How IBM Can Identify z/OS Networking Issues without tracing

Wed, August 12, 1:45-2:45
Session 17536

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Abstract

- Running traces has been an essential tool in resolving networking issues on z Systems.

- To reduce the need of running traces, z/OS Communication Server created the Network Management Interface (NMI) to give management tools **high-speed, low-overhead access to information** needed to isolate networking issues.

- This session will provide examples of how IBM's OMEGAMON XE for Mainframe Networks leverages the NMI to help networking experts **reduce the need to run traces by as much as 90%**.
Agenda

- Overview of how OMEGAMON leverages NMI
- Historical baselines
- Finding a resource
- IPSEC
- Integration with IBM Operations Analytics for z Systems
- Demo of enhanced 3270 user interface
- Demo of Tivoli Enterprise Portal

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Networking problem indicators

- Hangs
- Response Time
- Failures

Retransmissions
- Out of order
- Duplicate ACKs
- Window resets
- Backlog rejections
- Microcode
- Utilization

Locating Problems

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Key Points to Reducing the Need for Traces

1. Access to z/OS Communications Server data
   ✓ High speed, low overhead access to networking data
   ✓ Management tools have access through the \text{nmi}^{\text{1}} \text{ API}

2. OMEGAMON for Mainframe Networks leverages \text{nmi}^{\text{1}}
   ✓ Proactive with Alerting
   ✓ Enterprise Network Health Views
   ✓ Wildcard FIND connections, TN3270 and FTPs
   ✓ History provides trending and eliminates recreates

\text{nmi}^{\text{1}} = \text{Network Management Interface}
z/OS Communications Server Monitoring Overview

- z/OS Communications Server
- Traces
- SMF
- NMI API
- TCP Connections
  - OSA-Express Buffers
  - TN3270 Applications
  - EE/HPR
  - IPSEC
- Retries, Timeouts
- Rejections, Utilization . . .
- Resource Awareness
  - Metrics & Error Counts
- OMEGAMON XE for Mainframe Networks

Enhanced 3270 user interface

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
OMEGAMON History Overview

Tivoli Enterprise Portal
- Short term (last 24 hours) from PDS
- Long term (> 24 hours) from TDW

Tivoli Common Reporting

Tivoli Data Warehouse

Persistent Data Store

ITM Servers

z/OS

Tivoli Data Warehouse Persistent Data Store
Enhanced 3270 user interface
- Near-term history from PDS (all data available)
OMEGAMON XE for Mainframe Networks v5.3

Increased efficiency

- Understand information related to when the problem began with near-term history in the enhanced 3270 user interface

Effortlessly explore data around when the out of order segments occurred

Easily see when an application has high percent out of order segments and select for details
Historical Baselines – on Demand

- History Overlay for same time each day
- See weekly trends
- Create on-demand
Backlog Connections Rejected History example

With History I can see more details

<table>
<thead>
<tr>
<th>Recording Time</th>
<th>Local Port</th>
<th>Application Name</th>
<th>ASID</th>
<th>Active Connections</th>
<th>Backlog Connections Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/28/12 09:00:00</td>
<td>3006</td>
<td>DSNJDIST</td>
<td>0X007A</td>
<td>542</td>
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<td>DSNJDIST</td>
<td>0X007A</td>
<td>672</td>
<td>0</td>
</tr>
</tbody>
</table>
Finding a Connection - FAST

Enterprise Connections FIND

Remote IP Address | Application Name | Remote Port
--- | --- | ---
9.82.56.109 | CXEGDSST | 35234
9.82.56.100 | CXEGDSST | 36487
9.82.56.102 | CXEGDSST | 59457
9.82.56.124 | TWC6 | 24907

Dynamic Query

Enterprise FINDS
- Connections
- TN3270
- FTP Sessions
- FTP Transfers

FIND By - Examples:
- Wild Card '*'
- IP Addresses
- Ports
- Applications
- Connection States
- TN3270 LOGMODEs
- TELNET Names
- FTP DSN
- USERIDs

