the probe cannot find the correct jar files it will log:

```
Debug: Creating initial context class using <given method names>
```

```
Information: Probewatch: Unable to get events;
```

```
Caused by: Cannot instantiate class: <FactoryName>
```

And

```
Debug: Creating initial context class using <given method names>
```

```
Information: Probewatch: Unable to get events; Caused by: javax.naming.Reference
```

When all the jar files are found but there is a problem with the specific queue the probe will log:

```
Debug: Creating initial context class using <given method names>
```

```
Debug: Looking up <queue> in JNDI
```

```
Debug: Creating queue connection using username and password
```

```
Information: [stderr] <specific class messages>
```

3.4 Nokia OMS1350 example

This is an example of the property and properties file for connecting to the Nokia OMS1350 on the localhost using SSL on Linux using Netcool/OMNIbus 8.1.

3.4.1 message_bus_nokia_oms1350.props

```
# Object Server
Server           : AGG_P
NetworkTimeout   : 15
PollServer       : 30
# Nokia OMS1350 settings
Host             : 'localhost'
Port            : 8443
MessagePayload   : 'json'
TransportType    : 'Cometd'
TransportFile    : '${OMNIHOME}/probes/linux2x86/message_bus_nokia_oms1350.properties'
MessageLog       : '${OMNIHOME}/log/message_bus_nokia_oms1350.log'
RulesFile        : '${OMNIHOME}/probes/linux2x86/message_bus_nokia_oms1350.rules'
HeartbeatInterval : 60
# Default processing
TransformerFile  : ''
# Credentials to authenticate with system
Username         : 'username'
Password         : 'password'
# SSL configuration
EnableSSL        : 'true'
KeyStore         : '/tmp/netcool.jks'
KeyStorePassword : 'netcool'
#EOF
```

3.4.2 message_bus_nokia_oms1350.properties

The default file nokiaOms1350CometdTransport.properties is found in \$OMNIHOME/java/conf.

For this configuration HTTP needs to be set to https, with the other settings coming from the probes property file using the ++variable++ syntax. The version of Java used by the probe and the TLS version needs to match the servers for SSL to work correctly.

```
bayeuxClientTransport=long-polling

subscriptionChannel=/oms1350/events/otn/rest/alarmEvent

# SSL so use HTTPS
loginRequests={"requests":[{"uri":"/cas/v1/tickets","method":"POST","header":{"Content-Type":"application/x-www-form-urlencoded","Authorization":"Basic ++Username++:++Password++"},"data":"username=++Username++&password=++Password++"}, {"uri":"++Location++","method":"POST","data":"service=https://++Host++:8443/oms1350","header":{"Content-Type":"application/x-www-form-urlencoded","Connection":"Keep-Alive"}}, {"uri":"/oms1350/data/plat/session/login","method":"POST","data":"user=++Username++&password=++Password++&ticket=++TICKET++","header":{"Content-Type":"application/x-www-form-urlencoded","Connection":"Keep-Alive"}}]}

securityProtocol=TLSv1

connectTimeout=5

httpHeaders={"Accept":"application/json","User-Agent":"Netcool/OMNIbus Message Bus Probe"}
```

3.4.3 Testing

It is possible to test the connectivity using netcat, other with SSL enabled the information sent is encrypted.

e.g.

```
nc -l -p 8443
```

3.5 Apache Kafka Example

The example provided uses the standard installation of the Apache Kafka server and the April 2018 release of the Message Bus probe. In order to make maintenance of the probes files easier, these are best copied to a common directory, in this example the probes/platform directory. The examples uses Netcool/OMNIBus 8.1 on Red Hat linux, whose platform directory is linux2x86.

3.5.1 Apache Kafka

The Apache Kafka server is available for download and can be installed on a system for testing. It can be easily configured provided it has enough resources, and a supported version of Java.

3.5.2 User environment

The user running the Apache Kafka requires access to the ports and a supported version of Java.

Default ports used:

- 2181
- 9092

User environment setting:

```
csh
set path=(/opt/jdk1.8.0_144/jre/bin $path)
rehash
setenv LC_ALL "C"
setenv LANG "C"
```

3.5.3 Apache Kafka Server

The software can be downloaded as a GNU compressed tar file which can be extracted into a directory.

The Apache Kafka website includes a quick start guide:

<https://kafka.apache.org/quickstart>

Once unpacked the server can be started using the following commands:

```
bin/zookeeper-server-start.sh config/zookeeper.properties
bin/kafka-server-start.sh config/server.properties
```

To prepare for the probe connection create the example topics:

- topicABC
- topicXYZ

Using the commands:

```
bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication-factor 1 --partitions 1 --topic topicABC
bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication-factor 1 --partitions 1 --topic topicXYZ
```

To check the topics are available use:

```
bin/kafka-topics.sh --list --zookeeper localhost:2181
```


3.5.4 message_bus_kafka.props

```

=====
# SETTING PROBE LOGS, PROPS, RULES
=====
Manager                : 'Kafka'
MessageLog              : '$OMNIHOME/log/message_bus_kafka.log'
RulesFile               : '$OMNIHOME/probes/linux2x86/message_bus_kafka.rules'

=====
# SETTING TRANSPORT TYPE
=====
TransportType          : 'KAFKA'
#TransportFile         : '$OMNIHOME/java/conf/kafkaTransport.properties'
TransportFile          : '$OMNIHOME/probes/linux2x86/kafka/kafkaTransport.properties'

=====
# SETTING PARSER CONFIGURATIONS. (SUPPORTS JSON OR XML)
=====
# FOR PARSING JSON DATA
TransformerFile        : '$OMNIHOME/probes/linux2x86/kafka/message_bus_parser_config.json'
MessagePayload         : 'JSON'

# FOR PARSING XML DATA
# TransformerFile      : '$OMNIHOME/java/conf/transformers.xml'
# MessagePayload       : 'XML'

#PROTECTED REGION END#

```

3.5.5 kafkaTransport.properties

```

kafkaClientMode=CONSUMER
connectionPropertiesFile=$OMNIHOME/probes/linux2x86/kafka/kafkaConnectionProperties.json

```

3.5.6 kafkaConnectionProperties.json

```

{
  "zookeeper_client" :
  {
    "target" : "<FQDN>:2181",
    "properties" :
"/opt/nrv81/IBM/tivoli/netcool/omnibus/probes/linux2x86/kafka/zookeeperClient.properties",
    "java_sys_props" : "",
    "topic_watch": true,
    "broker_watch": true
  },
  "brokers" : "PLAINTEXT://<FQDN>:9092",
  "topics": "topicABC,topicXYZ",
  "kafka_client" :
  {
    "properties" :
"/opt/nrv81/IBM/tivoli/netcool/omnibus/probes/linux2x86/kafka/kafkaClient.properties",
    "java_sys_props" : ""
  }
}

```

3.5.7 zookeeperClient.properties

This can be an empty file.

3.5.8 kafkaClient.properties

```

ack=all
client.id=KafkaExampleProducer
group.id=KafkaConsumerGroupName
pollInterval=1

```

3.5.9 Sending events

Sending events to the probe from the Apache Kafka server.

Once the probe is connected JSON events can be sent through using the command line interface:

```
csh
set path=(/opt/jdk1.8.0_144/jre/bin $path)
rehash

bin/kafka-console-producer.sh --broker-list localhost:9092 --topic topicABC
>
{"eventfactory":[{"subscription-id":"1234567890","resource-id":"aabbcc-ffff-0001-1000-abcdef000000","monitoring-id":123456789012345678,"fault-type-id":123456789012345678,"fault-type-name":"CPU Failure","severities":"major"}]}
```

Expected probe logging at message level debug:

```
Received message with length of 225 from endpoint topicABC: {"eventfactory":[{"subscription-id":"1234567890","resource-id":"aabbcc-ffff-0001-1000-abcdef000000","monitoring-id":123456789012345678,"fault-type-id":123456789012345678,"fault-type-name":"CPU Failure","severities":"major"}]}
Start parsing JSON message
No exact parser for endpoint topicABC found. Parser configuration for source type "ANY" will be used.
Adding event of size 7 to queue
Done parsing JSON message
[Event Processor] resync_event:         false
[Event Processor] eventfactory.0.subscription-id:    1234567890
[Event Processor] eventfactory.0.fault-type-id:      123456789012345678
[Event Processor] eventfactory.0.monitoring-id:     123456789012345678
[Event Processor] eventfactory.0.fault-type-name:   CPU Failure
[Event Processor] eventfactory.0.severities: major
[Event Processor] eventfactory.0.resource-id:      aabbcc-ffff-0001-1000-abcdef000000
[Event Processor] Processing alert {0 remaining}
```

3.6 Logstash Webhook with SSL example

The platform used was linux as this include openssl.

3.6.1 Creating the SSL Certificates

Setting the Java path

```
cd $NCHOME
find . -name keytool
./IBM/tivoli/netcool/platform/linux2x86/jre64_1.7.0/jre/bin/keytool
```

```
ssh
set path=($NCHOME/platform/linux2x86/jre64_1.7.0/jre/bin $path)
rehash
java -version
```

Creating the probe store

```
keytool -genkey -alias <FQDN> -keystore LogStashProbeStore.jks -keyalg RSA -sigalg
SHA1withRSA -storepass netcool
```

```
[Unknown]: <FQDN>
What is the name of your organizational unit?
[Unknown]: Support
What is the name of your organization?
[Unknown]: IBM
What is the name of your City or Locality?
[Unknown]: New York
What is the name of your State or Province?
[Unknown]: New York
What is the two-letter country code for this unit?
[Unknown]: US
```

```
keytool -export -alias <FQDN> -file probe.cer -keystore LogStashProbeStore.jks -storepass
netcool
```

Create a local CA

```
setenv RANDFILE rand
openssl req -new -keyout cakey.pem -out careq.pem
openssl x509 -signkey cakey.pem -req -days 3650 -in careq.pem -out caroot.cer -extensions
v3_ca
keytool -printcert -v -file caroot.cer
keytool -certreq -alias <FQDN> -keystore LogStashProbeStore.jks -file ProbeReq.csr
```

```
echo 1234>serial.txt
openssl x509 -CA caroot.cer -CAkey cakey.pem -CAserial serial.txt -req -in ProbeReq.csr
-out ProbeCA.cer -days 365
```

```
keytool -import -keystore LogStashProbeStore.jks -alias rootca -file caroot.cer
-storepass netcool
keytool -import -keystore LogStashProbeStore.jks -alias <FQDN> -file ProbeCA.cer
-storepass netcool
```

```
keytool -list -keystore LogStashProbeStore.jks -storepass netcool
```

```
Your keystore contains 2 entries
rootca, Jul 20, 2018, trustedCertEntry,
<FQDN>, Jul 20, 2018, keyEntry,
```

