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What's New with z/OS Network Performance Monitoring with OMEGAMON?

OMEGAMON XE for Mainframe Networks v5.1

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IBM

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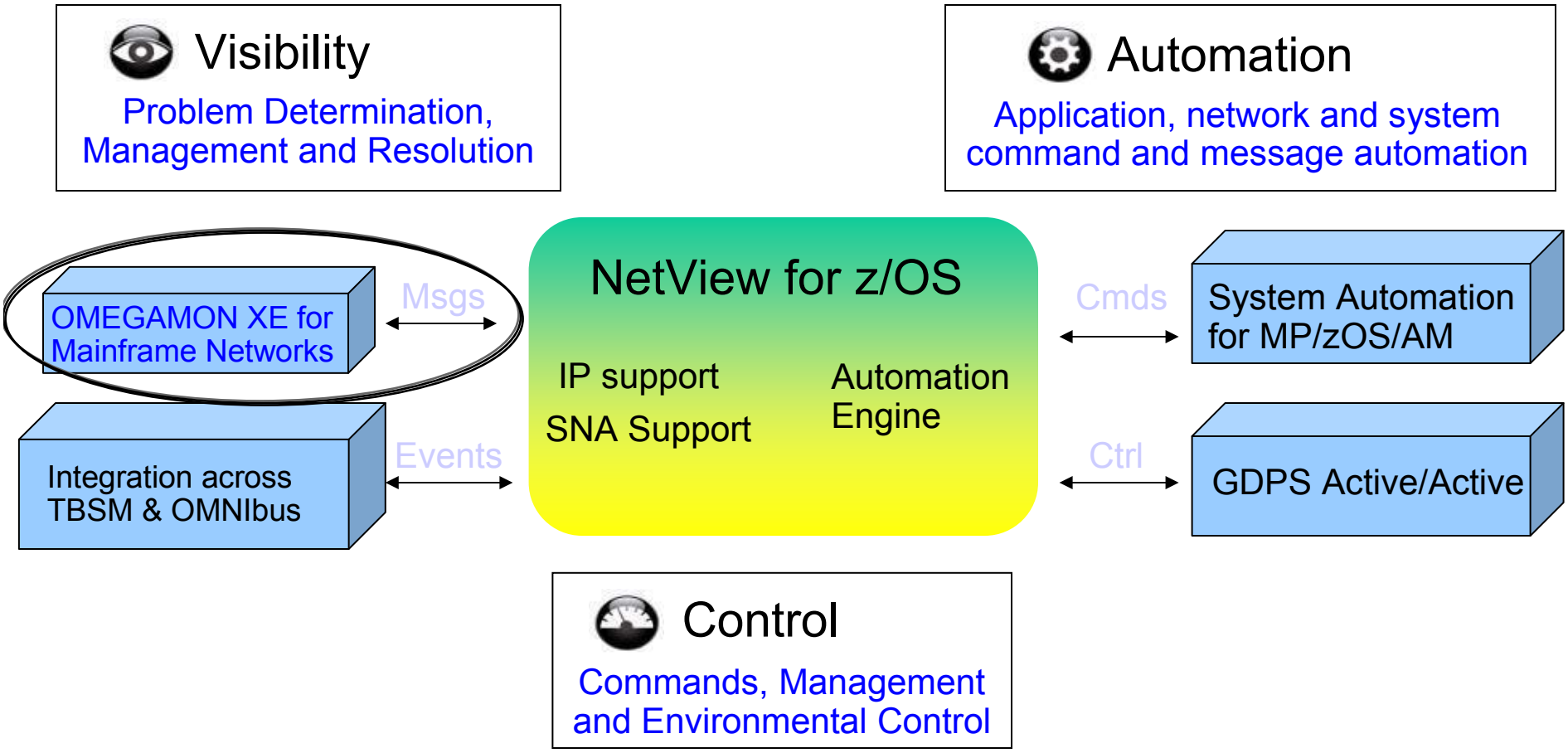
Increasing visibility with mainframe monitoring can improve availability across entire Enterprise

Key Takeaways

- IBM has provided leadership and best practices with System z Service Management Visibility, Control and Automation capability for years
- Enterprise-wide Monitoring and Management provides much better availability and performance results than individual separate products
- IBM's System z OMEGAMON family addresses key requirements, including reducing risk and decreasing costs, with improved productivity

OMEGAMON for Mainframe Networks V5.1 fits into Integrated Service Management Ecosystem



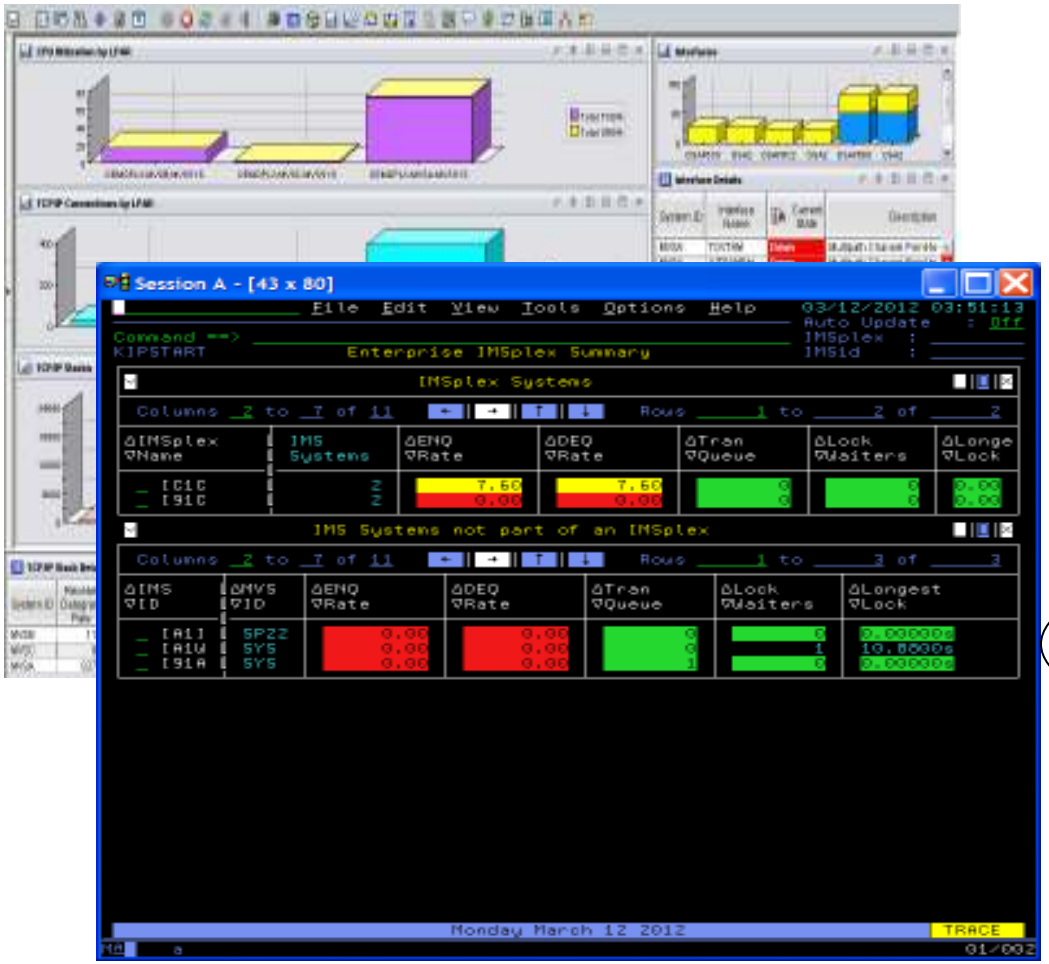
NetView and OMEGAMON for MfN working together create single view of enterprise networks

NetView for z/OS — Network Availability

OMEGAMON XE for Mainframe Networks — Network Performance

- Common user interface integrates TCP/IP data from both NetView for z/OS and OMEGAMON XE for Mainframe Networks.
- Integration function provides customers with a consolidated TCP/IP workbench
  - Allowing management of both TCP/IP availability and performance from the same user interface.
- Smart IP tracing to immediately learn where poor or unstable TCP/IP connections hamper application performance

