Discovering OMEGAMON
Volume 7

Enhanced 3270 and TEP User Interfaces

OMEGAMON XE for Mainframe Networks v5.1.1

Lab Exercises
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1.1 Introduction
This lab exercise will demonstrate how to logon, navigate, and use some of the primary features of the OMEGAMON Mainframe Networks V5.1 enhanced 3270 user interface. In this lab the user will perform a series of scenarios focused on the following:
- Customize PCOM for MFN LAB
- Enterprise Application Health
- Enterprise Application TCP Listeners and Connections
- Connection Details
- Enterprise Connections Health
- Networking Commands
- OSA Express
- TN3270
1.2  Enhanced 3270 User Interface PCOM Setup
Customer Feedback confirms that there is a dramatic usability improvement by leveraging the largest
3270 screen size and enabling 3270 mouse navigation. The following instructions will take you though
the IBM PCOM Customization for both.

1.2.1  Setting up 62x160 Screen size in PCOM
Select Communications then Configure.
Then Select 62x160 on Screen Size Pull down. (PCOM V6 or Later)

1.2.2  Setting up Mouse hotspot in PCOM
Select Edit Then Preferences then Hotspots.. Then select ENTER at cursor position on Hotspot Setup
1.2.3  Customize right mouse click as PF3

Select Edit Then Preferences then Mouse... Then select PF3 on pull down and select right mouse button.

Now with both hotspot and PF3 customized you drill down with the left mouse click and return to the previous panel with the right mouse click.

1.2.4  62x160 Screen size

Double left mouse click anything in white for the default drill down, sort, scrolling, maximize, restore, close window. After Drilling down, a single right mouse click returns to previous panel.
1.3 OMEGAMON for Mainframe Networks Scenario Setup

1.3.1 Close all subpanels except “Network Health for Applications”

1.3.2 Initial Default panel for OMEGAMON for Mainframe Networks

This view displays applications across the enterprise (all LPARs) that may be impacted by networking issues. They meet any of the following criteria:

- Percent out of order segments $\geq 5\%$
- Total out of order segments $> 15$
- Connections in backlog $> 10$
- Total backlog connections rejected $> 10$
- Percent segments retransmitted $\geq 3$

| Client | Job Name | Seq Out of Order | Seq Total | Conn in Backlog | Conn Backlog | Seq Rejected | Seq Total | State Time | Conn Count | Active Conn | Highest RC Conn | Error Code |
|--------|----------|------------------|----------|-----------------|-------------|--------------|----------|-----------|-----------|------------|-------------|-------------|------------|
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |
| MVS    | E1041Z   | 0                | 0        | 0               | 0           | 0            | 0        | 0         | 0         | 0          | 0           | 0           | 0          |

Place your mouse over the title of some errors and hit PF1 for a more detail explanation of the fields.

**Help for % Segs Out of Order**

The percentage of segments received that did not contain the next expected sequence number during the most recent time interval.

**Help for Tot Backlog Rejected**

The total number of connections rejected because the backlog limit was exceeded before the listener was able to accept the waiting connections. z/OS Communications Server rejects a new connection when the number of connections waiting to be accepted exceeds the backlog limit for a listener. The format is an unsigned integer.

**Help for Tot Segs Out of Order**

The total number of TCP data segments received that did not contain the next expected sequence number on all connections for this application that existed at the end of the most recent time interval. The format is an integer.
1.4 Navigate to Enterprise Application Health

1.4.1 Select Enterprise Application Health
Displays the following information for applications throughout your enterprise:

- Applications summary
- Applications with percent out-of-order segments >= 5% or total out-of-order segments >=15%
- Applications with connections in backlog >= 10 OR total backlog connections rejected > 10
- Applications with percent segments retransmitted > 3% OR total segments retransmitted > 10

Double click on an entry such as Connections in Backlog or Total Backlog Connections Rejected.
1.4.2 Drill down to Application Details
Point mouse to highlighted field and hit PF1 for help to get a description of the field.

1.4.3 TN3270 Connections
Go back to the default Network Health for Applications view and shift right to see the total segment re-transmissions.

Now enter L for TN3270A to view the Listeners.
1.5 Enterprise Application TCP Listeners and Connections

Shift right to view the LU name to see which one is yours.

Select your connection to see details. (Double mouse click or S and Enter)
### 1.6 Connection Details

Things to look for are:

- **Status and Response time**: Notice the Response time. If this is high then the cause can be seen in other sections on this panel. Hit F1 over Response time Variance.