Directory : \$NCHOME/omnibus/probes/linux2x86

File : message_bus.props-logstash-ssl

```
Server : 'AGG_P'
ServerBackup : 'AGG_B'
NetworkTimeout : 15
PollServer : 60
TransformerFile : '$
{OMNIHOME}/probes/linux2x86/message_bus_logstash/message_bus_logstash_parser.json'
TransportFile : '$
{OMNIHOME}/probes/linux2x86/message_bus_logstash/logstashWebhookTransport-ssl.properties'
TransportType : 'Webhook'
Port : 8888
HeartbeatInterval : 60
EnableSSL : 'true'
KeyStore : '/tmp/LogStashProbeStore.jks'
KeyStorePassword : 'netcool'
```

Directory : \$NCHOME/omnibus/probes/linux2x86/message_bus_logstash

File : logstashWebhookTransport-ssl.properties

webhookURI=/probe/webhook/logstash

idleTimeout=180

Sending a test message

```
curl --cacert ./caroot.cer -v -H "Content-Type: application/json" -d '{"test":"Message text"}' -X POST https://<FQDN>:8888/probe/webhook/logstash
```

Sending an event with some details:

```
curl --cacert ./caroot.cer -v -H "Content-Type: application/json" -d '{"nodeName": "localhost", "SourceName": "Commandline CURL", "Message": "This is a CURL test message", "Severity": "informational", "Type": "Event"}' -X POST https://<FQDN>:8888/probe/webhook/logstash
```

Extra features:

Directory : \$NCHOME/omnibus/probes/java

File : nco_p_message_bus.env

Enable SSL logging to standard out and enable SSLv3:

```
# SSL Logging and enable SSLv3
# NCO_JPROBE_JAVA_FLAGS="-Djavax.net.debug=ssl:handshake:verbose
-Dcom.ibm.jsse2.disableSSLv3=false $NCO_JPROBE_JAVA_FLAGS"
# Just SSL logging
NCO_JPROBE_JAVA_FLAGS="-Djavax.net.debug=ssl:handshake:verbose $NCO_JPROBE_JAVA_FLAGS"
echo "NCO_JPROBE_JAVA_FLAGS=$NCO_JPROBE_JAVA_FLAGS"
```

Example command line usage with SSL logging enabled:

```
cd $NCHOME/omnibus/probes/linux2x86
../nco_p_message_bus -propsfile ./message_bus.props-logstash-ssl -messagelevel debug > $
{OMNIHOME}/log/message_bus-ssl.log
```

3.7 HTTP BasicAuth example

It is possible to protect the HTTP port using Basic Authentication.

File : `$NCHOME/omnibus/probes/linux2x86/message_bus_HttpJsonBasicauth.props`

```
# Object Server connection
Server      : 'AGG_P'
ServerBackup : 'AGG_B'
NetworkTimeout : 15
PollServer  : 60
# Transport configuration
TransportType : 'HTTP'
MessagePayload : 'json'
TransformerFile : ''
TransportFile : '$NCHOME/omnibus/probes/linux2x86/message_bus_HttpJsonBasicauthTransport.properties'
HeartbeatInterval : 60
ProbeWatchHeartbeatInterval : 60
```

File : `$NCHOME/omnibus/probes/linux2x86/message_bus_HttpJsonBasicauthTransport.properties`

```
serverPort=http:9191
username=username
password=password
#EOF
```

You can test the probe using curl:

e.g.

```
curl -v -H "Content-Type: application/json" -H "Authorization: Basic
dXNlcm5hbWU6cGFzc3dvcmQ=" -d '{"test":"Message"}' -X POST http://localhost:9191
```

Where the user and password string used is created using base64.

e.g.

```
echo -n "username:password" | base64
dXNlcm5hbWU6cGFzc3dvcmQ=
```

Example debug logging

```
HttpRequestHandler]: Connection from client 'localhost' (51704) to server port
'http:9191'.
[HttpParser]: Successfully read HTTP header.
[HttpParser]: Reading payload size = 18
[HttpParser]: Successfully read HTTP payload.
Performing JSON format check
JSON format OK
[HttpRequestHandler]: Adding posted payload from endpoint 'http:9191' to queue.
[{"test":"Message"}].
[HttpRequestHandler]: Sent response [200]
[Event Processor] resync_event:         false
[Event Processor] MESSAGE.META.Content-Length:         [18]
[Event Processor] MESSAGE.META.Accept:         [*/*]
[Event Processor] test:         Message
[Event Processor] MESSAGE.META.Content-Type: [application/json]
[Event Processor] MESSAGE.META.Authorization:         [Basic dXNlcm5hbWU6cGFzc3dvcmQ=]
[Event Processor] Processing alert {0 remaining}
```

4 General Guidance

4.1 Custom Configurations

The Message bus probe and gateway packages install files in common directories. Because of this, it is best to create custom directory structures to hold copies of the edited configuration files.

Default file locations : Probe

`$NCHOME/omnibus/probes/java/nco_p_message_bus.env`
`$NCHOME/omnibus/probes/j<platform>/nco_p_message_bus.props`
`$NCHOME/omnibus/probes/j<platform>/nco_p_message_bus.rules`

Example Transport files:

Directory : `$NCHOME/omnibus/java/conf`
File extension : `*.properties`

XML XLS transformer files:

Directory : `$NCHOME/omnibus/java/conf`
File extension : `*.xls`

Example JSON parser files:

Directory : `$NCHOME/omnibus/probes/j<platform>/`
File extension : `*.json`

Default file locations : Gateway

Directory : `$NCHOME/omnibus/gateway/xml`
`G_XML.props`
`xml.map`
`xml.reader.tblrep.def`
`xml.startup.cmd`

default:

`G_XML.props`
`xml.map`
`xml.reader.tblrep.def`
`xml.startup.cmd`

Example Transport files:

Directory : `$NCHOME/omnibus/java/conf`
File extension : `*.properties`

XML XLS transformer files:

Directory : `$NCHOME/omnibus/java/conf`
File extension : `*.xls`

4.1.1 Probe Guidance

To create a new probe integration it is best to create a custom directory and copy the required customisation files to this directory. The probe property file can remain in the default location. For JMS/MQTT integrations use the `$NCHOME/omnibus/probes/java` directory as the integration uses custom JAR files, whilst for other integrations use the `$NCHOME/omnibus/probes/<platform>` directory. Copy over the required configuration files and then edit them to suit the requirements of the integration. Afterwards, update the probes property file to suit the newly created directory and filenames.

Example HTTP JSON probe configuration

File locations:

```
$NCHOME/omnibus/probes/<platform>/message_bus_http_json.props
$NCHOME/omnibus/probes/<platform>/message_bus_http_json/httpTransport.properties
$OMNIHOME/probes/<platform>/message_bus_http_json/message_bus_parser_config.json
```

File creation:

```
cd $NCHOME/omnibus/probes/<platform>
cp message_bus.props message_bus_http_json.props
mkdir message_bus_http_json
cd message_bus_http_json
cp $NCHOME/omnibus/java/conf/httpTransport.properties .
Vi httpTransport.properties
serverPort=http:9191
:wq
cp $NCHOME/omnibus/probes/<platform>/message_bus_parser_config.json .
Cd cd $NCHOME/omnibus/probes/<platform>
Vi message_bus_http_json.props
Server : 'AGG_P'
NetworkTimeout : 15
PollServer : 60
# HTTP/JSON
TransportType : 'HTTP'
MessagePayload : 'json'
TransportFile : '$NCHOME/omnibus/probes/<platform>/message_bus_http_json/httpTransport.properties'
# JSON message parsing

# JsonMessageDepth : 3
# JsonNestedHeader : ''
# JsonNestedPayload : ''
# Default parsing
TransformerFile : ''
# Uncomment for custom parsing
# TransformerFile : '$OMNIHOME/probes/<platform>/message_bus_http_json/message_bus_parser_config.json'
#
HeartbeatInterval : 60
#EOF
```

4.1.2 Gateway Guidance

To create a new gateway integration it is best to create a custom directory in the \$NCHOME/omnibus/gates directory. This directory can then be populated with copies of the required configuration files before editing. For JMS/MQTT integrations add a jar file sub-directory. Copy over the required configuration files before making any modifications. Afterwards update the gateways property file to reflect the newly created directory and filenames.

Directory: \$NCHOME/omnibus/gates/G_HTTP

Files:

G_HTTP.props
 httpTransport.properties
 transformers.xml
 xml.map
 xml.reader.tblrep.def
 xml.startup.cmd

File creation:

```
cd $NCHOME/omnibus/gates
cp -r xml G_HTTP
cd G_HTTP
cp G_XML.props G_HTTP.props
cp $NCHOME/omnibus/java/conf/httpTransport.properties .
Vi httpTransport.properties
clientURL=http://localhost:12345
#EOF
:wq
cp $NCHOME/omnibus/java/conf/transformers.xml .
Vi transformers.xml
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <tns:transformer name="netcoolEvents" type="northbound" endpoint="http://localhost:12345"
className="com.ibm.tivoli.netcool.integrations.transformer.EmptyTransformer">
  </tns:transformer>
</tns:transformers>
:wq
vi xml.reader.tblrep.def
REPLICATE ALL FROM TABLE 'alerts.status'
USING MAP 'StatusMap'
FILTER WITH 'Poll = 1'
AFTER IDUC DO 'Poll = 2'
;
#EOF
:wq
```


4.1.3 Creating a new probe

The Message bus probe is used for many integrations that are candidates for new probe integrations. It is possible to manually create these using the Message bus files, so that the probe can be easily integrated and managed.

For example Nokia NFPM integration could be manually turned into a new custom probe using the following steps.

```
cd $NCHOME/omnibus/probes
ln -s nco_jprobe nco_p_message_bus_nokia_nfmp
cd java
ln -s nco_p_message_bus.jar nco_p_message_bus_nokia_nfmp.jar
cp nco_p_message_bus.env nco_p_message_bus_nokia_nfmp.env
```

Required files and directories:

```
cd $NCHOME/omnibus/probes/linux2x86
mkdir nco_p_message_bus_nokia_nfmp
mkdir nco_p_message_bus_nokia_nfmp/JKS
mkdir nco_p_message_bus_nokia_nfmp/default
```

JKS : A directory to hold the Java Store File

Copy the required configuration files to the default directory and message_bus_nokia_nfmp for modification:

```
message_bus_nokia_nfmp.props
message_bus_nokia_nfmp_parser.json
nokiaNspKafkaClient.properties
nokiaNspKafkaConnectionProperties.json
nokiaNspKafkaTransport.properties
nokiaNspRestMultiChannelHttpTransport.json
```

Note: If a new Message bus probe patch is installed, it is recommended that the new configuration files are copied to the default directory, as well as the probe jar and env files recreated, with the env file modified as required. Because the Message bus probe relies on the transformer and transport modules, any integration specific nco_p_message_bus.jar should be kept up to date.