OMEGAMON V5.1 now has a complete family across System z sub-systems



OMEGAMON XE z/OS v 5.1

OMEGAMON XE CICS v 5.1

OMEGAMON XE DB2 v 5.1.1

OMEGAMON XE IMS v 5.1

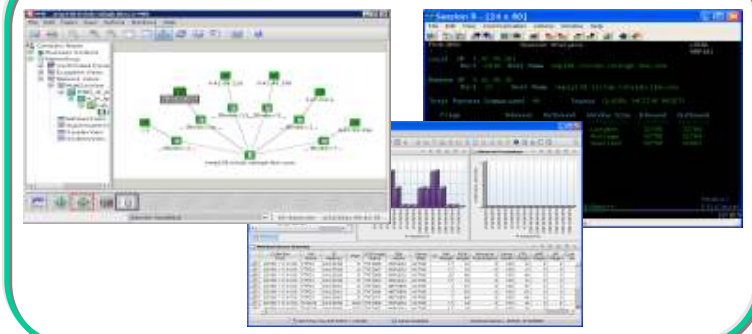
OMEGAMON XE Storage v 5.1

OMEGAMON XE Messaging v 7.1

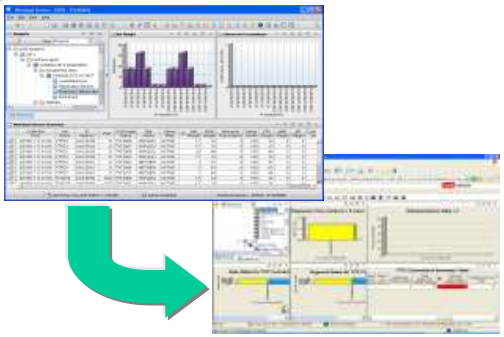
OMEGAMON XE Mainframe Networks v 5.1

OMEGAMON for z/OS Management Suite V5.1

All the components work together to keep applications and services available

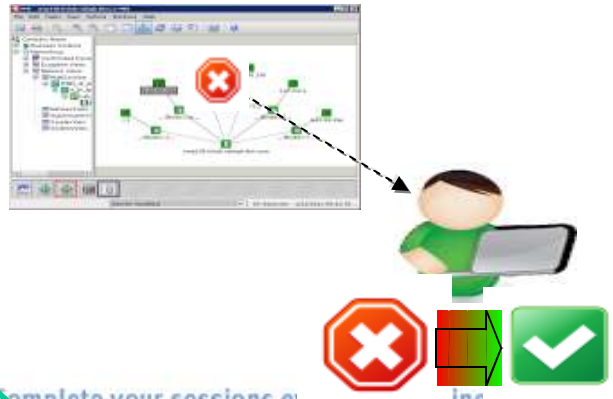


Role appropriate views of right data at right time

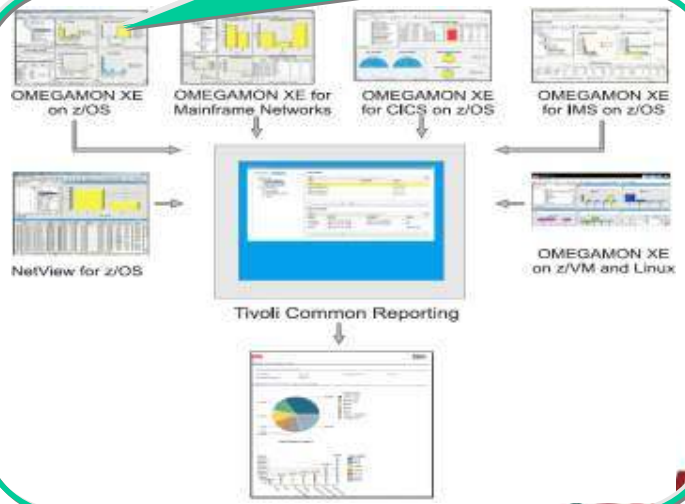


Rapid problem diagnostics via common UI and drill down between

Alert me when thresholds breeched and enable to automate corrective actions



Consistent historical views of resource performance and availability data



Business Agility with improved IT visibility now available with OMEGAMON V5.1 family

Modernized and strengthened OMEGAMON product line for reduced resource usage and faster problem resolution

Increased System Availability with faster problem resolution

- Enhanced 3270 User Interface for SMEs
- Built-in Problem Solving Scenarios

Improved Productivity with simplified information

- Faster Install/Configuration/Maintenance
- zEnterprise monitoring across z196/114 and zBX

Reduced Costs with decreased resource usage

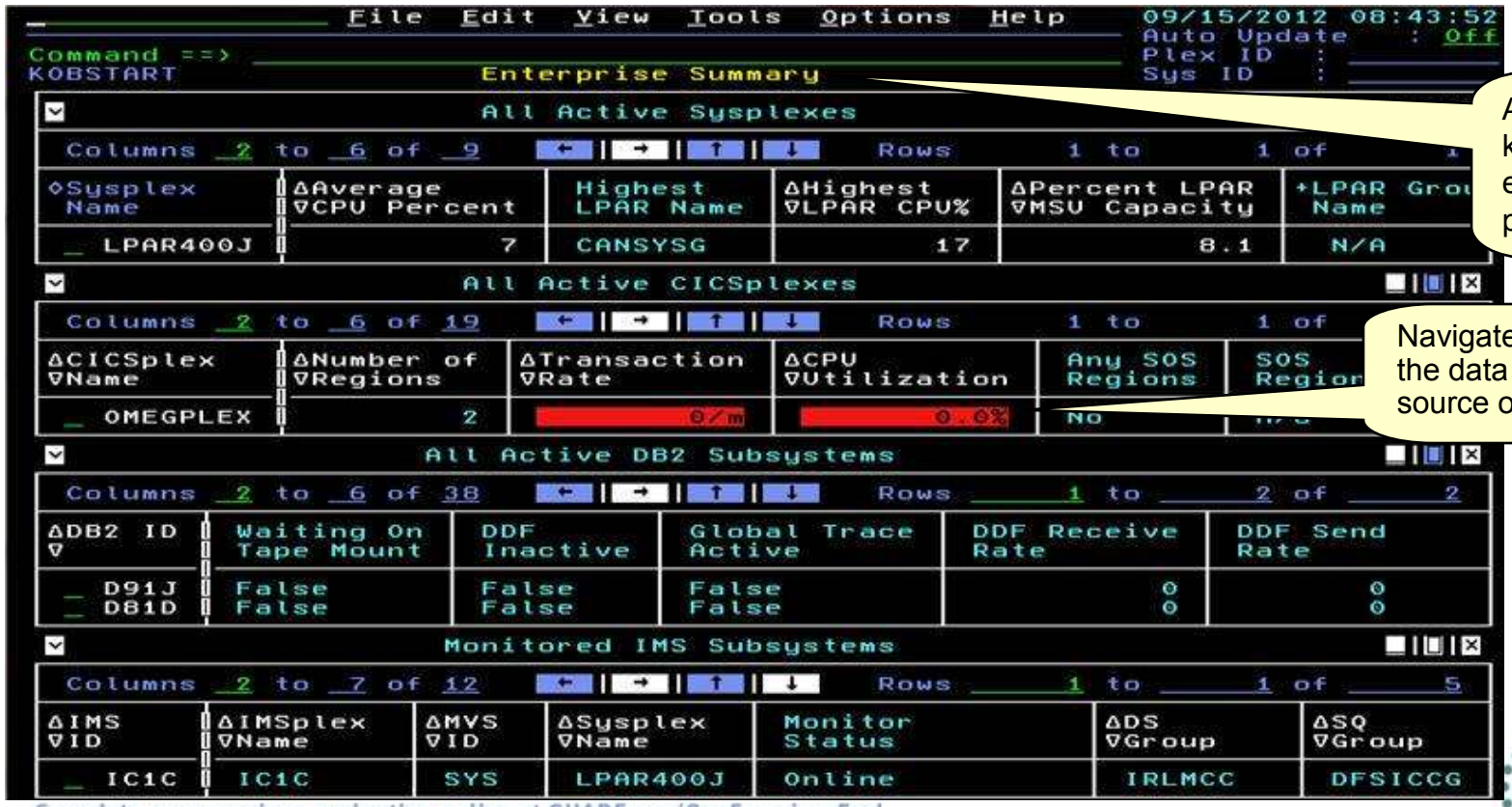
- Usage of zIIP specialty servers
- Simplified OMEGAMON architecture

Individual products include additional capability

Enhanced 3270 user interface creates Enterprise wide view of information for improved availability

- Understand transactions across your enterprise
- Color coding to provide ability to find and resolve problems quickly
- Eliminates need to move between multiple screens and monitors

"GUI on a green screen"



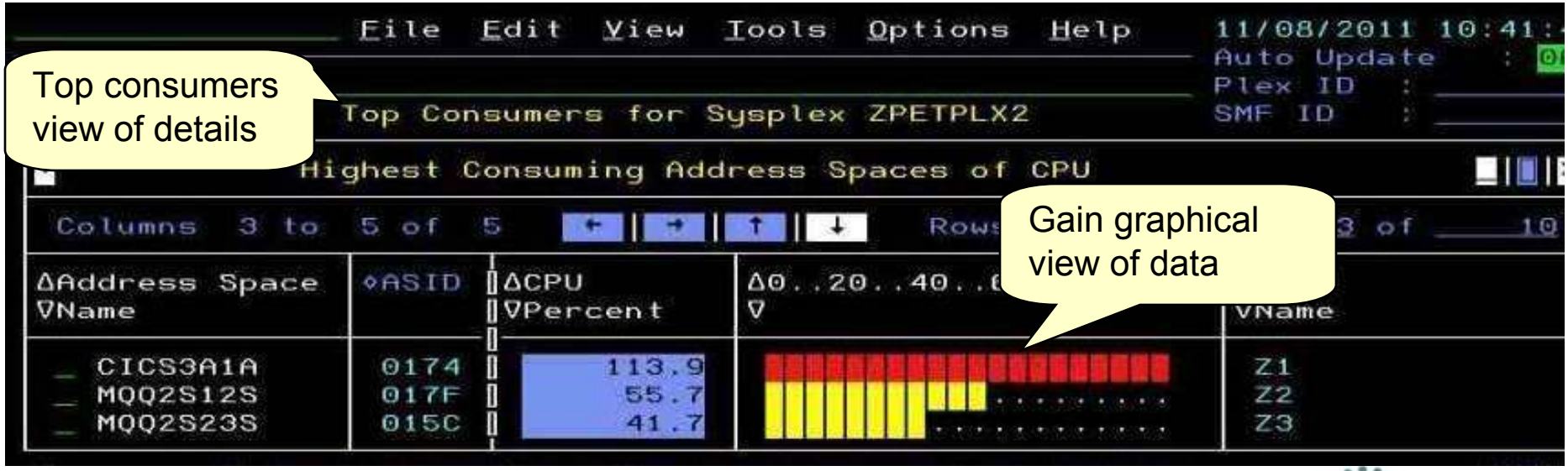
At a glance, view key information for each OMEGAMON product