- **Retransmissions and out of order segments**: These are indicators that can indicate the cause of performance issues.

- **Window size**: Window Size Freq > 0 can indicate severe congestion or resource issues at the end point.

- **Statistics window**: Notice the outbound interface name. Maybe the connection is not going over the OSA you thought it was because of a DVIPA issue. This can change during the connection.
1.7 Enterprise Connections Health
PF3 or right mouse click to get to previous panel.
Then Enter E for Enterprise Network Workspaces list
Then Enter C for Enterprise Connections Health Workspace

We see three windows. The first one indication connections with no activity in longer than 10 minutes. The second window indicates Connections not in Established state. And the 3rd window indicates connections with bytes being buffered in CSM storage.

1.7.1 Connection State not equal to Established

Connections in CLOSE WAIT for hours or days can eventually prevent new connections from starting. This can be caused by applications failing to cleanup connections correctly. You can drop these “zombie” connections by issuing Drop command right from here.
### 1.7.2 Inbound or Outbound Bytes buffered

Bytes buffered can be caused by networking issues or the endpoint not being able to keep up. These are buffered in CSM storage. Shift right or drill down into one of these sessions to see why bytes are backing up. It turns out some of these are in Close Wait. Bytes backed up will not be freed up until the connection is dropped. If this Panel is missing then none of the connections meet this condition.

**Enterprise Connections Health**

<table>
<thead>
<tr>
<th>System</th>
<th>Job Name</th>
<th>Local Port</th>
<th>Remote Port</th>
<th>Remote IP Address</th>
<th>Last Activity</th>
<th>Connection State</th>
<th>Time Since Last Activity</th>
<th>In Queued Data</th>
<th>Out Queued Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSE</td>
<td>CIOSAPI05</td>
<td>8009</td>
<td>203.195.27.23</td>
<td>Established</td>
<td>24h:00m:00s</td>
<td>192.0.2.2</td>
<td>10:12:23</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Connection State Not Equal to Established**

<table>
<thead>
<tr>
<th>System</th>
<th>Job Name</th>
<th>Local Port</th>
<th>Remote Port</th>
<th>Remote IP Address</th>
<th>Connection State</th>
<th>Time Since Last Activity</th>
<th>In Queued Data</th>
<th>Out Queued Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSE</td>
<td>CIOSAPI05</td>
<td>8009</td>
<td>203.195.27.23</td>
<td>Established</td>
<td>Close Wait</td>
<td>10:12:23</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Inbound or Outbound Bytes buffered**

<table>
<thead>
<tr>
<th>System</th>
<th>Job Name</th>
<th>Local Port</th>
<th>Remote Port</th>
<th>Remote IP Address</th>
<th>Bytes Buffered</th>
<th>In Queued Data</th>
<th>Time Stamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSE</td>
<td>CIOSAPI05</td>
<td>8009</td>
<td>203.195.27.23</td>
<td>Established</td>
<td>0</td>
<td>12/12/23 01:43:05</td>
<td></td>
</tr>
</tbody>
</table>

**Inbound or Outbound Bytes buffered**

<table>
<thead>
<tr>
<th>System</th>
<th>Job Name</th>
<th>Local Port</th>
<th>Remote Port</th>
<th>Remote IP Address</th>
<th>Bytes Buffered</th>
<th>In Queued Data</th>
<th>Time Stamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSE</td>
<td>CIOSAPI05</td>
<td>8009</td>
<td>203.195.27.23</td>
<td>Established</td>
<td>0</td>
<td>12/12/23 01:43:05</td>
<td></td>
</tr>
</tbody>
</table>
1.8 Networking Commands

To issue commands Enter ! On the start of the connection for a list of commands, or at the start of the row, just enter P for Ping, T for Tracerte, N for NSLOOKUP and D for Drop. If you have problems, your userid may not be authorized in RACF to issue these commands.

The IP address might be outside a firewall. You can try one of these commands on the local LPAR IP address. You can locate it by finding the **local IP address** on a connections view on the previous exercise.