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OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

- Quickly FIND network resources
  
  Command ==> find_

  or

  Command ==> find conn_

- Locate TCP connections, FTP sessions, FTP transfers or TN3270 Sessions in your enterprise

- Then navigate in context or issue Take Action commands against a selected network resource
IP Security (IPSec)

● Overview
  ✓ Network layer Security
    ◆ Driven by filters
    ◆ Difficult to debug
  ✓ IP Filter Statistics
    ◆ HPR Maps to UDP
  ✓ Tunnel Details
    ◆ High Retransmissions
    ◆ Out of Sequence

● Results
  – Diagnose IPSEC tunnels and IP filters
  – Unique to OMEGAMON
Integration with IBM Operations Analytics

OMEGAMON + IBM Operations Analytics – Launch in Context from TEP

The **One Two – Punch**: Combine two very powerful tools to ensure performance and high availability of your enterprise.

- **Perform log analysis in context of OMEGAMON workspaces** – This approach enables OMEGAMON users to perform in-context log analysis while doing problem determination
  - From your OMEGAMON workspace, use the IOA search bar to search logs (using LPAR or Sysplex as the default context)
  - Easy to implement - Configure TEP to display the IOA search bar

Launch IOA from OMEGAMON performance monitoring workspaces to search logs in context
Summary

✓ z/OS Comm Server NMI provides alternative to tracing
  ✓ High speed, low overhead access to networking data
✓ OMEGAMON exploits this interface
  ✓ History eliminates recreates
  ✓ Flexible ways to FIND resources, really fast
  ✓ Enterprise views of networking resources
    ✓ Applications, listeners, connections
    ✓ FTP, TN3270
    ✓ OSA and interfaces
    ✓ TCP/IP, VTAM, buffers, and storage
  ✓ IPSec and IP Filters
  ✓ Integration with IBM Operations Analytics for z Systems
YouTube videos of problem solving scenarios

http://www.youtube.com/playlist?list=PLiD3_RDV00Jcpfl2GCf2mPqprba2KZCsP

- What's New with OMEGAMON XE for Mainframe Networks?
- Diagnosing Slow Response Times to a Business Partner's Applications
- Troubleshooting Applications with Poor FTP Performance
- Troubleshooting Backlogged Connections with TEP
- Diagnosing Connection Problems using a FIND Workspace
- Spotting Trends in an Abnormal Connection Count
- Backlog Connection Count Exceeds a Defined Threshold
- Balancing Workloads Between OSA Adapters
- Troubleshooting Problems with TN3270 Connectivity
- Determining Stack Health Using Throughput
- Running a NetView z/OS IP Packet Trace from OMEGAMON Mainframe Networks
- Understanding Spikes in CSM Storage Usage

- More videos are under development…
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OMEGAMON XE for Mainframe Networks v5.3

Increased efficiency
- Understand information related to when the problem began with near-term history in the enhanced 3270 user interface

Easily see when an application has high percent out of order segments and select for details

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OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

- View TCP connections and z/OS address space details together to understand when network performance is impacted by z/OS resource constraints

- Zoom into OMEGAMON on z/OS workspaces to investigate further into bottlenecks, storage usage, and WLM service classes
Decreased problem resolution time and effort

- View TCP connections and TCP listeners for a queue manager’s channel initiator address space to understand if network performance is impacting the processing of messages.

- Navigate to OMEGAMON XE for Mainframe Networks workspaces to investigate further into any potential network performance issues.
OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

- Quickly FIND network resources

  Command ==> find_

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- Locate TCP connections, FTP sessions, FTP transfers or TN3270 Sessions in your enterprise

- Then navigate in context or issue Take Action commands against a selected network resource
Decreased problem resolution time and effort

- Debug network problems faster
- Issue PING, NSLOOKUP and TRACERTE commands while viewing any workspace in the enhanced 3270 user interface

The command is issued from the selected system and the output is displayed in the Command and Response Log workspace.