Navigate quickly through the data to identify the source of a problem

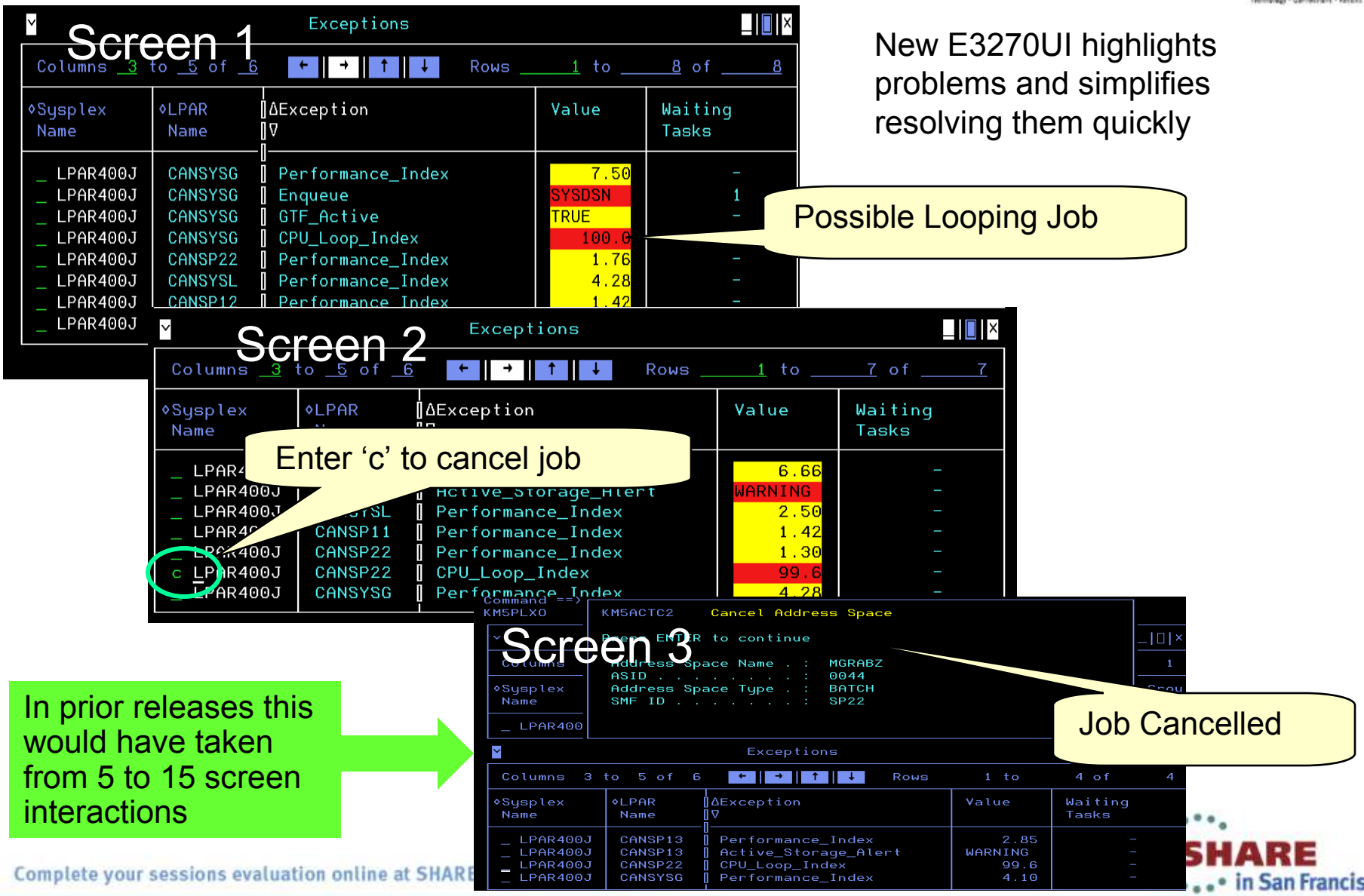
Customer prioritized Problem Solving scenarios built into enhanced 3270 user interface

Easy to see and find critical system and sub-system information for improved performance and availability across System z

- Customized screens focused on customer defined problems
- Screen content based on high priority problems
- Includes Healthcheck and Bottleneck analysis



Example of quickly finding and fixing z/OS Problem



New E3270UI highlights problems and simplifies resolving them quickly

In prior releases this would have taken from 5 to 15 screen interactions

OMEGAMON V5.1 enhanced configuration and maintenance capability with Self-Describing Agents

Faster, easier, less error-prone for improved reliability and productivity

- Eliminate monitoring outages caused by ITM Server recycles
  - Product upgrades/maintenance requires agent or RTEMS recycles only
- Eliminate maintenance upgrade errors:
  - Applies to new installs, staged upgrades, and maintenance
  - Crosschecks/validates version with installed data and framework
  - Avoids inconsistent application data in ITM framework layers
- Self-describing framework extensible to new capabilities
- Eliminates application data DVDs and CDs:
  - No extra distributed installs or upgrades for mainframe-centric customers

- Moving from 40 hours a week to 4 hours a week maintenance
- 80% improvement in time for installation and maintenance
- 30% improvement in time to configure post installation

Customer Driven improvements simplify Installation and Configuration using PARMGEN

Replaces ICAT as primary way to install and configure

*Before: 145 ICAT **product-centric** jobs to configure 38 components for 1 LPAR RTE*
*Today: 8 Parmgen **function-centric** jobs to configure components for 1 LPAR RTE*
Customers experiencing over 35% improvement in install and configuration time

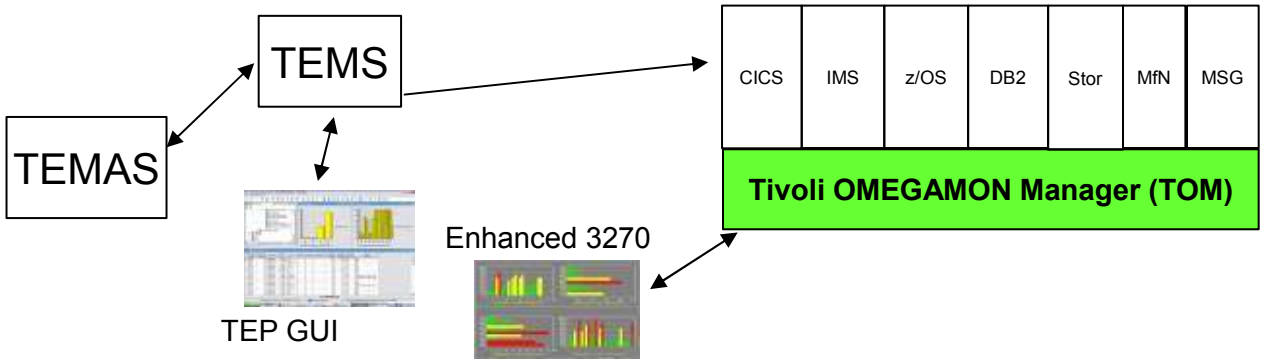
- Easy to walkthrough steps to complete configuration and customize profile
- Automatically updates hundreds of configuration artifacts, including auto-discovery of system values
- Validate parameter settings for tolerance and type
- Imports settings from an existing ICAT environment
- Re-run to change values, add or delete products

"I like using the PARMGEN approach better than ICAT. I find it much easier to make things repeatable... I like the fact that PARMGEN does not overwrite my running members"
Typical quotes from early adopters program

The overall process has been simple and quick. Total time for 3-4 products (z/OS, CICS, DB2, TOM plain vanilla) has been about 2 hours *Field Engineer*

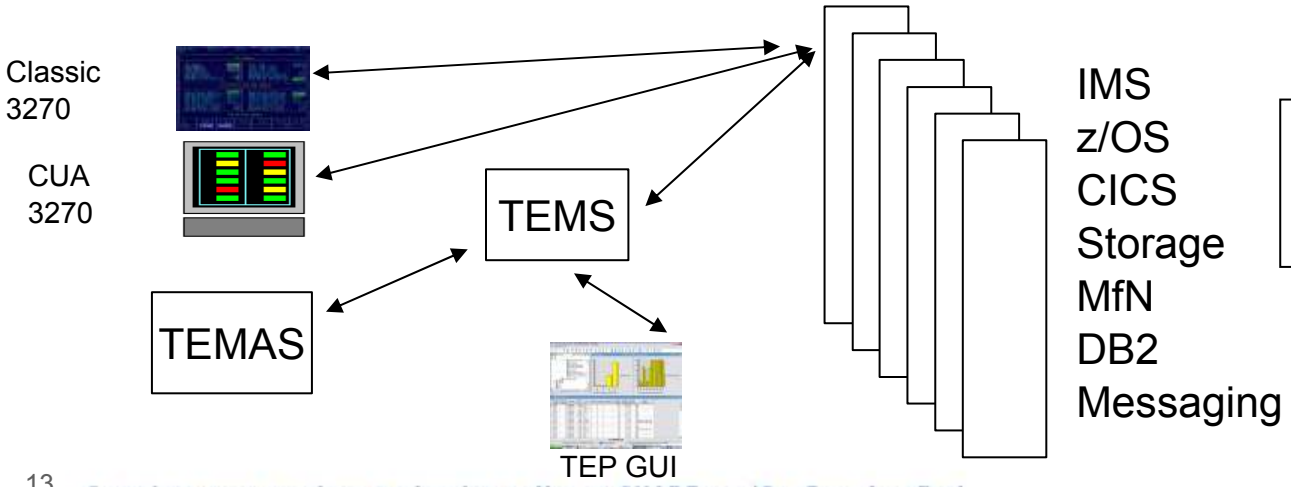
Moving to simplified architecture driving decreased resource utilization without loss of current function

Enhanced OMEGAMON Architecture



Single Manager and User Interface across OMEGAMON family

Current OMEGAMON Architecture



Multiple Address Spaces and User Interfaces across each OMEGAMON

OMEGAMON for Mainframe Networks V5.1 improves network diagnostics and management

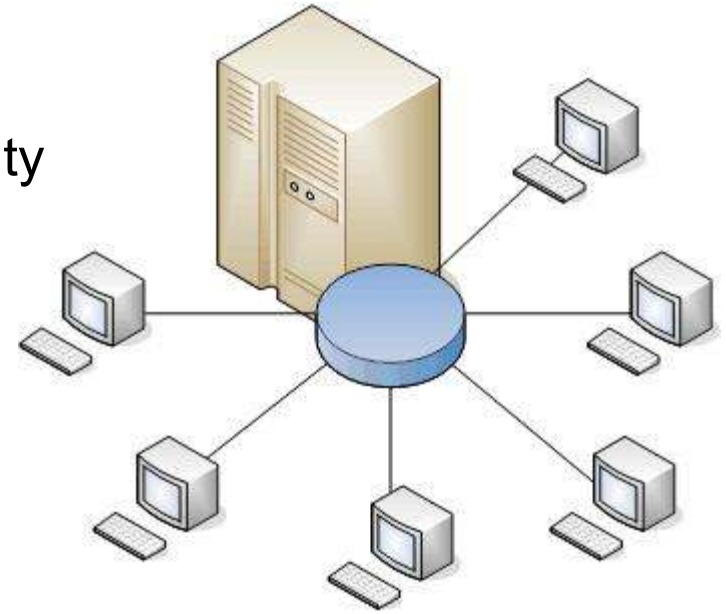
In addition to OMEGAMON V5.1 family capability:

- Increased system availability with faster problem resolution through built-in problem solving scenarios
- Improved diagnostics and decreased CPU utilization
- Support for zEnterprise mainframe server improves application availability
- Improved resource usage with more control over data collection
- Greater synergy with IBM Tivoli NetView for z/OS
- Improved management through additional Take Action commands
- Improved troubleshooting of data collection problems

Increased System Availability with faster problem resolution

OMEGAMON XE for Mainframe Networks V5.1 delivers problem solving scenarios for your network

- Monitor application and TCP listener activity
- Monitor OSA and interface activity
- Monitor TN3270 server activity
- Monitor TCP/IP stacks activity



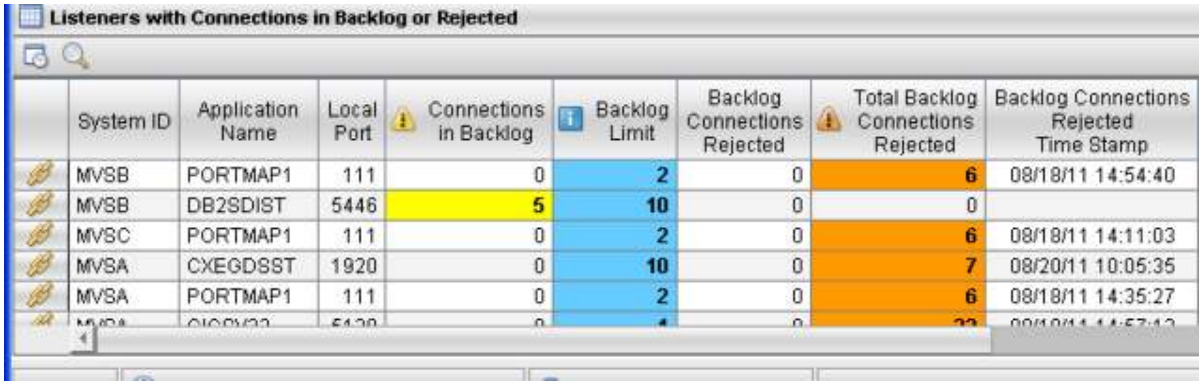
Scenario A:
Scheduled logons and “silent” failures

The setting:

A mainframe network systems programmer was building a baseline for network performance of his LPARs and applications. A very high number of rejected connections were being reported by OMEGAMON XE for Mainframe Networks just after 10 pm each evening. At first, the systems programmer thought he had found a problem with the monitoring software.