### 1.8.1 Ping Results:

<table>
<thead>
<tr>
<th>Command and Response Log</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command</strong></td>
</tr>
<tr>
<td>ping 192.84.47.47</td>
</tr>
</tbody>
</table>

### 1.8.2 Trace route Results:

<table>
<thead>
<tr>
<th>Command and Response Log</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command</strong></td>
</tr>
<tr>
<td>CS VIR13: Tracering to 192.84.47.66 (192.84.47.66)</td>
</tr>
</tbody>
</table>

### 1.8.3 NSLookup Results:

<table>
<thead>
<tr>
<th>Command and Response Log</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command</strong></td>
</tr>
<tr>
<td>EZB3170I Server: p505d-x001.demos.ibm.com</td>
</tr>
<tr>
<td>EZB3172I Address: 192.84.45.3</td>
</tr>
</tbody>
</table>
1.9 OSA Express Interfaces

PF3 or right mouse click to get to previous panel. Then E Then O

Interface attributes come from Communications Server where the OSA Express Ports and Channel attributes come directly from OSA-Express through SNMP. We will focus on the interface because with z/OS 1.12 or later, we see significantly more metrics.

OSA issue like high utilization or other errors can be found here. Notice any errors such as % packets in error and inactive OSA Interfaces. Also notice that we now see the 4 OSA outbound queue priorities.

Further details on OSA Express can be found through the Ports and channels selections off the enterprise Network Workspaces selection. Return to previous panel then Enter (E then P or B)
Some OSA Performance issues can be as a result of being at the wrong microcode levels. See if you can locate it in the **OSA Express Channel** summary.

<table>
<thead>
<tr>
<th>System VID</th>
<th>Chan Num</th>
<th>PCI Util %</th>
<th>Channel Type</th>
<th>Device or Port Name</th>
<th>Port Count</th>
<th>Micro Code Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVSE</td>
<td>04</td>
<td>0</td>
<td>osaIntraensembleData</td>
<td>IUTXP004</td>
<td>1</td>
<td>003C</td>
</tr>
</tbody>
</table>
1.10 Enterprise TN3270 Session Connections

From the initial MFN panel you can Enter (E then N) or / and then N or 4.

1.10.1 TN3270 Server Sessions

Displays the following data for all TN3270 server connections for a TN3270 listener port on a TCP/IP stack:

- TN3270 server session connections summary. Both Active and recently inactive sessions.
- TN3270 server sessionless connections summary

<table>
<thead>
<tr>
<th>TN3270 Server Session Connections Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column 2 to 10 of 18</td>
</tr>
<tr>
<td>Remote IP Address</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>24.219.143.152</td>
</tr>
<tr>
<td>56.41.129.246</td>
</tr>
<tr>
<td>92.123.118.57</td>
</tr>
<tr>
<td>172.74.202.95</td>
</tr>
<tr>
<td>56.41.129.246</td>
</tr>
<tr>
<td>123.131.3.76</td>
</tr>
<tr>
<td>98.212.124.192</td>
</tr>
<tr>
<td>172.74.209.65</td>
</tr>
</tbody>
</table>

High IP Response Times can indicate networking issues. Drill down into the TCP/IP connections and look for issues there. For High SNA response times, look to the application or end point issues. If you shift right, you will see the session end times for recently ended sessions. Active sessions will show all zeros.
Drill down (**S** or double mouse click) on the first column of one of the sessions to see the TN3270 connection details. TN3270 sliding window performance details.
1.11 TN3270 Connection Details

Maximize the Bucket Response Times. These are available if they were defined in the monitoring group in the TCP/IP profile. For this table. This is similar to the old RTM (Response time Monitor) 3270 metrics. You see the number of time the user experienced response times in each bucket range.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.26300s</td>
<td>0.16700s</td>
<td>353</td>
<td>75</td>
<td>279</td>
<td>3</td>
</tr>
</tbody>
</table>

Bucket Response Times

<table>
<thead>
<tr>
<th>Bucket Number</th>
<th>Bucket Range</th>
<th>Bucket Resp Times Count</th>
<th>Bucket Resp Times %</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>151ms - higher</td>
<td>1</td>
<td>33</td>
</tr>
<tr>
<td>4</td>
<td>101ms - 151ms</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>70ms - 101ms</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>51ms - 70ms</td>
<td>2</td>
<td>67</td>
</tr>
<tr>
<td>1</td>
<td>0ms - 51ms</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Traffic Statistics

<table>
<thead>
<tr>
<th>Total Bytes Received</th>
<th>0</th>
<th>Total Bytes Sent</th>
<th>0</th>
</tr>
</thead>
</table>

Configuration and Status
1.12 FTP (New with V5.1.1)
FTP will only show FTPs using the Communications Server for z/OS FTP Server. Others like SFTP and Connect:Direct will only show up in the connections views.

1.12.1 FTP Sessions
FTP data is collected when a new session or transfer is opened or when an existing session or transfer is closed. Information on completed FTPs is kept depending on the FTP Data Display Interval, which defaults to 2 hours but can be set up to 24 hours, which is recommended in most environments. This history is dedicated to FTP and does not use the persistent datastore datasets. FTP history longer than 24 hours can be saved in the TDW and viewed through the TEP.