4.2 XML Events

4.2.1 Example XML event

An event that could be parsed by netcool2nvpairs.xsl would look like;

```
<tns:netcoolEvent type="insert" xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool">
  <tns:netcoolField type="string" name="Identifier">MTTRAPD-EVENT-0001</tns:netcoolField>
  <tns:netcoolField type="string" name="TTNumber">TT00001</tns:netcoolField>
  <tns:netcoolField type="string" name="TTStatus">opened</tns:netcoolField>
  <tns:netcoolField type="integer" name="Class">123456</tns:netcoolField>
  <tns:netcoolField type="string" name="Summary">Summary Text MTTrapd</tns:netcoolField>
  <tns:netcoolField type="string" name="AlarmID">ABC123</tns:netcoolField>
  <tns:netcoolField type="string" name="Node">Node001</tns:netcoolField>
  <tns:netcoolField type="string" name="AlertGroup">test</tns:netcoolField>
  <tns:netcoolField type="string" name="AlertKey">xml</tns:netcoolField>
</tns:netcoolEvent>
```

The event source must send only one event per data push, as the XML standard requires that only one root per push.

4.2.2 Example XSL checker script

Directory : \$NCHOME/omnibus/utlis

File : XLSChecker.sh

```
#!/bin/sh
if [ $# -ne 2 ]
then
echo "Usage : `basename $0` [XSL] [XML]"
exit
fi
if [ ! -f $1 ]
then
echo "Cannot locate file " $1
exit
fi
if [ ! -f $2 ]
then
echo "Cannot locate file " $2
exit
fi
if [ ! -f $OMNIHOME/java/jars/Transformer.jar ]
then
echo "Cannot locate file " $OMNIHOME/java/jars/Transformer.jar
exit
fi

# Run checker
java -cp $OMNIHOME/java/jars/Transformer.jar
com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer $1 $2
#EOF
```

4.2.3 Example XSL parsing usage

Creating the example event input file, `example_netcool_event.xml`, from the event given earlier, it is possible to demonstrate how the XSL checker script is meant to parse the events. Note that the probe only parses one event at a time, so any custom format must have single events, not batches of events.

```
./XLSChecker.sh $NCHOME/omnibus/java/conf/default/netcool2nvpairs.xsl
/tmp/example_netcool_event.xml
Output from applying transformer
'/opt/IBM/tivoli/netcool/omnibus/java/conf/default/netcool2nvpairs.xsl' to source
file
'/tmp/example_netcool_event.xml':-

NetcoolEventAction:string:insert
Identifier:string:"MTTRAPD EVENT"
CTSNumber:string:"TT00001"
CTSStatus:string:"cltTktState"
Class:integer:"30535"
Summary:string:"3059"
AlarmID:string:"AN_UPDATE"
SourceDomain:string:"AGG"
AOTSTNumber:string:"0000001"
AOTSSStatus:string:"Active"
AOTSTNumberReturnTime:string:"1296064757"
CTSNumberReturnTime:string:"1296770805"
ProblemSubCat:string:"XML test"
```

Which confirms that the `netcool2nvpairs.xsl` XSL file is suitable for use in the `transformers.xml` file:

transformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <!-- Southbound (probe) transformer definitions -->
  <tns:transformer name="netcool2nvpairs" type="southbound" endpoint="netcool"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
    <tns:property name="xsltFilename" type="java.lang.String" value="$
{OMNIHOME}/java/conf/netcool2nvpairs.xsl" description="XSLT file for converting Netcool events to name/value
pairs"/>
  </tns:transformer>
</tns:transformers>
```

4.3 Supporting packages

By default the probe and gateway packages install the supporting packages when they are installed. However, if the supporting packages have been installed separately, they may not be updated when the latest probe or gateway package are installed.

To check the package listing use imcl:

```
~/IBM/InstallationManager/eclipse/tools/imcl listInstalledPackages -features -long | awk -F\: '{ print $3,$4}'
```

If only the probe and gateway package are listed then the latest supporting packages should have been installed as well.

If the supporting packages are listed as well, it is likely the latest supporting packages need to be installed separately.

e.g.

```
Netcool/OMNIBus Gateway nco-g-xml 1.9.0.0
Netcool/OMNIBus Common transformer 1.6.0.0
Netcool/OMNIBus Common transportmodule 1.11.0.0
```

To find the latest packages search the internet using the strings like:

```
ibm release transformer
ibm release transportmodule
```

And compare the release dates with the probe and gateway release date.

In order to apply the latest supporting package you will need to remove the old package before installing the new package.

e.g.

```
~/IBM/InstallationManager/eclipse/tools/imcl uninstall com.ibm.tivoli.omnibus.integrations.transportmodule
~/IBM/InstallationManager/eclipse/tools/imcl uninstall com.ibm.tivoli.omnibus.integrations.transformer

~/IBM/InstallationManager/eclipse/tools/imcl listAvailablePackages -repositories ./Im-common-transportmodule-18_0.zip
~/IBM/InstallationManager/eclipse/tools/imcl -c install com.ibm.tivoli.omnibus.integrations.transportmodule
-repositories ./Im-common-transportmodule-18_0.zip
~/IBM/InstallationManager/eclipse/tools/imcl listAvailablePackages -repositories ./Im-common-transformer-8_0.zip
~/IBM/InstallationManager/eclipse/tools/imcl -c install com.ibm.tivoli.omnibus.integrations.transformer
-repositories ./Im-common-transportmodule-18_0.zip
```

Check everything is installed as expected using imcl.

```
Netcool/OMNIBus Gateway nco-g-xml 1.9.0.0
Netcool/OMNIBus Common transformer 1.8.0.0
Netcool/OMNIBus Common transportmodule 1.18.0.0
```

Note: Install the latest fix pack for Netcool/OMNIBus as well to ensure all the supporting packages are up to date as libngtk is provided with the Netcool/OMNIBus fix pack.

4.3.1 nco_g_xml.env

There is a possibility that the nco_g_xml.env is not updated as expected. To check for this issue you can use UNIX find to locate the default env files, that are updated correctly, provided they remain unmodified.

e.g.

```
find $NCHOME -name nco_g_xml.env
/opt/nrv81/IBM/tivoli/netcool/omnibus/platform/linux2x86/bin/default/nco_g_xml.env
/opt/nrv81/IBM/tivoli/netcool/omnibus/platform/linux2x86/bin/nco_g_xml.env
/opt/nrv81/IBM/tivoli/netcool/omnibus/platform/linux2x86/bin64/default/nco_g_xml.env
/opt/nrv81/IBM/tivoli/netcool/omnibus/platform/linux2x86/bin64/nco_g_xml.env
```

The files can then be used to compare against the env files being used.

e.g.

```
diff $NCHOME/omnibus/platform/linux2x86/bin/default/nco_g_xml.env
$NCHOME/omnibus/platform/linux2x86/bin/nco_g_xml.env

diff $NCHOME/omnibus/platform/linux2x86/bin64/default/nco_g_xml.env
$NCHOME/omnibus/platform/linux2x86/bin64/nco_g_xml.env
```

If there are any unexpected differences try replacing the working env file with the default file, and add any debugging statements if required.

e.g.

```
cd $NCHOME/omnibus/platform/linux2x86/bin64
ls -l nco_g_xml.env
mv nco_g_xml.env nco_g_xml.env.old
cp default/nco_g_xml.env .
ls -l nco_g_xml.env
```

4.4 Kafka Server configuration

4.4.1 Using the group.id

The group.id is set in the probes kafkaClient.properties file, by default as:

```
group.id=KafkaConsumerGroupName
```

This can be used to nullify the need for the zookeeper server connection through the creation of a subscription group.

Listing the servers group.id's

```
bin/kafka-consumer-groups.sh --list --bootstrap-server localhost:9092
```

```
KafkaConsumerGroupName
```

Adding the probes group.id to the Kafka server

```
bin/kafka-consumer-groups.sh --new-consumer --describe --group KafkaConsumerGroupName
--bootstrap-server localhost:9092
```

Now the zookeeper_client settings are no longer required in the kafkaConnectionProperties.json file.

4.4.2 Heartbeating topic

You can create a heartbeating topic which you can use to send period events to.

On the Kafka server with the correct java path set use the Kafka scripts to create a heartbeating topic.

```
bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication-factor 1
--partitions 1 --topic heartbeating
```

Set the probes kafkaConnectionProperties.json file to reflect a subscription to the heartbeating topic.

```
"topics": "topicABC,topicXYZ,heartbeating",
```

Start the message bus probe.

Try sending an message to the probe using the heartbeating topic.

```
bin/kafka-console-producer.sh --broker-list localhost:9092 --topic heartbeating
>
{"eventfactory": [{"heartbeat-
id": "1234567890", "timestamp": "date", "summary": "Heartbeat", "severity": "information"}]}
```

4.4.3 Example heartbeating script

```
#!/bin/sh
export KAFKADIR DATE PERIOD COUNT KJAVA
# set required paths and settings
KJAVA=/opt/jdk1.8.0_144/jre
KAFKADIR=/opt/kafka_2.12-1.1.0
PERIOD=60
# Initialise counter
COUNT=0
# Ensure the right Java is in the path
# as KAFKA is Java sensitive
PATH=${KJAVA}/bin:${PATH}

# Run forever
while true
do
# Count the heartbeats
COUNT=`expr $COUNT + 1`
# Create timestamp number
DATE=`date +%Y%m%d%H%M%S`
# Connect and send event
${KAFKADIR}/bin/kafka-console-producer.sh --broker-list localhost:9092 --topic
heartbeating << EOF
{"eventfactory":[{"heartbeat-id":"$COUNT","timestamp":"$
{DATE}","summary":"Heartbeat","severity":"information"]]}
EOF
# sleep for PERIOD seconds
sleep $PERIOD
done