Scheduled logons and “silent” failures

1. Johann, the network systems programmer, enabled a situation that e-mails him when backlog connections are rejected.



Listeners with Connections in Backlog or Rejected

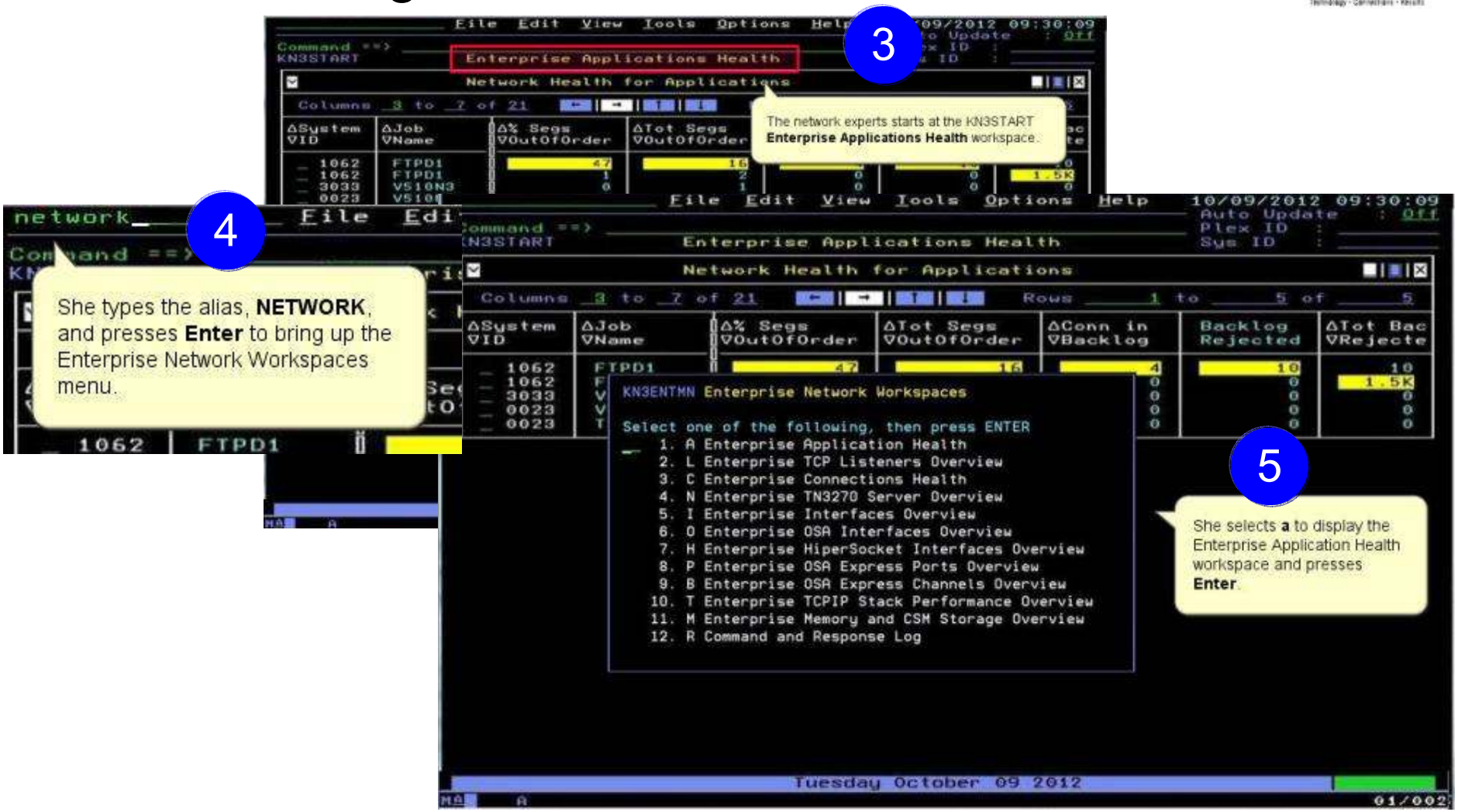
System ID	Application Name	Local Port	Connections in Backlog	Backlog Limit	Backlog Connections Rejected	Total Backlog Connections Rejected	Backlog Connections Rejected Time Stamp
MVSB	PORTMAP1	111	0	2	0	6	08/18/11 14:54:40
MVSB	DB2SDIST	5446	5	10	0	0	
MVSC	PORTMAP1	111	0	2	0	6	08/18/11 14:11:03
MVSA	CXEGDSST	1920	0	10	0	7	08/20/11 10:05:35
MVSA	PORTMAP1	111	0	2	0	6	08/18/11 14:35:27

2. The e-mails confirmed that thousands of connection requests were being rejected before the FTP server was able to accept.

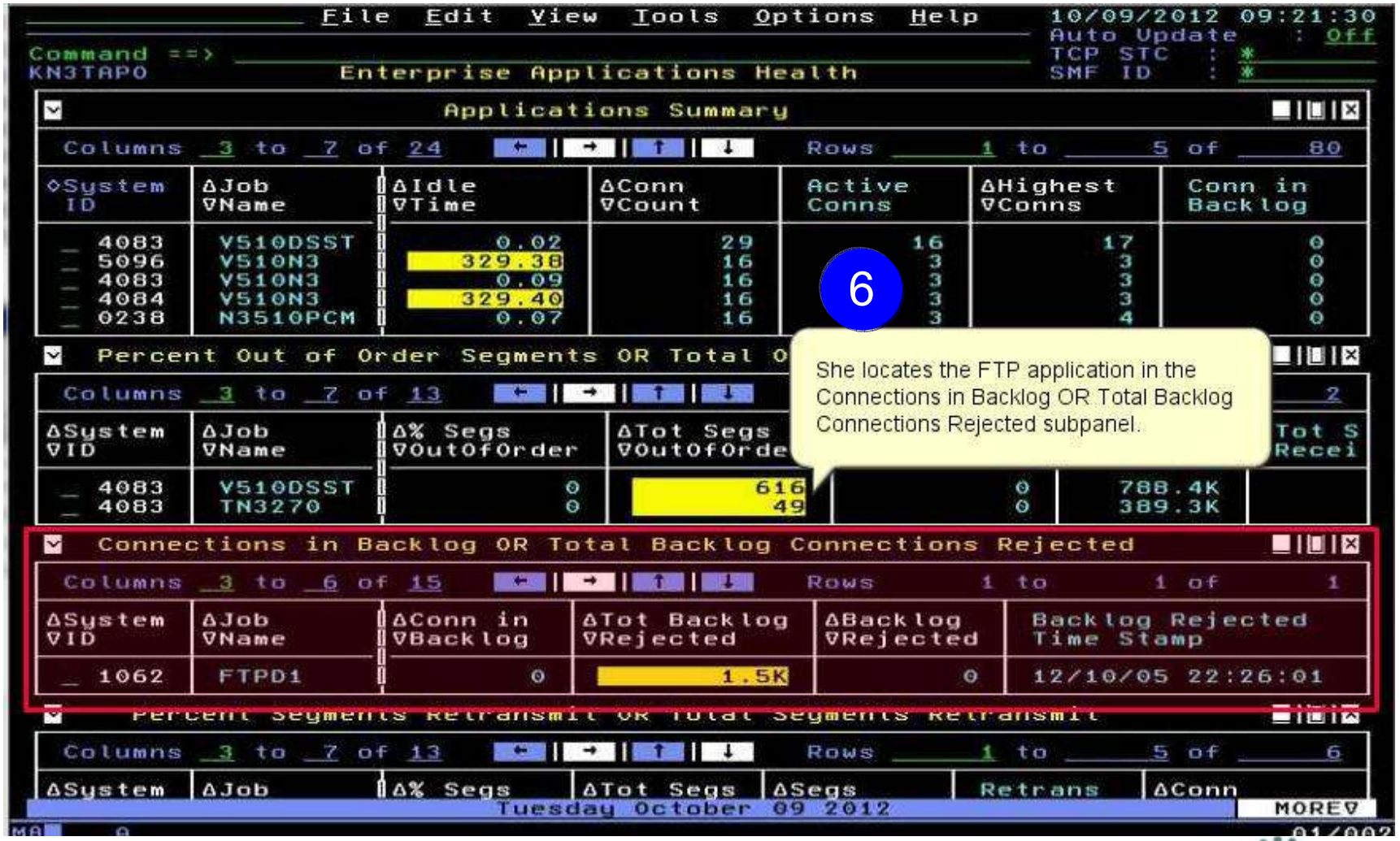
BacklogConnsRejected - The number of rejected backlog connections for FTPD1 on SYSXX is **6,842**: 11/16/09 22:07EST.

BacklogConnsRejected - The number of rejected backlog connections for FTPD1 on SYSXX is **8,045**: 11/17/09 22:06EST.