FTP Logon failures can be especially helpful for common errors such as expired passwords or invalid user IDs. If there is a FTP Session Failure, further information could be found in the connection views.
1.12.2 FTP Transfers

From the FTP Session Summary window you can drill down to see the FTP Transfers for that session.

FTP transfer Details shows information such as the size of the FTP, how long it took, userid and dataset names.
### FTP Transfer Details

<table>
<thead>
<tr>
<th>Columns 1 to 4 of 4</th>
<th>Rows 1 to 1 of 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Addresses and Ports</td>
<td></td>
</tr>
<tr>
<td>Local IP Address</td>
<td>Remote IP Address</td>
</tr>
<tr>
<td>192.84.47.60</td>
<td>24.161.86.175</td>
</tr>
<tr>
<td>Local Port</td>
<td>Remote Port</td>
</tr>
<tr>
<td>20</td>
<td>55886</td>
</tr>
</tbody>
</table>

### Transmission

- **Transmission Start Date**: 13/11/04
- **Transmission Start Time**: 19:26:59
- **Transmission Duration**: 0:00:02
- **Bytes Xmit**: 783K
- **Transmission End Date**: 13/11/04
- **Transmission End Time**: 19:26:59
- **Transmission Mode**: Stream
- **Disconnect Code**: 221

### User ID and Command

- **Job Name**: MSS19
- **User ID on Server**: MSS19
- **Client User ID**: MSS19
- **User ID on Server Ext**: MSS19
- **Server Logging Session ID**: FTPS109
- **Remote Command**: RETR

### Dataset

- **Data Set Name**: CANDLET
- **Data Type**: ASCII
- **Data Structure**: File
- **Data Set Type**: SEQ
- **New Data Set Name**: DEMOJOB
- **New Data Member Name**: None

### Security

- **Security Mechanism**: None
- **Login Method**: None
- **Security Protocol Level**: None
- **Session Protect Level**: None
- **Cipher Specification**: None
1.13 VTAM HPR (New with V5.1.1)

FTP will only show FTPs using the Communications Server for z/OS FTP Server. Others like SFTP and Connect:Direct will only show up in the connections views.

Select HPR Connections Overview

Select to drill down to HPR details
TEP Walk through of the Enterprise_Extended Navigator View

1.14 Introduction
The Enterprise_Networks Navigator View was created to simplify the monitoring of z/OS networks. Many of these workspaces were created from user experiences to identify and resolve specific network issues. This view provides a cross-LPAR, real-time view of the z/OS Communications Server network focused on specific application and networking issues. This set of workspaces moves away from LPAR-scope views to enterprise-wide views. These new workspaces eliminate many of the mouse clicks previously required to get to key issues, dramatically improving system availability with faster problem resolution through built-in problem solving scenarios. They also facilitate new enterprise-wide searches based on characteristics such as System ID, application name, IP address, FTP user ID, or data set name.

1.15 How to access the Enterprise_Networks Navigator View
The new out of the Box Enterprise_Networks Navigator View not assign to anyone to view. This procedure should not be necessary for this LAB and is only here for you to be familiar with the procedure.

1) Select Administer Users then

2) Assign View to Users or Groups
1.16  Enterprise Application Health (Default Workspace)

Displays a summary of applications, applications with percent out-of-order segments >=5% or total out-of-order segments >=15%, applications with connections in backlog >= 10 OR total backlog connections rejected > 10, and applications with percent segments retransmitted > 3% OR total segments retransmitted > 10 for applications throughout your enterprise. This workspace also displays 3 Top 5 application bar charts for total backlog connections rejected, total segments retransmitted, and total out of order segments.
1.17 New Enterprise_Networks Navigation

The Enterprise Networks Navigation view is a scrollable list of workspaces available from the Enterprise_Networks view. This view also includes Enterprise-level Find workspaces used to locate groups of like resources. The Enterprise Networks Navigation view is found in every Enterprise workspace immediately adjacent to the Navigator. To access one of the Enterprise Networks workspaces from the Enterprise Networks Navigation view, do the following:

1. Select the Link icon in the row adjacent to the name of the workspace you want to access.
2. Select the workspace.

Left mouse click on link on view you want Then Select to go to view you want to go to.
1.18 Enterprise OSA Interfaces
Displays errors, statistics, configuration and status data for all OSA interfaces across the enterprise. Notice the four queue priorities in the write queue statistics. Traffic is going over the wrong priorities could cause performance issues during very high loads. (z/OS 1.12 or later)

To Find the Microcode Level of the OSA-Express, Drill down by selecting the link in any of the windows and select Interface Status. This will take you to the Interface Status in the physical view.