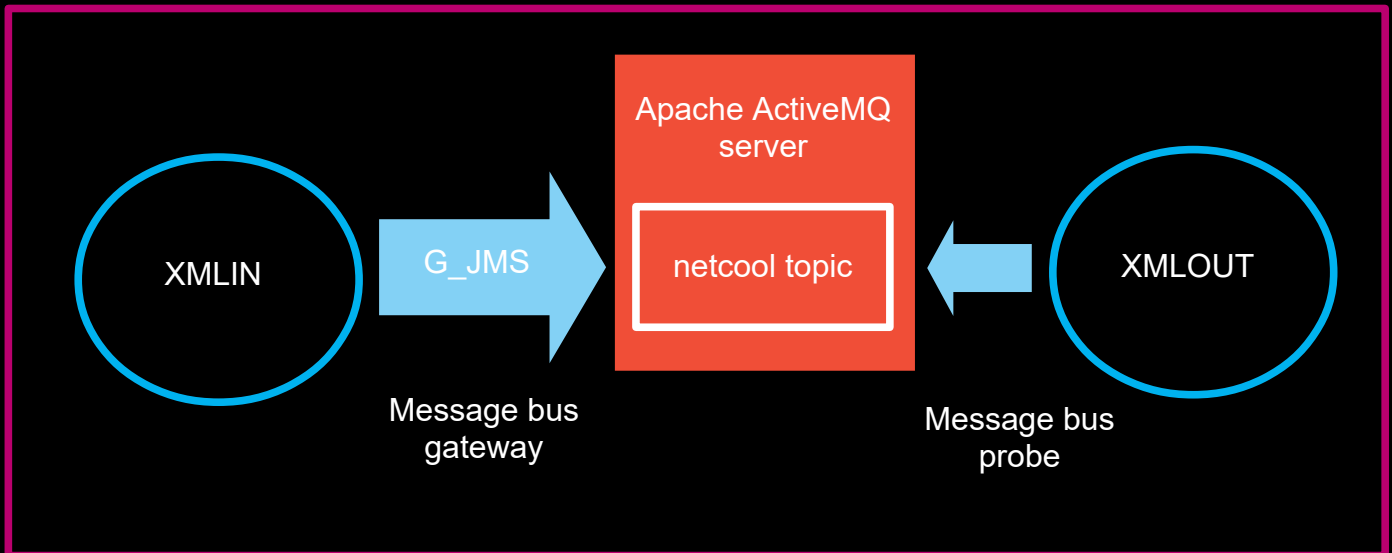
#EOF
```

Probe and Gateway Examples

The following chapters cover how to use the probe and gateway together which is useful for testing transports and transformer configurations

5 Example Apache ActiveMQ Probe and Gateway usage

The following design was used to configure a probe and gateway to forward events from one object server to another via an Apache ActiveMQ sever, to illustrate message bus usage and configuration. This type of configuration is not practical but does provide a useful test environment for users to familiarise themselves with the technologies used by the message bus integration.



5.1 The Message Bus JMS Gateway

5.1.1 G_JMS.props

This is an example property file:

```
Name : 'G_JMS'
Gate.Reader.Server : 'XMLIN'
Ipc.Timeout : 600
Gate.Reader.IducFlushRate : 11
Gate.XMLGateway.TransportType : 'JMS'
MessageLog : '$OMNIHOME/log/G_JMS.log'
PropsFile : '$OMNIHOME/gates/G_JMS/G_JMS.props'
Gate.MapFile : '$OMNIHOME/gates/G_JMS/xml.map'
Gate.StartupCmdFile : '$OMNIHOME/gates/G_JMS/xml.startup.cmd'
Gate.Reader.TblReplicateDefFile : '$OMNIHOME/gates/G_JMS/xml.reader.tblrep.def'
Gate.XMLGateway.TransformerFile : '$OMNIHOME/gates/G_JMS/conf/transformers.xml'
Gate.XMLGateway.TransportFile : '$OMNIHOME/gates/G_JMS/conf/jmsTransport.properties'
Gate.XMLGateway.MessageID : 'netcoolEvents'
Gate.Java.ClassPath :
'/opt/IBM/tivoli/netcool/omnibus/gates/java/nco_g_xml.jar:/opt/IBM/tivoli/netcool/omnibus/gates/java/ngjava.jar:
/opt/IBM/tivoli/netcool/omnibus/java/jars/TransportModule.jar:/opt/IBM/tivoli/netcool/omnibus/java/jars/Transfor
mer.jar:/opt/IBM/tivoli/netcool/omnibus/java/jars/com.ibm.ws.ejb.thinclient_8.5.0.jar:/opt/IBM/tivoli/netcool/om
nibus/java/jars/com.ibm.ws.sib.client.thin.jms_8.5.0.jar:/opt/IBM/tivoli/netcool/omnibus/java/jars/JSON4J.jar:/o
pt/IBM/tivoli/netcool/omnibus/gates/G_JMS/conf/slf4j-api-
1.7.13.jar:/opt/IBM/tivoli/netcool/omnibus/gates/G_JMS/conf/log4j-
1.2.17.jar:/opt/IBM/tivoli/netcool/omnibus/gates/G_JMS/conf/activemq-all-
5.13.0.jar:/opt/IBM/tivoli/netcool/omnibus/gates/G_JMS/conf'
```

5.1.2 xml.reader.tblrep.def

The table replication only needs to forward the alerts.status table, with the SENT_TO_AAMQ flag added as a filter and set to 1 after the events have been forwarded to the Apache ActiveMQ server:

```
REPLICATE ALL FROM TABLE 'alerts.status'
    USING MAP 'StatusMap'
FILTER WITH 'SENT_TO_AAMQ=0'
AFTER IDUC DO 'SENT_TO_AAMQ=1'
;
```

5.1.3 Adding a control flag

Add a control flag to the source object server, XMLIN, so that the events can be marked as sent:

```
alter table alerts.status add SENT_TO_AAMQ int;
go
```

5.1.4 Creating the G_JMS directory

In order to create a new XML Gateway configuration it is best to create this in the \$OMNIHOME/gates directory, adding all the required configuration files, so that they are kept in one place and therefore are not modified whilst deploying another Message Bus integration.

```
cd $OMNIHOME/gates
cp -r xml G_JMS
cd G_JMS
mkdir conf
```

Copy the required jar files to the conf directory and update or create the required configuration files.

Once the configuration is complete the directory will contain the following files:

```
G_JMS:
G_JMS.props
conf
xml.map
xml.reader.tblrep.def
xml.startup.cmd

G_JMS/conf:
transformers.xml
jmsTransport.properties
jndi.properties
log4j-1.2.17.jar
slf4j-api-1.7.13.jar
activemq-all-5.13.0.jar
```

Example settings:

5.1.5 transformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <!-- Northbound (gateway) transformer definitions -->
  <tns:transformer name="netcoolEvents" type="northbound" endpoint="netcool"
className="com.ibm.tivoli.netcool.integrations.transformer.EmptyTransformer">
    </tns:transformer>
</tns:transformers>
```

5.1.6 jmsTransport.properties

```
initialContextFactory=org.apache.activemq.jndi.ActiveMQInitialContextFactory
providerURL=tcp://192.168.20.20:61616
topicName=netcool
topicConnectionFactory=ConnectionFactory
#queueName=netcool
#queueConnectionFactory=ConnectionFactory
username=activemq
password=activemq
#EOF
```

5.1.7 jndi.properties

```
java.naming.factory.initial = org.apache.activemq.jndi.ActiveMQInitialContextFactory
java.naming.provider.url = vm://192.168.20.20
connectionFactoryNames = ConnectionFactory
#queue.netcool = netcool
topic.netcool = netcool
#EOF
```

5.2 The Message Bus JMS probe

The message bus probes configuration requires the same sort of configuration, so you can use some of the files, like `jndi.properties` and the `jmsTransport.properties` from the gateways configuration.

Create a probe configuration directory in the `$OMNIHOME/probes/java` directory, and copy or create the configuration files, then copy the jar files there, so that the directory has the following files:

```
transformers.xml
jmsTransport.properties
jndi.properties
activemq-all-5.13.0.jar
log4j-1.2.17.jar
slf4j-api-1.7.13.jar
```

5.2.1 message_bus.props

The message bus property file defines what the transport type is and where to find the transport properties and transformers definition file:

```
Server          : 'XMLOUT'
#ServerBackup   : ''
NetworkTimeout : 15
PollServer      : 30
# JMS Transport
TransportType   : 'JMS'
TransportFile   : '/opt/IBM/tivoli/netcool/omnibus/probes/java/nco_p_message_bus/jmsTransport.properties'
# Transformer
MessagePayload  : 'xml'
TransformerFile : '/opt/IBM/tivoli/netcool/omnibus/probes/java/nco_p_message_bus/transformers.xml'
WebSocketID     : 'netcoolEvents'
#EOF
```

5.2.2 nco_p_message_bus.env

Add the jar file paths to the probe environment script as shown:

```
#####
# Add on required jar files for Apache ActiveMQ
#####
export jarfile
CLASSPATH=${OMNIHOME}/probes/java/${PROGRAM}:$CLASSPATH
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/log4j-1.2.17.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/slf4j-api-1.7.13.jar
# Uncomment for the MQTT transport
#CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/wmqtt.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/activemq-all-5.13.0.jar
# DEBUGGING
echo "CLASSPATH= " $CLASSPATH
echo $CLASSPATH | awk -F\: '{for(i=1;i<=NF;i++)print $i}' | while read jarfile
do
echo $jarfile
done
#EOF
```

5.2.3 transformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<!-- Southbound (probe) transformer defintions -->
<tns:transformer name="netcool2nvpairs" type="southbound" endpoint="netcool"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
<tns:property name="xsltFilename" type="java.lang.String"
value="$OMNIHOME/java/conf/netcool2nvpairs.xsl" description="XSLT file for converting
Netcool events to name/value pairs"/>
</tns:transformer>
</tns:transformers>
```

5.2.4 jmsTransport.properties

```
initialContextFactory=org.apache.activemq.jndi.ActiveMQInitialContextFactory
providerURL=tcp://192.169.20.20:61616
#queueName=netcool
#queueConnectionFactory=ConnectionFactory
topicName=netcool
topicConnectionFactory=ConnectionFactory
username=activemq
password=activemq
#EOF
```

5.2.5 jndi.properties

```
java.naming.factory.initial = org.apache.activemq.jndi.ActiveMQInitialContextFactory
java.naming.provider.url = vm://192.168.20.20
connectionFactoryNames = ConnectionFactory
#queue.netcool = netcool
topic.netcool = netcool
#EOF
```

5.3 Event processing

5.3.1 Creating an SQL user

In order to check the object servers process the test events it is best to create a dedicated user for use with the SQL scripts. Add this user to both XMLIN and XMLOUT:

```
create user 'eventuser' id 555 full name 'eventuser' password 'eventuser';
go
alter group 'Probe' assign members 'eventuser';
go
alter group 'ISQL' assign members 'eventuser';
go
alter group 'ISQLWrite' assign members 'eventuser';
go
```

5.3.2 Sending test events

To test event processing and event needs to be inserted into the source object server, XMLIN. This can be done using the following script:

```
File : insert_event.sh
#!/bin/sh
SQLCMD="$OMNIHOME/bin/nco_sql -server XMLIN -user eventuser -password eventuser"
export SQLCMD DATE
DATE=`date`
echo $DATE
$SQLCMD <<EOF
insert into alerts.status
(Identifier,Severity,Summary,AlertGroup,AlertKey,OwnerUID,OwnerGID)
values ('test-alert-`${DATE}`',4,'XML Gateway test event','testing','Gateway
event',65534,0);
go
quit
EOF
#EOF
```

5.3.3 Checking event processing

The inserted events can be checked to see if they have been processed, which will occur when SENT_TO_AAMQ is set to 1 by the Message Bus gateway:

```
File : check_GW_event.sh
#!/bin/sh
SQLCMD="$OMNIHOME/bin/nco_sql -server XMLIN -user eventuser -password eventuser"
export SQLCMD DATE
$SQLCMD <<EOF
select count(*) from alerts.status where AlertGroup = 'testing' and SENT_TO_AAMQ = 1;
go
quit
EOF
#EOF
```

To check the target object server, XMLOUT, you can use the following script:

```
File : check_event.sh
#!/bin/sh
SQLCMD="$OMNIHOME/bin/nco_sql -server XMLOUT -user eventuser -password eventuser"
export SQLCMD DATE
$SQLCMD <<EOF
select count(*) from alerts.status where Summary = 'XML Gateway test event' ;
go
quit
EOF
#EOF
```

5.3.4 The Results

To test the behaviour, login to the Apache ActiveMQ server using a browser and the admin/admin user. Monitor the clients connecting and the number of events processed. Start the G_JMS gateway, and then the probe in debug mode. Using tail to monitor the log files is useful, but not necessary unless an issue is seen.

Insert ten events into the XMLIN object server using the insert_event.sh script.

Monitor the SENT_TO_AAMQ flag using check_GW_event.sh script, and once the flag is set to 1, check for the event in the XMLOUT object server using the check_event.sh script.

With ten unique events, all ten events should be seen in the target object server within a minute, having the original Summary, if the default rules files are being used.

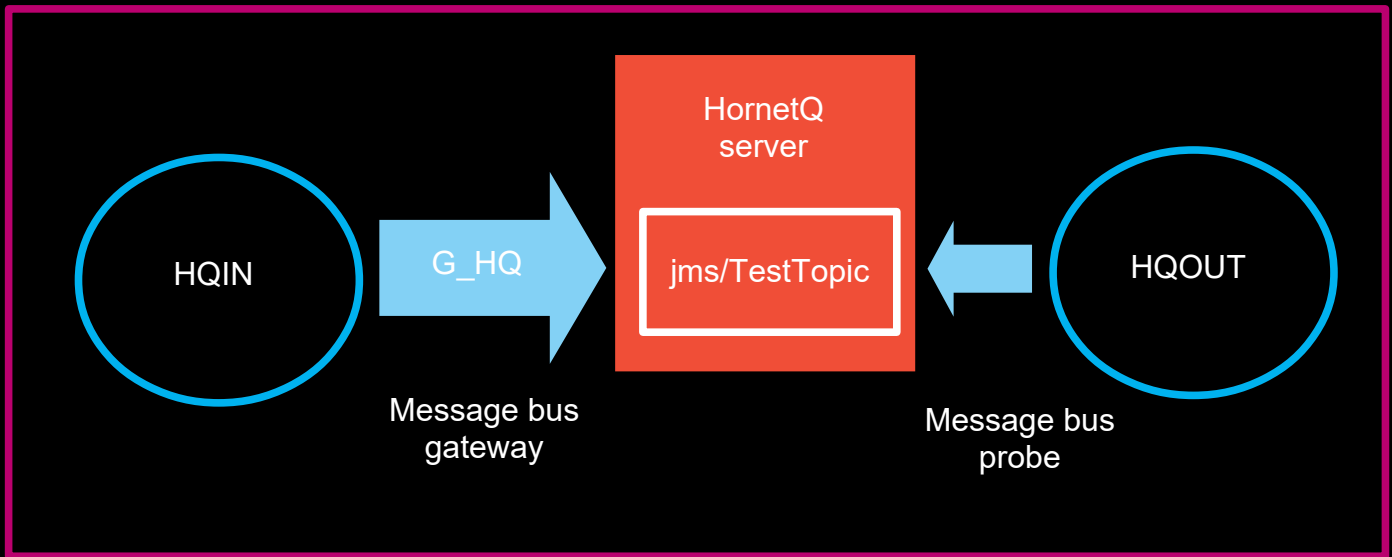
If necessary, check the probe is receiving events using the Apache ActiveMQ web page. Click the 'send' tab and enter the Topic name 'netcool' and select Topic, from the menu. Copy and paste the test event given in General Guidance chapter, into the 'Message Body' and click 'Send'. The probes log should indicate that the event was tokenised and processed, with this event being visible in the XMLOUT's event list.

General comment:

The MTTrapd probe was used to perform a simple throughput test. It was noted that the event rate between the source probe, creating the events, and the Message Bus probe were of the same order. Although it was noted that there were periodic pauses in the Message Bus probes event processing that may indicate a possible bottleneck in its event processing. For example, if the MTTrapd probe ran at 20 events per second, the Message Bus probe could run at the same event rate, but its event rate would periodically reduce to 5 events per second for one 10s log interval. It is advised the customers check the Message Bus integrations performance within their own environment before deploying a solution to ensure that it is capable of managing the load it will be required to handle.

One workaround for any performance issues would be to run multiple probes and/or gateways and uses filters to divide the load amongst them.

6 Example HornetQ probe and gateway configuration



The HornetQ server is a lightweight messaging server capable of transmitting JMS messages. The following configuration uses the default installation and server configuration. Both the probe and gateway can be configured to connect to the same topic and pass events between themselves. For this to work there must be two object servers, HQIN and HQOUT.

The HornetQ server uses localhost by default, so additional configuration is required if the probe and gateway need to be remote for testing.

6.1 Configuring HornetQ

The HornetQ server can be downloaded from the website <http://hornetq.jboss.org>. It is unpacked into the local directory, and is ready for use immediately for the given examples.

6.1.1 Creating a Test Topic

The TestTopic is created in the hornetq-jms.xml file.

Default HornetQ configuration files are all located in *INSTALL_DIR/config/stand-alone/non-clustered*.

To add a new Connection Factory "TestTopicConnectionFactory" and Topic "TestTopic", add the following connection-factory clause at the end of the connection-factory settings:

```
<connection-factory name="TestTopicConnectionFactory" signature="topic">
  <xa>false</xa>
  <connectors>
    <connector-ref connector-name="netty"/>
  </connectors>
  <entries>
    <entry name="jms/TestTopicConnectionFactory"/>
  </entries>
</connection-factory>
```

And after the defaults queues add:

```
<topic name="TestTopic">
  <entry name="jms/TestTopic"/>
</topic>
```

To allow the HornetQ server to be connected to remotely replace the localhost with the HornetQ servers IP Address:

hornetq-beans.xml:

```
<property name="bindAddress">${jnp.host:<HORNETQ_IP>}</property>
<property name="rmiBindAddress">${jnp.host:<HORNETQ_IP>}</property>
```

hornetq-configuration.xml:

```
<param key="host" value="${hornetq.remoting.netty.host:<HORNETQ_IP>}" />
<param key="host" value="${hornetq.remoting.netty.host:<HORNETQ_IP>}" />
<param key="host" value="${hornetq.remoting.netty.host:<HORNETQ_IP>}" />
<param key="host" value="${hornetq.remoting.netty.host:<HORNETQ_IP>}" />
```

Set the debug logging in the logging.properties file to check connectivity:

```
cd config/stand-alone/non-clustered
vi logging.properties
logger.level=DEBUG
```

and set the full path to the logs directory:

```
handler.FILE.fileName=/opt/hornetq-2.4.0.Final/logs/hornetq.log
```

The HornetQ is started by executing run.sh in the bin directory.

```
e.g.
cd /opt/hornetq-2.4.0.Final/bin
./run.sh
```

6.2 JMS probe

The following details provide a working example for the HornetQ server.

Directory: \$NCHOME/omnibus/probes/java/nco_p_message_bus

Contents:

- hornetq-commons.jar
- hornetq-core-client.jar
- hornetq-jms-client.jar
- jboss-jms-api.jar
- jnp-client.jar
- jmsTransport.properties
- transformers.xml

6.2.1 transformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <!-- Southbound (probe) transformer defintions -->
  <tns:transformer name="netcool2nvpairs" type="southbound" endpoint="jms/TestTopic"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
    <tns:property name="xsltFilename" type="java.lang.String" value="$
{OMNIHOME}/java/conf/netcool2nvpairs.xsl" description="XSLT file for converting Netcool events to name/value
pairs"/>
  </tns:transformer>
</tns:transformers>
```

6.2.2 jmsTransport.properties

```
initialContextFactory=org.jnp.interfaces.NamingContextFactory
providerURL=jnp://<HORNETQ_IP>:1099
topicConnectionFactory=jms/TestTopicConnectionFactory
topicName=jms/TestTopic
username=guest
password=guest
#EOF
```

6.2.3 nco_p_message_bus.env

Directory: \$NCHOME/omnibus/probes/java/nco_p_message_bus

```
#####
# Add on required jar files for HornetQ
#####
CLASSPATH=${OMNIHOME}/probes/java/${PROGRAM}:$CLASSPATH
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/hornetq-core-client.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/hornetq-commons.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/hornetq-jms-client.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/jboss-jms-api.jar
CLASSPATH=$CLASSPATH:${OMNIHOME}/probes/java/${PROGRAM}/jnp-client.jar
echo "CLASSPATH= " $CLASSPATH
echo $CLASSPATH | awk -F\: '{for(i=1;i<=NF;i++)print $i}' | while read jarfile
do
echo $jarfile
done
#EOF
```

6.2.4 message_bus_hornetq.props

Directory: \$NCHOME/omnibus/probes/<platform>

```
Server : 'HQOUT'
TransportType : 'JMS'
MessagePayload : 'xml'
TransformerFile : '$NCHOME/omnibus/probes/java/nco_p_message_bus/transformers.xml'
TransportFile : '$NCHOME/omnibus/probes/java/nco_p_message_bus/jmsTransport.properties'
#EOF
```

6.3 JMS Gateway

Directory : \$NCHOME/omnibus/gates/G_HQ

Contents:

- CSHRC
- G_HQ.props
- conf
- xml.map (default)
- xml.reader.tblrep.def (default)
- xml.startup.cmd (default)

File : CSHRC

```
setenv CLASSPATH $OMNIHOME/gates/G_HQ/conf/hornetq-core-client.jar
setenv CLASSPATH $OMNIHOME/gates/G_HQ/conf/hornetq-commons.jar:$CLASSPATH
setenv CLASSPATH $OMNIHOME/gates/G_HQ/conf/hornetq-jms-client.jar:$CLASSPATH
setenv CLASSPATH $OMNIHOME/gates/G_HQ/conf/jboss-jms-api.jar:$CLASSPATH
setenv CLASSPATH $OMNIHOME/gates/G_HQ/conf/jnp-client.jar:$CLASSPATH
setenv CLASSPATH $OMNIHOME/gates/G_HQ/conf/netty.jar:$CLASSPATH
```