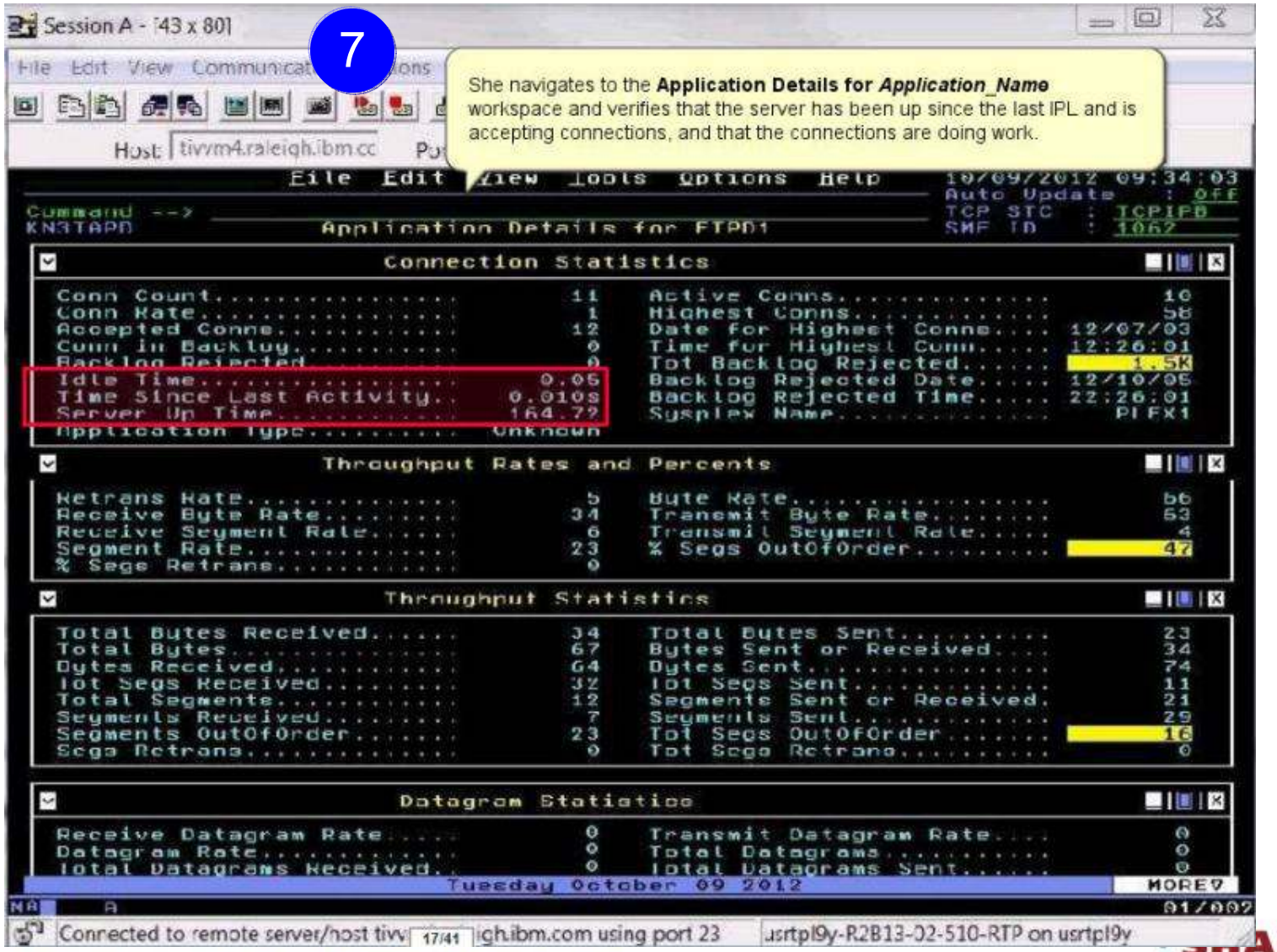
Scheduled logons and “silent” failures …



Scheduled logons and “silent” failures …



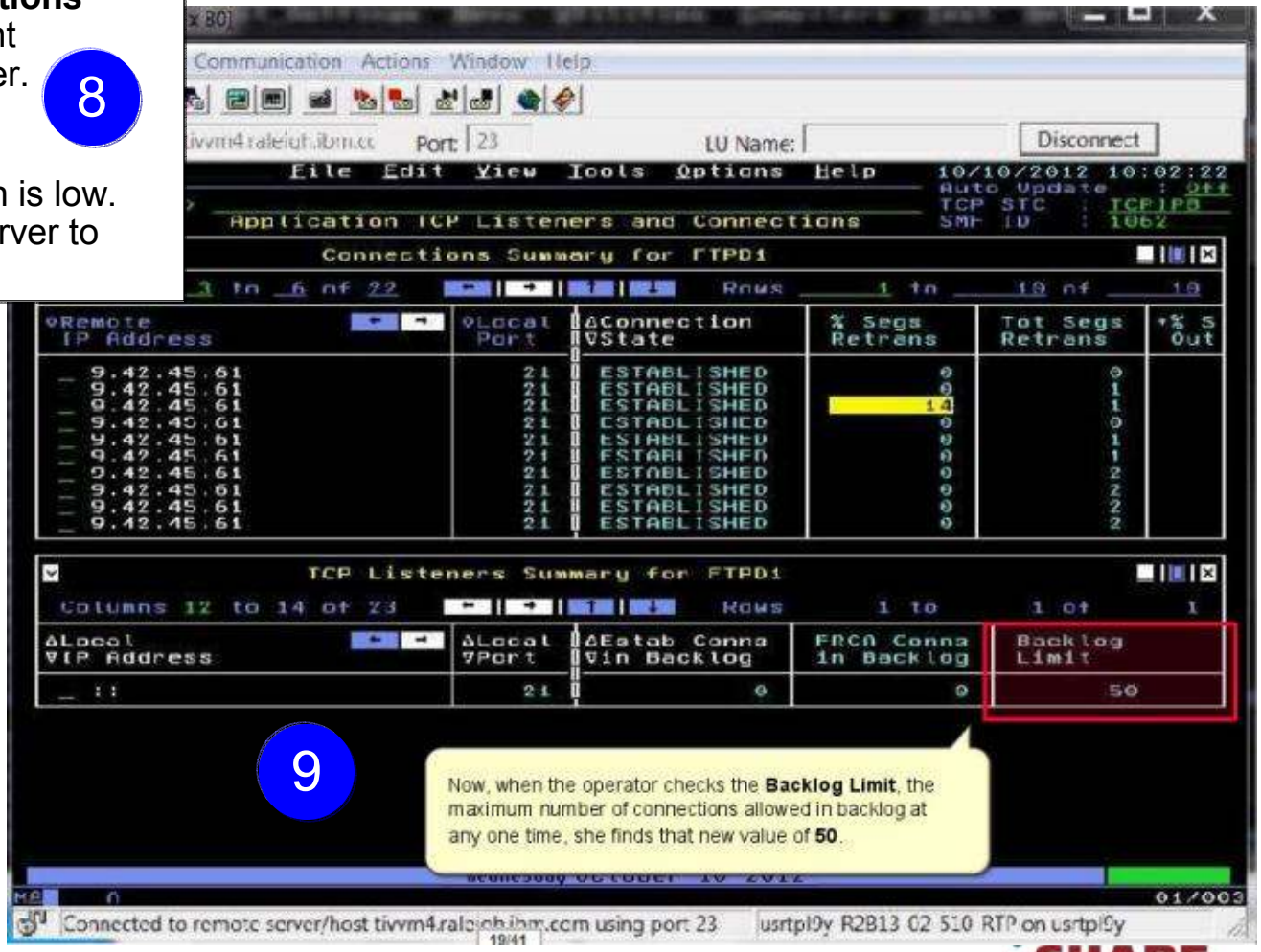
Scheduled logons and “silent” failures …



Scheduled logons and “silent” failures …

She then navigates to the **Application TCP Listeners and Connections** workspace to view the current connections to the FTP server. 8

The backlog limit is 10, which is low. She reconfigures the FTP server to have a backlog limit of 50.



Scheduled logons and “silent” failures …

That evening starting at 10 pm, the FTP server was accepting connections as usual, but the backlog limit is quickly exceeded and subsequent connections are rejected.

10 The OMEGAMON operator again verifies that the FTP application is accepting connections, and the connections in backlog returns to zero by 10:30 pm. She calls the network expert to update her on the problem.

11 When she investigates further, the network expert finds that 10,000+ workstations all “wake up” at the same time and attempt to FTP files at 10pm every night.

12 She increases the backlog limit for the FTP sever temporarily to 2000 to provide relief until desktop support can roll out a change to the automated nightly timer, staggering the FTP connection requests over a couple of hours.

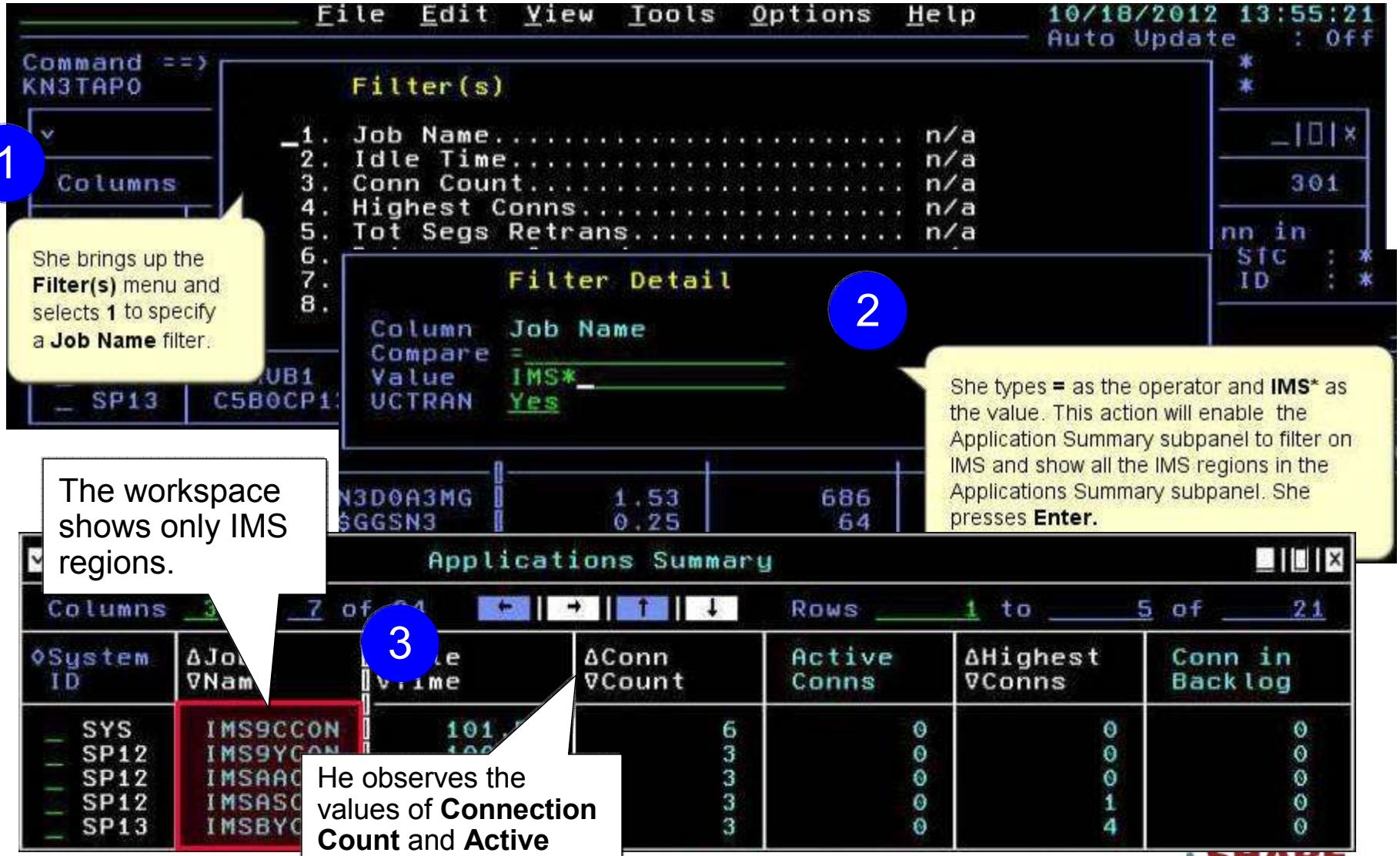
Scenario B:
Spotting trends in abnormal connection count