Slide the Interface Status Summary Table window over until you spot the OSA Code Level, which is also known and the Microcode level.
<table>
<thead>
<tr>
<th>Configured MTU Value</th>
<th>Actual MTU Value</th>
<th>Routing MTU Size</th>
<th>OSA Code</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8992</td>
<td>0</td>
<td></td>
<td>0x005F</td>
</tr>
</tbody>
</table>
1.19 Enterprise TN3270 Server Overview
Displays the current status of all TN3270 Server ports across the enterprise. Drill down takes you into the physical Navigator View to see the active connections on the port you selected.

Now that we are in the Physical Navigator View, to get back to the Enterprise_Networks View, select the Green back arrow or select Enterprise_Networks Navigator Tab.
1.20 Enterprise HPR Connections Overview
Displays performance data for High-Performance Routing (HPR) Rapid Transfer Protocol (RTP) connections (pipes) when one endpoint of an HPR connection is located on a monitored z/OS system image. To identify the cause of performance issues look at error conditions such as Percent Packets Retransmitted, out of Sequence Buffers and a high number of path switches. Persistent ARB Mode in Red could indicate an issue.
Drill down on the HPR Connection Summary link to see more details.
1.21 Enterprise FTP Sessions Overview
Displays all FTP sessions that were completed or became active within the display interval (24 Hours) across the enterprise. Active sessions that were established or closed prior to the display interval are not displayed.

Take notice of one of the FTP User ID. Next we will find all FTPs issued by that UserID during the last FTP Data Display Interval, which defaults to 2 hours but can be set up to 24 hours, which is recommended in most environments. This history is dedicated to FTP and does not use the persistent datastore datasets. FTP history longer than 24 hours can be saved in the TDW and can also be viewed through the TEP.

This interval is defined by the FTP Data Display Interval value that was set in ICAT on the Specify Component Configuration panel or the KN3_TCP_FTP_DSPINTV PARMGEN parameter. The configured value can be modified while the monitoring agent is running using the DSPINTV parameter on the KN3FCCMD START FTP command. See the IBM Tivoli Monitoring for Mainframe Networks: Planning and Configuration Guide for more information.

To Confirm the FTP Data Display Interval. Select OMEGAMON for Mainframe Networks Health in the Enterprise Networks Navigation window. Then Locate the TCP Collection Window in the bottom window. You will see the number of hours the FTP and TN3270 data is kept.
1.22 Enterprise FTP Transfers FIND
Displays performance metrics for all FTP transfers matching search criteria specified by the end user. All active or completed FTP transfers captured within the configured FTP display interval that match the search criteria are displayed. Add * at end for wildcard such as DIL*. The finds are case sensitive.
Try some other wildcard finds by userid or dataset name.
1.23 Enterprise Connections Find
Displays performance metrics for connections matching search criteria specified by the end user.
Try all Connections on port 1920 on all LPARS. You can also try 19*.

Notice information such as response times and any error conditions.
Try some other Find commands against IP addresses or Application Name with * wildcard.
1.24 Enterprise TN3270 Find
Displays performance metrics for all TN3270 server connections matching search criteria specified by the end user. All TN3270 server connections captured within the configured TN3270 display interval that match the search criteria display regardless of the status of the session (Active, Completed or None). Notice Breakout of response time by SNA and IP.
Try to view all TN3270 connections with LU names Starting with TCP* on all LPARs.
Congratulations. You have now completed the OMEGAMON MFN V5.1 Lab!

Please feel free to ask your lab instructor for additional exercises.
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<tr>
<td>12/27/12</td>
<td>V1</td>
<td>Ernie Gilman</td>
<td>Created and authored OMEGAMON MFN Lab Workbook</td>
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<td>03/11/13</td>
<td>V2</td>
<td>Lih Wang</td>
<td>Edited</td>
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<tr>
<td>03/14/13</td>
<td>V2</td>
<td>Ernie Gilman</td>
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<tr>
<td>11/07/13</td>
<td>V4</td>
<td>Ernie Gilman</td>
<td>Added V5.1.1 views and TEP Enterprise_Networks</td>
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<td>Lih Wang</td>
<td>Edited for OMEGAMON POT 3&lt;sup&gt;rd&lt;/sup&gt; Edition publishing on iQWorks</td>
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