#EOF

6.3.1 G_HQ.props

```
Name : 'G_HQ'
MessageLog : '$OMNIHOME/log/G_HQ.log'
PropsFile : '$OMNIHOME/gates/G_HQ/G_HQ.props'
Gate.MapFile : '$OMNIHOME/gates/G_HQ/xml.map'
Gate.StartupCmdFile : '$OMNIHOME/gates/G_HQ/xml.startup.cmd'
Gate.Reader.TblReplicateDefFile : '$OMNIHOME/gates/G_HQ/xml.reader.tblrep.def'
Gate.XMLGateway.TransformerFile : '$OMNIHOME/gates/G_HQ/conf/transformers.xml'
Gate.XMLGateway.TransportFile : '$OMNIHOME/gates/G_HQ/conf/jmsTransport.properties'
Gate.XMLGateway.TransportType : 'JMS'
Gate.XMLGateway.MessageID : 'netcoolEvents'
```

6.3.2 Required JAR files

Directory : \$NCHOME/omnibus/gates/G_HQ/conf

Contents:

- hornetq-commons.jar
- hornetq-core-client.jar
- hornetq-jms-client.jar
- jboss-jms-api.jar
- jnp-client.jar
- netty.jar
- jmsTransport.properties
- transformers.xml

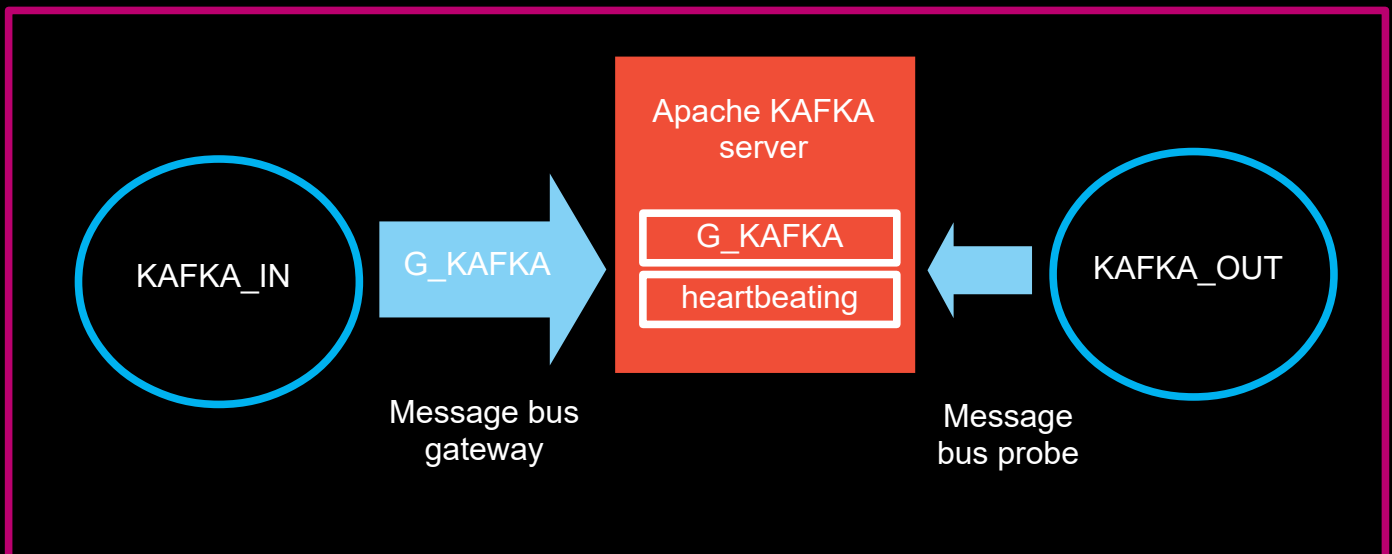
6.3.3 transformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<!-- Northbound (gateway) transformer definitions -->
<tns:transformer name="netcoolEvents" type="northbound" endpoint="jms/TestTopic"
className="com.ibm.tivoli.netcool.integrations.transformer.EmptyTransformer">
</tns:transformer>
</tns:transformers>
```

6.3.4 jmsTransport.properties

```
initialContextFactory=org.jnp.interfaces.NamingContextFactory
providerURL=jnp://<HORNETQ_IP>:1099
topicConnectionFactory=jms/TestTopicConnectionFactory
topicName=jms/TestTopic
username=guest
password=guest
#EOF
```

7 Example Apache KAFKA Probe and Gateway Configuration



As with the Message bus integrations it is possible to feed the message bus probe using the message bus [XML] gateway. These types of integration examples are useful in understanding the Netcool/OMNIbus features and how the probe and gateway are configured. There is no attempt to performance tune or understand the impact of feeding the probe using the gateway, on the Apache KAFKA server.

In order to feed events from the gateway to the probe, the gateway [producer] needs to send JSON event messages to the probes [consumer] topic.

7.1 Apache KAFKA Configuration

The software can be downloaded as a GNU compressed tar file which can be extracted into a directory.

Download : <https://kafka.apache.org>

Once unpacked the Apache KAFKA server can be started using the following commands:

```
bin/zookeeper-server-start.sh config/zookeeper.properties
bin/kafka-server-start.sh config/server.properties
```

To prepare the server create the topics:

- heartbeating
- G_KAFKA

Using the commands:

```
bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication-factor 1 --partitions 1
--topic heartbeating
bin/kafka-topics.sh --create --zookeeper localhost:2181 --replication-factor 1 --partitions 1
--topic G_KAFKA
```

To check the topics are available use in zookeeper:

```
bin/kafka-topics.sh --list --zookeeper localhost:2181
```

List consumer groups:

```
bin/kafka-consumer-groups.sh --list --bootstrap-server localhost:9092
```

7.2 Gateway Configuration

This example uses the \$NCHOME/omnibus/gates/G_KAFKA directory as the configuration directory. Using a single directory makes checking the files easier and prevents them from being overwritten by other integrations and package updates. The G_KAFKA server needs to be added to the XML Gateway servers \$NCHOME/etc/omni.dat file.

7.2.1 G_KAFKA.props

The XML Gateways property file is the top level configuration file.

In this example xml.startup.cmd is the default file or an empty file.

The xml.map file can be the default map file or some customised mapping file, and is used to define the fields that are passed to KAFKA for each event.

The transformers.xml file needs to convert the Object Server events to JSON messages for consumption by the KAFKA server.

```
MessageLog           : '$OMNIBOME/log/G_KAFKA.log'
Name                 : 'G_KAFKA'
Gate.Reader.Server   : 'KAFKA_IN'
MessageLevel         : 'debug'
Gate.XMLGateway.TransportType : 'KAFKA'
# Gate.XMLGateway.MessageID : 'netcoolEvents'
Gate.XMLGateway.TransformerFile : '$OMNIBOME/gates/G_KAFKA/transformers.xml'
Gate.XMLGateway.TransportFile : '$OMNIBOME/gates/G_KAFKA/kafkaTransport.properties'
Gate.Reader.TblReplicateDefFile : '$OMNIBOME/gates/G_KAFKA/xml.reader.tblrep.def'
Gate.MapFile         : '$OMNIBOME/gates/G_KAFKA/xml.map'
Gate.StartupCmdFile  : '$OMNIBOME/gates/G_KAFKA/xml.startup.cmd'
# EOF
```

7.2.2 kafkaTransport.properties

The main transport properties file defines the transport connection properties file.

```
KafkaClientMode=PRODUCER
ConnectionPropertiesFile=/opt/nrv81/IBM/tivoli/netcool/omnibus/gates/G_KAFKA/kafkaConnectionProperties.json
#EOF
```

7.2.3 kafkaConnectionProperties.json

The KAFKA transport connection properties file defines the servers, transports, topics and properties files used for connecting to the KAFKA server. The latest version of KAFKA supports configurations without the need to define the zookeeper server, which simplifies the configuration. In this example the data is sent to the G_KAFKA topic in PLAINTEXT and without any authentication.

```
{
  "zookeeper_client" :
  {
    "target" : "",
    "properties" : "",
    "java_sys_props" : "",
    "topic_watch": false,
    "broker_watch": false
  },
  "brokers" : "PLAINTEXT://<FQDN>:9092",
  "topics": "G_KAFKA",
  "kafka_client" :
  {
    "properties" : "/opt/nrv81/IBM/tivoli/netcool/omnibus/gates/G_KAFKA/kafkaClient.properties",
    "java_sys_props" : ""
  }
}
```


7.2.4 kafkaClient.properties

The default KAFKA properties usually suffice, with the client.id being set to a unique string for identification within the KAFKA server.

```
client.id=KafkaNetcoolProducer
ack=all
max.block.ms=60000
retries=0
batch.size=16384
buffer.memory=33554432
```

7.2.5 transformers.xml

The transformers.xml file needs to be configured to redirect the netcoolEvents to the JSON XSLT parser, so that the Object Server events are passed to the KAFKA server in the correct format, JSON, and not the default XML format.

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
  xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <tns:transformer name="netcoolEvents" type="northbound" endpoint="netcool"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
    <tns:property name="xsltFilename" type="java.lang.String" value="$
{OMNIHOME}/java/conf/netcool2json.xsl" description="XSLT file for converting Netcool events to JSON events"
/>
  </tns:transformer>
</tns:transformers>
```

7.2.6 xml.reader.tblrep.def

In this example the events passed to KAFKA are limited using a FILTER, so that only events with the Poll field set to a value are passed to the KAFKA server.

```
REPLICATE ALL FROM TABLE 'alerts.status'
USING MAP 'StatusMap'
FILTER WITH 'Poll>0'
;
```

7.3 Probe Configuration

The Message bus probe is configured like the KAFKA XML gateway using the same sort of properties. It is best to place all the configuration files in one direction to ensure they are not modified by another integration or a package installation. In this example the events are forwarded to a new object server to allow them to be checked for successful transmission.

7.3.1 message_bus_kafka.G_KAFKA.props

You can set the Name property to a unique name if more than one Message bus probe is being used on the same server, to ensure the filenames are unique. In this example only the pertinent properties are set. The Transformer file used is the default JSON transformer file, and the rules file is a custom rules file to allow suitable event processing and event logging.

```
Server                : 'KAFKA_OUT'
NetworkTimeout       : 15
PollServer           : 60
MessageLevel         : 'debug'
Manager              : 'Kafka'
MessageLog           : '$OMNIHOME/log/message_bus_G_KAFKA.log'
MaxLogFileSize       : 10485760
RulesFile            : '$OMNIHOME/probes/linux2x86/message_bus_kafka.rules'
TransportType        : 'KAFKA'
TransportFile        : '$OMNIHOME/probes/linux2x86/G_KAFKA/kafkaTransport.properties'
TransformerFile      : '$OMNIHOME/probes/linux2x86/G_KAFKA/message_bus_parser_config.json'
MessagePayload       : 'JSON'
#EOF
```

7.3.2 kafkaTransport.properties

The KAFKA properties defines the probe as a CONSUMER and sets the KAFKA connection properties file.

```
kafkaClientMode=CONSUMER
connectionPropertiesFile=$OMNIHOME/probes/linux2x86/G_KAFKA/kafkaConnectionProperties.json.nozoo
#EOF
```

7.3.3 kafkaConnectionProperties.json.nozoo

In this example the zookeeper server is not configured.