The setting:

In this use case, a network systems programmer needs to identify the reasons behind slow, steady growth in the number of connections in one IMS region.

The network systems programmer navigates to the **Enterprise Applications Health** (KN3TAPO) workspace to view the IMS applications.

Spotting trends in an abnormal connection count …



Spotting trends in an abnormal connection count …

4 To focus on the IMS regions on System SP13, she types **SP13** into the **SMF ID** field and presses **Enter**.

5 **IMSBYCON** has a higher connection count than the other IMS regions.

Applications Summary

Columns 3 to 7 of 24 Rows 1 to 5 of 6

◊System ID	ΔJob ∇Name	ΔIdle ∇Time	ΔConn ∇Count	Act… Conns	ΔHighest ∇Conns	Conn in Backlog
_ SP13	IMSCACON	1.85	30	6	24	0
_ SP13	IMSBYCON	0.50	117	91	91	0
_ SP13	IMSCWCON	24.73	3	0	0	0
_ SP13	IMSAGCON	0.03	35	19	2	0
_ SP13	IMSCZCON	0.00	34	12	2	0

6 He contacts an IMS systems programmer who verifies that all the IMS regions, including **IMSBYCON**, are performaing work and no one has reported any connectivity issues.

7 There are no connections in backlog and the Idle Time shows that the IMS region is accepting connections

Spotting trends in an abnormal connection count …

8 He observes the IMS regions over time, watching the **Connection Count** increase while the **Idle Time** and **Connections in Backlog** remain in a normal range.

Friday:

IMSBYCON	0.50	227	140	140	0

Monday:

IMSBYCON	0.50	1228	1000	1000	0

9 He again contacts the IMS systems programmer.

By now, 1000+ connections are open, but not performing any work.

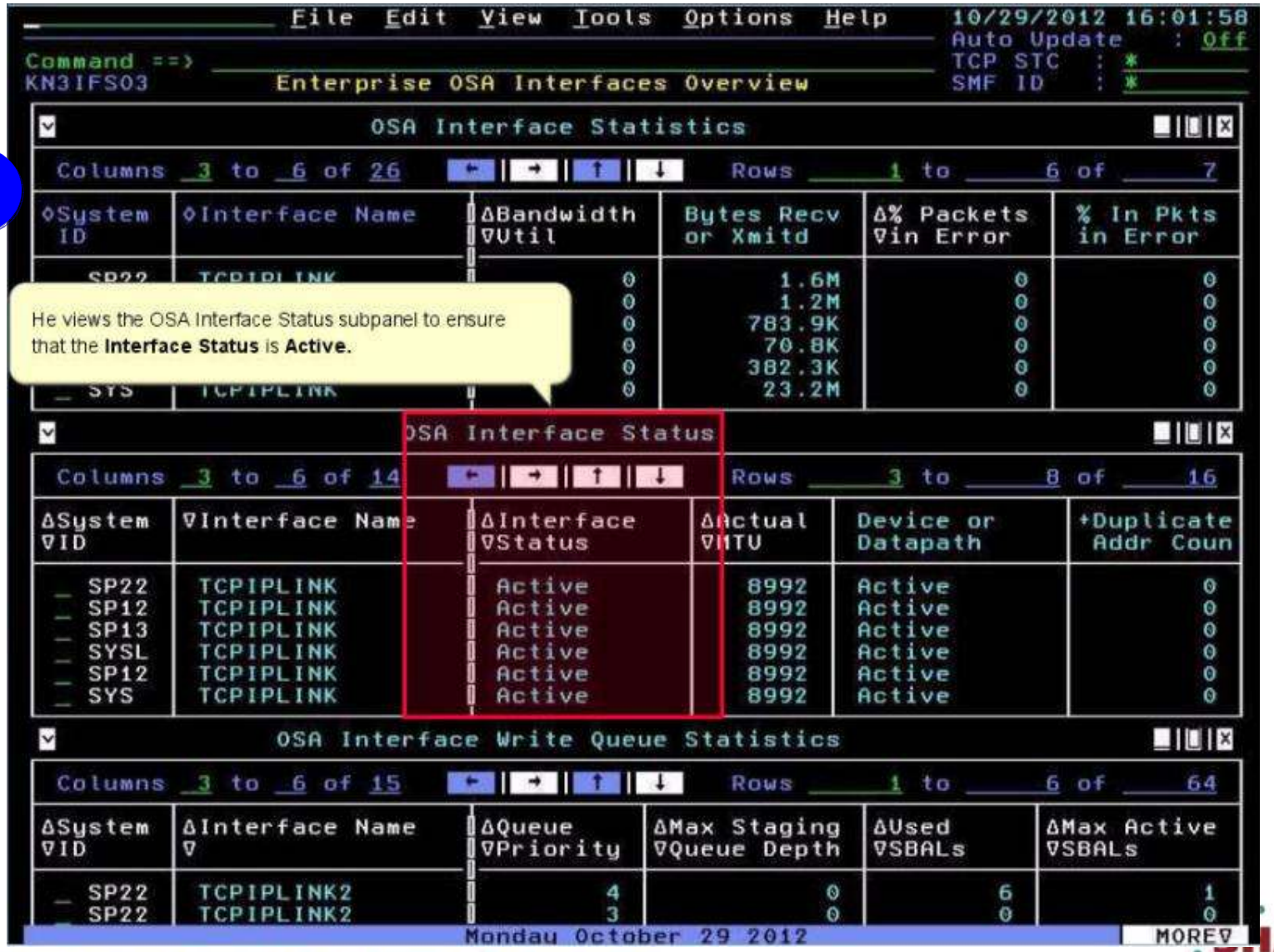
They determine that connections are being opened that are not being closed. The recycle IMS server to relieve the problem and the IMS programmer further investigates the IMS region.

Scenario C:
Congested OSA Interface

The setting:

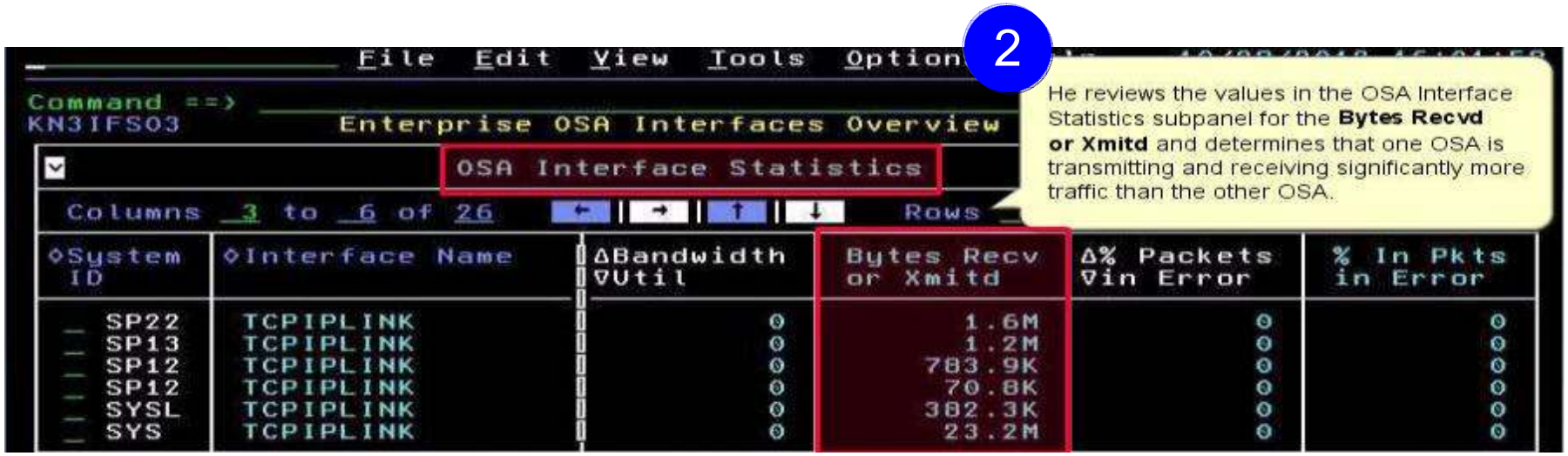
A systems programmer needs to quickly identify whether one OSA is processing a significantly higher volume of traffic than the other OSA on LPAR SP12. Traffic should be evenly distributed between the two OSA ports.

Congested OSA interface …



1

Congested OSA interface …



3 He issues a D TCPIP OMP RTTABLE command to display the main OMPROUTE table and determines that a first hop switch is congested for the non-productive OSA.

He contacts the enterprise networking team to resolve.