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

Improved navigation:
- Enterprise Network Workspaces menu
  - Access using the E action or the NETWORK or NETMENU commands
- Investigate interfaces and OSA issues with the OSA command
- Investigate issues with TCP/IP resources with the TCPIP or TCPIPMENU commands
- Investigate issues with VTAM resources with the VTAM or VTAMMENU commands

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OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

Customize filters and queries by setting site or user profile variables

- When you navigate to a workspace or invoke a command, there are default values for query and workspace filters
- Set site or user profile variables in `rtename.UKOBDATF` dataset to override the defaults
Decreased problem resolution time and effort

- View UDP endpoints data in context of an Enterprise Extender connection
- The UDP endpoints data displays the byte rates, datagrams discarded, and queued bytes for all the EE connections on this LPAR
- View additional information by selecting one of the UDP endpoints and navigating to the UDP Connection Details workspace

![Image of EE Connection Summary for EX000003]

![Image of HPR Connections Summary]

![Image of UDP Endpoints Summary]
OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

- Identify overall TCP/IP and VTAM address space issues
  - Discards or retransmits
  - CPU percent
  - Paging rate
  - CSA and private storage usage

- Navigate to VTAM Buffer Pools summary and details workspaces
OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

Identify gaps in monitoring and issues with your monitoring agents with the Enterprise Mainframe Networks Health workspace

- Invoke HEALTH command from any OMEGAMON XE for Mainframe Networks workspace
  
  Command ==> health

- Verify monitoring agents are online

- Verify that data collection is active and configured correctly

- SNA Collector and TCP Collector tabs provide additional information
OMEGAMON XE for Mainframe Networks v5.3

Decreased problem resolution time and effort

Monitor your OSA-Express5S adapters in the enhanced 3270 user interface

- Enterprise OSA-Express Ports Overview
- OSA-Express Ports for Channel
- OSA-Express Ports for Interface
- OSA-Express5S Ports Details
Enterprise Network Health

Applications that may be impacted by networking issues

- Out of order segments
- **Backlog connections rejected**
- Segments retransmitted
- Datagrams Discarded
- Number of connections and Idle Time

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Backlog Connection Rejections

**Overview**

- Connection Rejections
  - Exceeds Backlog Limit
- Need to retry logon
  - Excessive overhead
- Backlog limit too low
  - Application can override

**Results:**

- Most common unidentified issue
- Applications are not be notified
- No Message from z/OS Comm Server
We see three windows with potential connection issues:

- Connections with no activity in longer than 10 minutes.
- Connections not in Established state.
- Connections with bytes being buffered in CSM storage.
TCP/IP Bytes Backing Up

**Overview**
- Backup in CSM storage
  - LPAR can run out of storage
- Outbound backup
  - Endpoint slow or network issues
- Inbound backup
  - High Application CPU

**Results**
- Can Prevent LPAR crash
  - Situation to drop connection

![TEP: Inbound & Outbound Bytes Buffered](image)

Enhanced 3270 user interface: Enterprise Connections Health
Zombie Connections

Overview

✓ Connections
  ◆ Not in established State
✓ Can prevent new connections
  ◆ Exceed maximum socket limit
✓ No activity for days

Results

★ Prevent Major outage
  ◆ Drop zombie connections

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.

Enhanced 3270 user interface or TEP:
Enterprise Connection Health
FTP Monitoring

Overview

✓ FTP Sessions
  ◆ Session Errors
  ◆ Drill down to TCP/IP
✓ FTP Transfers
  ◆ Monitor performance
✓ Enterprise FINDS
  ◆ IP Address,
  ◆ USERID, DSN

Results

★ Access History immediately
★ No need to wait for Report

Available in TEP and enhanced 3270 user interface
**OSA-Express and Hypersockets**

**Overview**

- Utilization, Discards,
- Microcode, MTU Size
- **Outbound Queue Priorities**
- View non-z/OS OSAs (snmp)
- Alert if OSA is down

Available in TEP and enhanced 3270 user interface