Only the KAFKA server and topics are defined along with the KAFKA client properties.

```
{
  "zookeeper_client" :
  {
    "target" : "",
    "properties" : "",
    "java_sys_props" : "",
    "topic_watch": true,
    "broker_watch": true
  },
  "brokers" : "PLAINTEXT://<FQDN>:9092",
  "topics": "G_KAFKA,heartbeating",
  "kafka_client" :
  {
    "properties" :
"/opt/nrv81/IBM/tivoli/netcool/omnibus/probes/linux2x86/G_KAFKA/kafkaClient.properties",
    "java_sys_props" : ""
  }
}
```

7.3.4 kafkaClient.properties

The KAFKA properties requires unique group.id and client.id settings. You could configure other probes with the same group.id to share event processing. For Peer-to-Peer configuration the group.id would need to be unique. The default serialization uses LongSerializer, which is incompatible with the events produced by the XML gateway.

```
group.id=GKAFKAMessageBusProbeGroup
pollInterval=1000
max.poll.records=1000
enable.auto.commit=true
auto.commit.interval.ms=5000
auto.offset.reset=latest
key.deserializer=org.apache.kafka.common.serialization.StringDeserializer
value.deserializer=org.apache.kafka.common.serialization.StringDeserializer
client.id=GKAFKAMessageBusProbe
ack=all
max.block.ms=60000
retries=0
key.serializer=org.apache.kafka.common.serialization.StringSerializer
value.serializer=org.apache.kafka.common.serialization.StringSerializer
#EOF
```

7.4 Example Scripts

7.4.1 Heartbeat Script

The `heartbeat.sh` script is run on the KAFKA server from the KAFKA installation directory with the correct user environment. The script can be used to create a test event on the heartbeating topic, or to periodically send an event to check the probes connectivity.

File : `heartbeat.sh`

```
#!/bin/sh
export DATE
DATE=`date +%Y%m%d%H%M%S`
echo $DATE
echo '{"eventfactory":[{"heartbeat-id":"$
{DATE}","timestamp":"date","summary":"Heartbeat","severity":"information"}]}'
bin/kafka-console-producer.sh --broker-list localhost:9092 --topic heartbeating <<
EOF
{"eventfactory":[{"heartbeat-id":"$
{DATE}","timestamp":"date","summary":"Heartbeat","severity":"information"}]}'
EOF
#EOF
```

7.4.2 Test event script

The test event can be used to insert an event into the KAFKA_IN object server such that the event is passed to the KAFKA server by the G_KAFKA gateway. The correct username and password need to use to allow `nco_sql` to be used.

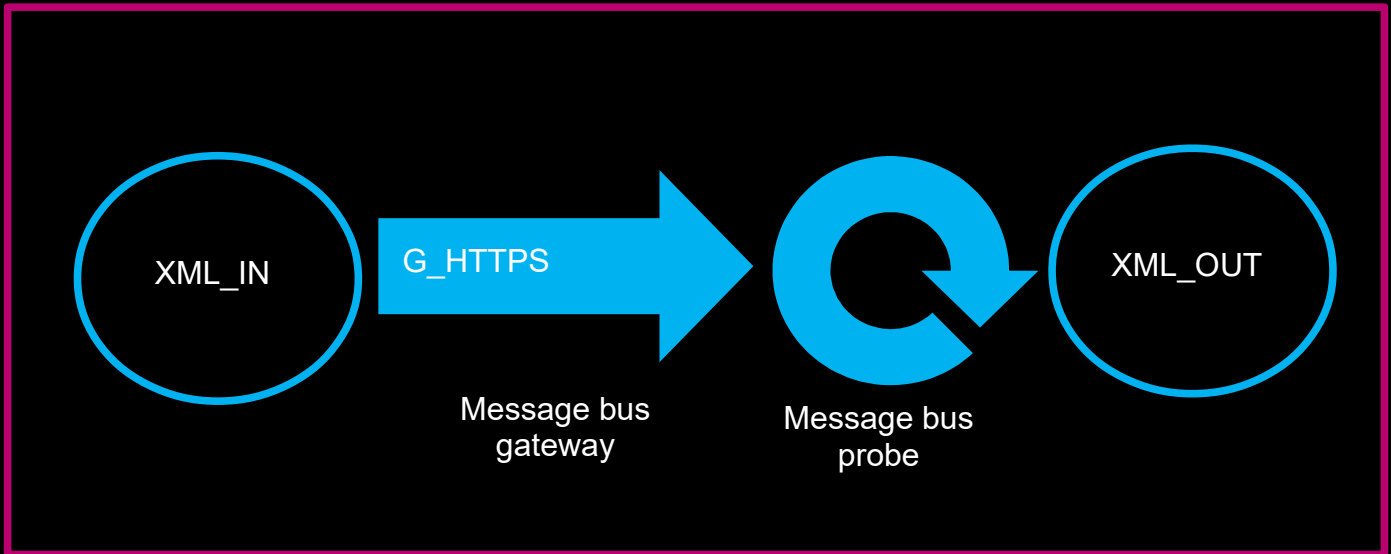
File : `insert_poll_event.sh`

```
#!/bin/sh
if [ $# -ne 1 ]
then
echo "Usage : `basename $0` NCOMS"
exit
fi

SQLCMD="$OMNIHOME/bin/nco_sql -server ${1} -user root -password netcool"
export SQLCMD DATE COUNTER DATE
DATE=`date`

$SQLCMD <<EOF
insert into alerts.status
(Identifier,Severity,Summary,AlertGroup,AlertKey,OwnerUID,OwnerGID,Poll)
values ('test-poll-alert-example-${DATE}',4,
'Poll TEST event ${DATE}','testing','Poll',65534,0,1);
go
quit
EOF
#EOF
```

8 Secure HTTP Transport with XML messages



The Message bus Gateway can send secure XML messages to the Message bus probe using HTTPS. In this example configuration a local CA is used to provide the CA certificates and sign the probes client certificate, so as to mimic production environments. Before implementing HTTPS, the example configuration will illustrate how to test the system using HTTP, and how to debug SSL communications.

The example configuration is for Red Hat Linux where platform is set to linux2x86.

8.1 HTTP probe

Create a basic HTTP probe configuration that is capable of reading XML Name Value Pairs.

8.1.1 message_bus_xml.props

```
Server          : 'XML_IN'
MessageLevel    : 'debug'
TransportType   : 'HTTP'
MessagePayload  : 'xml'
TransformerFile : '$NCHOME/omnibus/probes/linux2x86/messagebus-xml/transformer.xml'
TransportFile   : '$NCHOME/omnibus/probes/linux2x86/messagebus-xml/httpsTransport.properties'
HeartbeatInterval : 60
```

8.1.2 httpsTransport.properties

Directory : \$NCHOME/omnibus/probes/linux2x86/messagebus-xml

serverPort=[http:5555](http://5555)

8.1.3 transformer.xml

Directory : \$NCHOME/omnibus/probes/linux2x86/messagebus-xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <!-- Southbound (probe) transformer defintions -->
  <tns:transformer name="netcool2nvpairs" type="southbound" endpoint="http:5555"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
    <tns:property name="xsltFilename" type="java.lang.String" value="$
{OMNIHOME}/java/conf/netcool2nvpairs.xsl" description="XSLT file for converting Netcool
events to name/value pairs"/>
  </tns:transformer>
</tns:transformers>
```

8.2 HTTP Gateway

Configure The G_HTTPS gateway to use HTTP initially.
Remember to add G_HTTPS as a server in \$NCHOME/etc/omni.dat.

8.2.1 G_HTTPS.props

Directory : \$OMNIHOME/gates/G_HTTPS/G_HTTPS.props

```
# SSL Debugging
# Gate.Java.Arguments : '-Djavax.net.debug=ssl:handshake:verbose'
#
Gate.XMLGateway.TransportType : 'HTTP'
Gate.Reader.Server : 'XML_IN'
Name : 'G_HTTPS'
MessageLevel : 'debug'
MessageLog : '$OMNIHOME/log/G_HTTPS.log'
PropsFile : '$OMNIHOME/gates/G_HTTPS/G_HTTPS.props'
Gate.MapFile : '$OMNIHOME/gates/G_HTTPS/xml.map'
Gate.StartupCmdFile : '$OMNIHOME/gates/G_HTTPS/xml.startup.cmd'
Gate.Reader.TblReplicateDefFile : '$OMNIHOME/gates/G_HTTPS/xml.reader.tblrep.def'
Gate.XMLGateway.TransformerFile : '$OMNIHOME/gates/G_HTTPS/httpstransformers.xml'
Gate.XMLGateway.TransportFile : '$OMNIHOME/gates/G_HTTPS/httpsTransport.properties'
Gate.XMLGateway.MessageID : 'netcoolEvents'
#EOF
```

8.2.2 httpsTransport.properties

```
clientURL=http://<FQDN>:5555
bufferSize=1
#EOF
```

8.2.3 httpstransformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<!-- Northbound (gateway) transformer definitions -->
<tns:transformer name="netcoolEvents" type="northbound" endpoint="http://<FQDN>:5555"
className="com.ibm.tivoli.netcool.integrations.transformer.EmptyTransformer">
</tns:transformer>
</tns:transformers>
```

8.2.4 xml.reader.tblrep.def

```

REPLICATE ALL FROM TABLE 'alerts.status'
USING MAP 'StatusMap'
FILTER WITH 'Poll=1'
AFTER IDUC DO 'Poll=2'
;
#EOF

```

8.2.5 xml.startup.cmd

```
<empty>
```

8.2.6 xml.map

```

CREATE MAPPING StatusMap
(
    'Identifier'      =      '@Identifier'      ON INSERT ONLY,
    'Node'           =      '@Node'            ON INSERT ONLY,
    'NodeAlias'      =      '@NodeAlias'       ON INSERT ONLY
                                NOTNULL '@Node',
    'Manager'        =      '@Manager'         ON INSERT ONLY,
    'AlertGroup'     =      '@AlertGroup'      ON INSERT ONLY,
    'AlertKey'       =      '@AlertKey'        ON INSERT ONLY,
    'Severity'       =      '@Severity',
    'Summary'        =      '@Summary',
    'FirstOccurrence' = '@FirstOccurrence'    ON INSERT ONLY,
    'LastOccurrence' = '@LastOccurrence',
    'Type'           =      '@Type'            ON INSERT ONLY,
    'Tally'          =      '@Tally',
    'ServerName'     =      '@ServerName'      ON INSERT ONLY,
    'ServerSerial'   =      '@ServerSerial'    ON INSERT ONLY
);

```


8.3 Testing the event processing

Object Server User

```
create user 'testuser' id 888 full name 'Test User' password 'netcool';
go
alter group 'Probe' assign members 'testuser' ;
go
alter group 'ISQL' assign members 'testuser' ;
go
```

Insert Script

```
vi insert_GHTTPS_event.sh

#!/bin/sh
# Usage check
if [ $# -ne 1 ]
then
echo "Usage : `basename $0` NCOMS"
exit
fi
# SQL Command
SQLCMD="$OMNIHOME/bin/nco_sql -server ${1} -user testuser -password netcool"
export SQLCMD DATE COUNTER DATE
DATE=`date`
# Run command - Poll=1
$SQLCMD <<EOF
insert into alerts.status
(Identifier,Severity,Summary,AlertGroup,AlertKey,OwnerUID,OwnerGID,Poll)
values ('test-alert-4-G_HTTPS-${DATE}',4,'TEST event
G_HTTPS','testing','G_HTTPS',65534,0,1);
go
quit
EOF

#EOF

chmod 755 insert_GHTTPS_event.sh
```

Insert an event into the object server [XML_IN]

Start the probe and gateway in debug mode and send an event to the probe using the gateway by adding an event to the source object server XML_IN using the script:

```
./insert_GHTTPS_event.sh XML_IN
```

The event should be seen in the gateways log file, and then after a time in the probes log file where it should be converted to an event, depending upon how the rules file was configured. This event should then be inserted into the target object server, XML_OUT.