Scenario D:
TN3270 connectivity problems

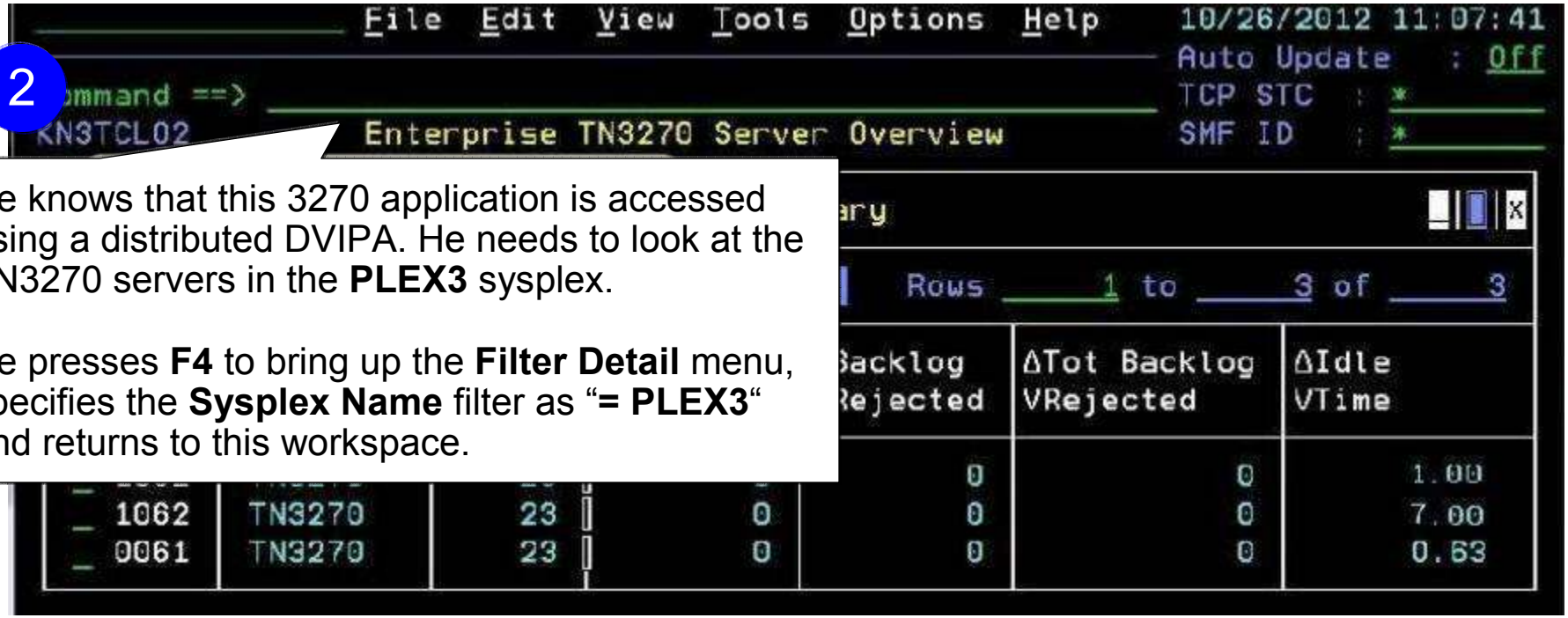
The setting:

A user has reported a problem accessing a 3270 application using a TN3270 session. Since the enterprise has more than 10,000 TN3270 connections, systems programmers cannot chase down individual connection issues.

However, after more users call with a similar complaint, a systems programmer starts to investigate.

TN3270 connectivity problems …

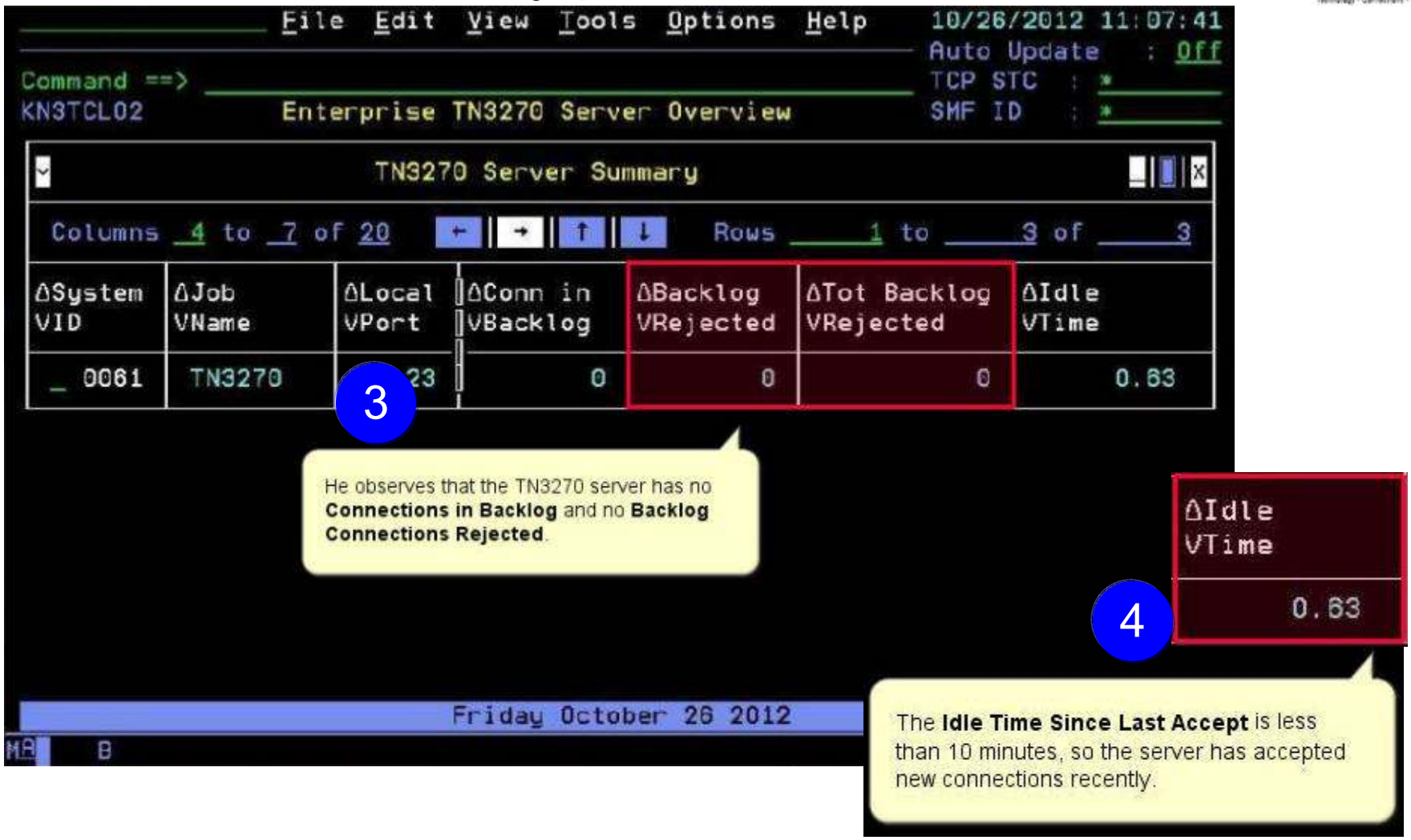
1. He navigates to the **Enterprise TN3270 Servers Overview** workspace



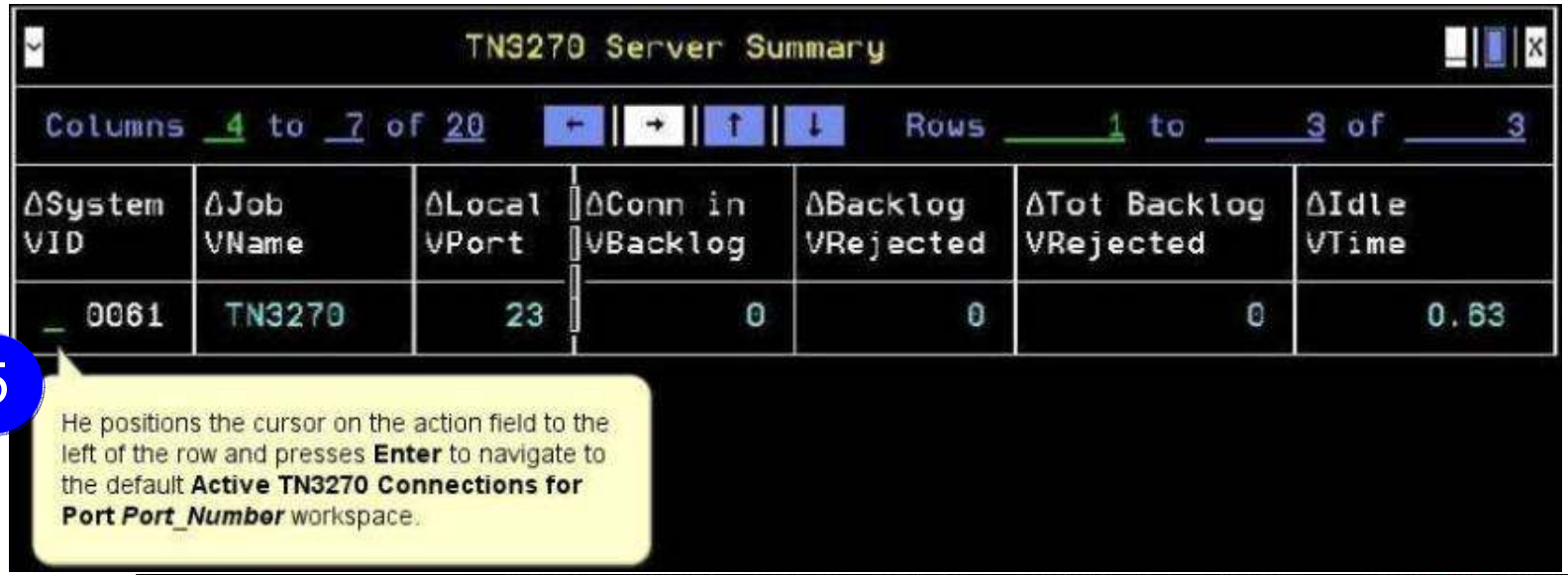
2. He knows that this 3270 application is accessed using a distributed DVIPA. He needs to look at the TN3270 servers in the **PLEX3** sysplex.

   He presses **F4** to bring up the **Filter Detail** menu, specifies the **Sysplex Name** filter as "**= PLEX3**" and returns to this workspace.