8.4 Adding the SSL Certificates

Note : The probe requires the <FQDN> to be used for the signed SSL certificate.

Setting the correct Java environment

```
cd $NCHOME
find . -name keytool
./IBM/tivoli/netcool/platform/linux2x86/jre64_1.7.0/jre/bin/keytool

csh
set path=($NCHOME/platform/linux2x86/jre64_1.7.0/jre/bin $path)
rehash
java -version
```

8.4.1 Configuring the probe

Creating the probe keystore

```
keytool -genkey -alias <FQDN> -keystore ProbeStore.jks -keyalg RSA -sigalg
SHA1withRSA -storepass netcool
keytool -export -alias <FQDN> -file probe.cer -keystore ProbeStore.jks -storepass
netcool
```

Creating a local CA

```
setenv RANDFILE rand
openssl req -new -keyout cakey.pem -out careq.pem
openssl x509 -signkey cakey.pem -req -days 3650 -in careq.pem -out caroot.cer
-extensions v3_ca
keytool -printcert -v -file caroot.cer
```

Signing the probes certificate

```
keytool -certreq -alias <FQDN> -keystore ProbeStore.jks -file ProbeReq.csr

echo 1234>serial.txt
openssl x509 -CA caroot.cer -CAkey cakey.pem -CAserial serial.txt -req -in
ProbeReq.csr -out ProbeCA.cer -days 365
```

Loading the signed certificate into the probes keystore

```
keytool -import -keystore ProbeStore.jks -alias rootca -file caroot.cer
-storepass netcool
keytool -import -keystore ProbeStore.jks -alias <FQDN> -file ProbeCA.cer
-storepass netcool
```

```
keytool -list -keystore ProbeStore.jks -storepass netcool
Your keystore contains 2 entries
rootca, Jul 20, 2018, trustedCertEntry,
<FQDN>, Jul 20, 2018, keyEntry,
```

Setting the probes Transport file

Update 'http' to 'https'.
Add the JKS files and passwords.

File : httpsTransport.properties

```
serverPort=https:5555
trustStore=/tmp/ProbeStore.jks
trustStorePassword=netcool
keyStore=/tmp/ProbeStore.jks
keyStorePassword=netcool
```

Setting the probes Transformer file

Update 'http' to 'https'.

File : transformer.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <!-- Southbound (probe) transformer defintions -->
  <tns:transformer name="netcool2nvpairs" type="southbound"
endpoint="https:5555"
className="com.ibm.tivoli.netcool.integrations.transformer.XSLTTransformer">
  <tns:property name="xsltFilename" type="java.lang.String" value="$
{OMNIHOME}/java/conf/netcool2nvpairs.xsl" description="XSLT file for converting
Netcool events to name/value pairs"/>
  </tns:transformer>
</tns:transformers>
```

Testing the probe using curl

Use the caroot.cer certificate file as the CA CERTIFICATE.

```
curl --cacert ./caroot.cer -v -H "Content-Type: application/json" -d
'{"test":"Message text"}' -X POST https://<FQDN>:5555
```

8.4.2 Configuring the Gateway

Create the Gateways keystore

```
keytool -import -keystore GatewayStore.jks -alias rootca -file ./caroot.cer
-storepass netcool
keytool -list -keystore GatewayStore.jks -storepass netcool
```

Gateways property file settings

File : G_HTTPS.props

```
# Uncomment for SSL debugging through stdout
#Gate.Java.Arguments : '-Djavax.net.debug=ssl:handshake:verbose'
#
Gate.XMLGateway.TransportType : 'HTTP'
Gate.Reader.Server : 'XML_IN'
Name : 'G_HTTPS'
MessageLog : '$OMNIHOME/log/G_HTTPS.log'
PropsFile : '$OMNIHOME/gates/G_HTTPS/G_HTTPS.props'
Gate.MapFile : '$OMNIHOME/gates/G_HTTPS/xml.map'
Gate.StartupCmdFile : '$OMNIHOME/gates/G_HTTPS/xml.startup.cmd'
Gate.Reader.TblReplicateDefFile : '$OMNIHOME/gates/G_HTTPS/xml.reader.tblrep.def'
Gate.XMLGateway.TransformerFile : '$OMNIHOME/gates/G_HTTPS/httpstransformers.xml'
Gate.XMLGateway.TransportFile :
'$OMNIHOME/gates/G_HTTPS/httpsTransport.properties'
Gate.XMLGateway.MessageID : 'netcoolEvents'
#EOF
```

File : httpsTransport.properties

```
clientURL=https://<FQDN>:5555
trustStore=/tmp/GatewayStore.jks
keyStore=/tmp/GatewayStore.jks
trustStorePassword=netcool
keyStorePassword=netcool
#EOF
```

File : httpstransformers.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<tns:transformers
xmlns:tns="http://item.tivoli.ibm.com/omnibus/netcool/transformer"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<!-- Northbound (gateway) transformer definitions -->
<tns:transformer name="netcoolEvents" type="northbound"
endpoint="https://<FQDN>:5555"
className="com.ibm.tivoli.netcool.integrations.transformer.EmptyTransformer">
</tns:transformer>
</tns:transformers>
```

8.4.3 Example certificates

File : ProbeStore.jks

```
Keystore type: jks
Keystore provider: IBMJCE
```

Your keystore contains 2 entries

```
Alias name: rootca
Entry type: trustedCertEntry
Owner: EMAILADDRESS=root@<FQDN>, CN=<FQDN>, OU=Support, O=IBM, L=New York, ST=New
York, C=US
Issuer: EMAILADDRESS=root@<FQDN>, CN=<FQDN>, OU=Support, O=IBM, L=New York,
ST=New York, C=US
```

```
Alias name: <FQDN>
Owner: CN=<FQDN>, OU=Support, O=IBM, L=New York, ST=New York, C=US
Issuer: EMAILADDRESS=root@<FQDN>, CN=<FQDN>, OU=Support, O=IBM, L=New York,
ST=New York, C=US
```

File : GatewayStore.jks

```
Keystore type: jks
Keystore provider: IBMJCE
Your keystore contains 1 entry
```

```
Alias name: rootca
Entry type: trustedCertEntry
Owner: EMAILADDRESS=root@<FQDN>, CN=<FQDN>, OU=Support, O=IBM, L=New York, ST=New
York, C=US
Issuer: EMAILADDRESS=root@<FQDN>, CN=<FQDN>, OU=Support, O=IBM, L=New York,
ST=New York, C=US
```

Using the property file to set keystore files:

```
Gate.Java.Arguments : '-Djavax.net.ssl.keyStore=/tmp/GatewayStore.jks
-Djavax.net.ssl.keyStorePassword=netcool
-Djavax.net.ssl.trustStore=/tmp/GatewayStore.jks
-Djavax.net.ssl.trustStorePassword=netcool'
```

8.5 Debugging SSL

8.5.1 Probe Debugging

The Probe SSL messages can be debugged using the `nco_p_message_bus.env` file.

```
File : nco_p_message_bus.env
Directory : $NCHOME/omnibus/probes/java
```

```
NCO_JPROBE_JAVA_FLAGS="-Djavax.net.debug=ssl:handshake:verbose"
echo "NCO_JPROBE_JAVA_FLAGS=$NCO_JPROBE_JAVA_FLAGS"
```

Running the probe:

```
Directory : $NCHOME/omnibus/probes/<platform>
```

```
$NCHOME/omnibus/probes/nco_p_message_bus -propsfile ./message_bus.props >
/tmp/message_bus_probe.ssl.log
```

Reading the log file:

```
grep -i found message_bus_probe.ssl.log
found key for : <FQDN>
```

```
grep '\*\*\*' message_bus_probe.ssl.log
*** ClientHello, TLSv1.2
*** ServerHello, TLSv1.2
*** Certificate chain
*** ECDH ServerKeyExchange
*** ServerHelloDone
*** ECDHClientKeyExchange
*** Finished
*** Finished
*** ClientHello, TLSv1.2
*** ServerHello, TLSv1.2
*** Finished
*** Finished
*** ClientHello, TLSv1.2
*** ServerHello, TLSv1.2
*** Finished
*** Finished
```

8.5.2 Gateway Debugging

The Gateways SSL messages can be debugged using the Gate.Java.Arguments property. The details is written to standard out so will need to be redirected to a file. Remember to disable SSL logging after the issue is resolved.

File : G_HTTPS.props

```
# Uncomment for SSL debugging through stdout
Gate.Java.Arguments : '-Djavax.net.debug=ssl:handshake:verbose'
```

Running the Gateway:

Directory : \$NCHOME/omnibus/gates/G_HTTPS

```
nco_g_xml -propsfile ./G_HTTPS.props > /tmp/G_HTTPS.ssl.log
```

Reading the log:

Successful SSL handshakes

```
grep -i found G_HTTPS.ssl.log
Found trusted certificate:
```

```
grep '\*\*\*' G_HTTPS.ssl.log
*** ClientHello, TLSv1.2
*** ServerHello, TLSv1.2
*** Certificate chain
*** ECDH ServerKeyExchange
*** ServerHelloDone
*** ECDHClientKeyExchange
*** Finished
*** Finished
*** ClientHello, TLSv1.2
*** ServerHello, TLSv1.2
*** Finished
*** Finished
*** ClientHello, TLSv1.2
*** ServerHello, TLSv1.2
*** Finished
*** Finished
```