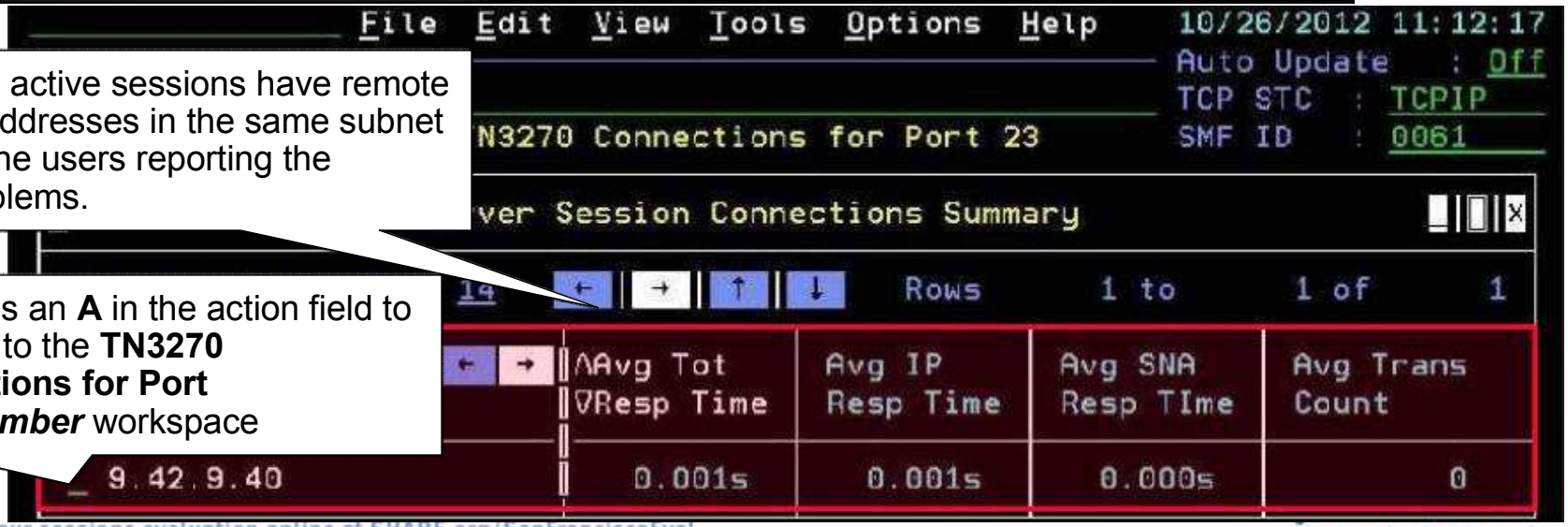
TN3270 connectivity problems …



TN3270 connectivity problems …



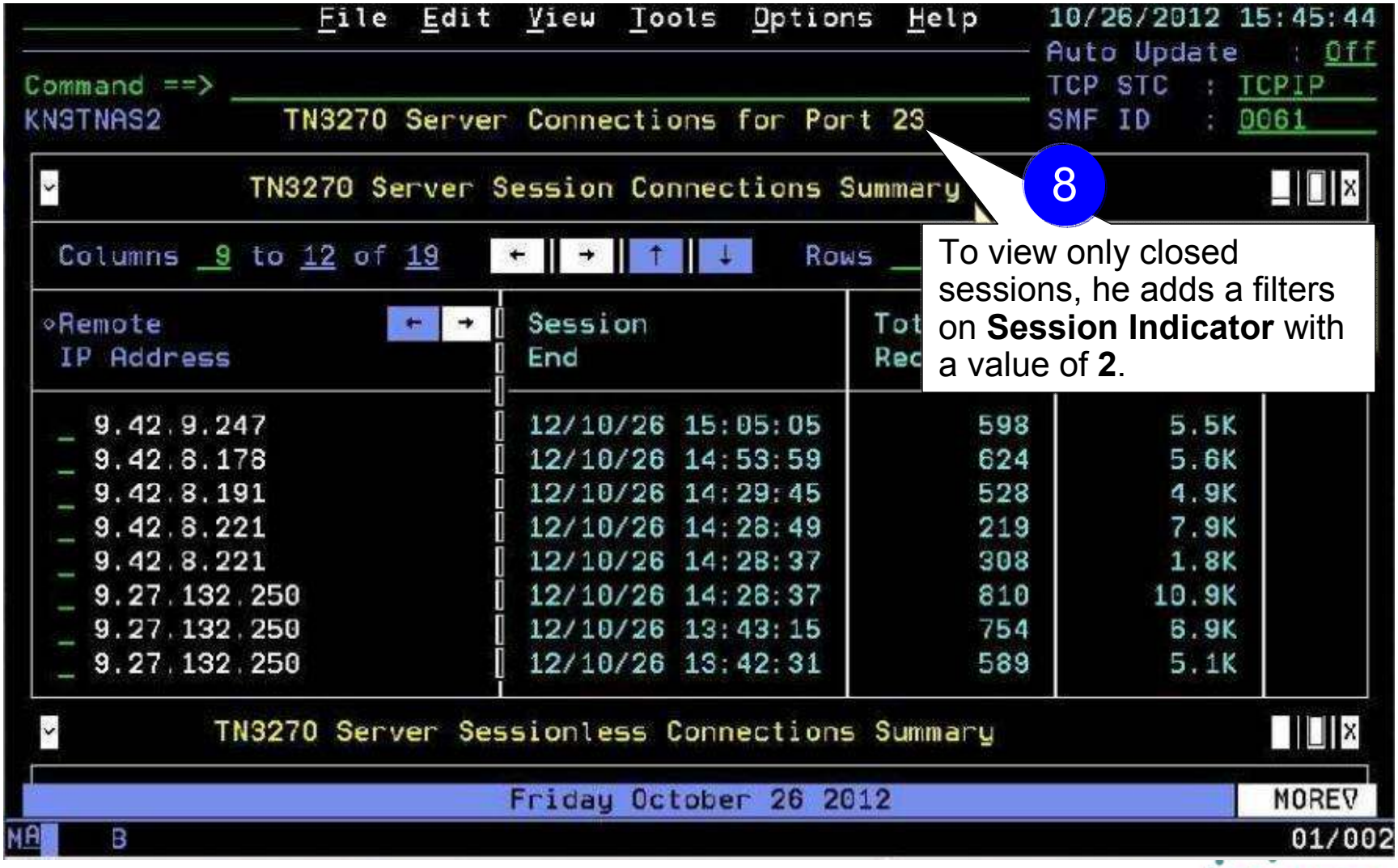
5 He positions the cursor on the action field to the left of the row and presses **Enter** to navigate to the default **Active TN3270 Connections for Port *Port_Number*** workspace.



6 No active sessions have remote IP addresses in the same subnet as the users reporting the problems.

7 He types an **A** in the action field to navigate to the **TN3270 Connections for Port *Port_Number*** workspace

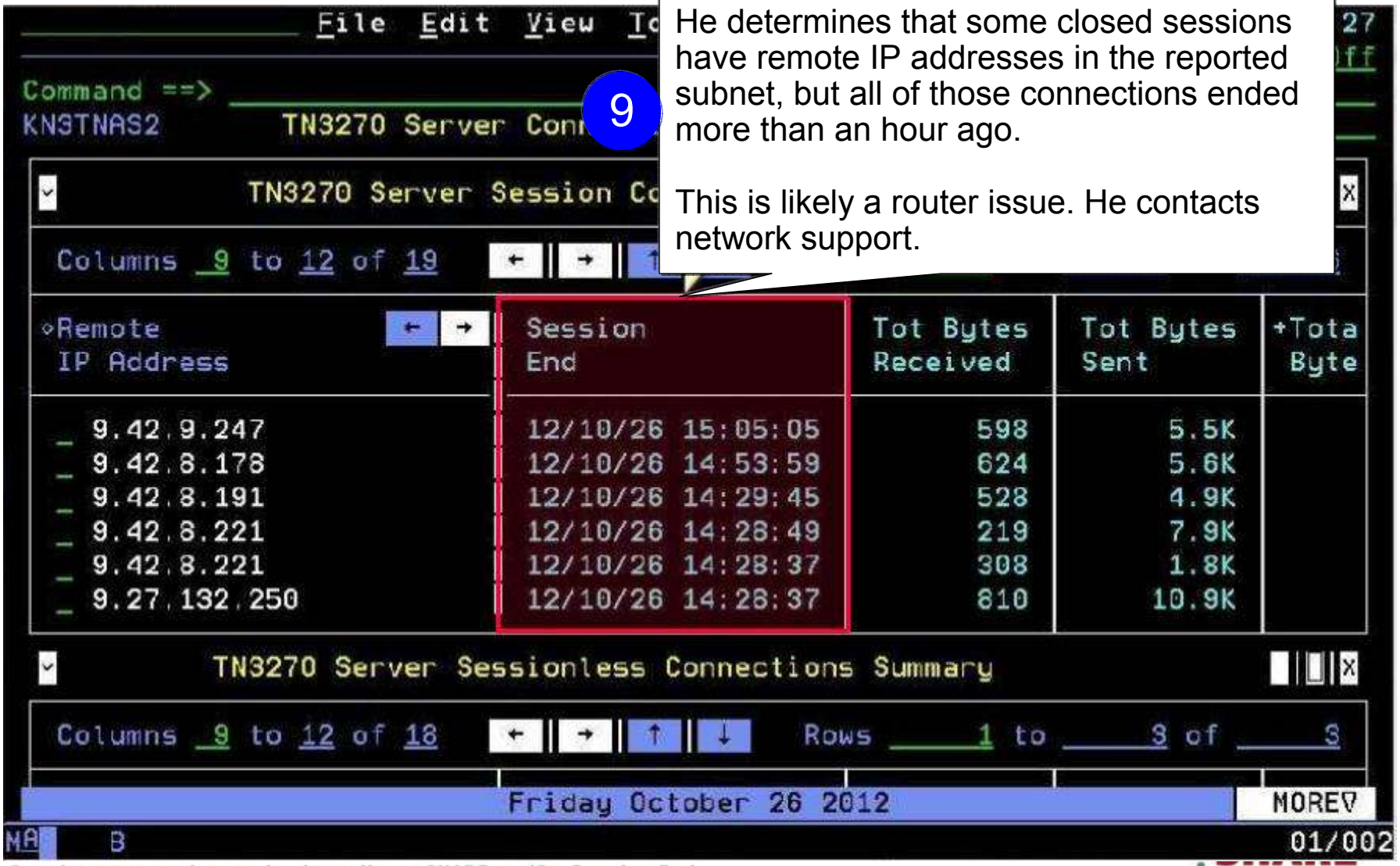
TN3270 connectivity problems …



8

To view only closed sessions, he adds a filters on **Session Indicator** with a value of **2**.

TN3270 connectivity problems …



He determines that some closed sessions have remote IP addresses in the reported subnet, but all of those connections ended more than an hour ago.

This is likely a router issue. He contacts network support.

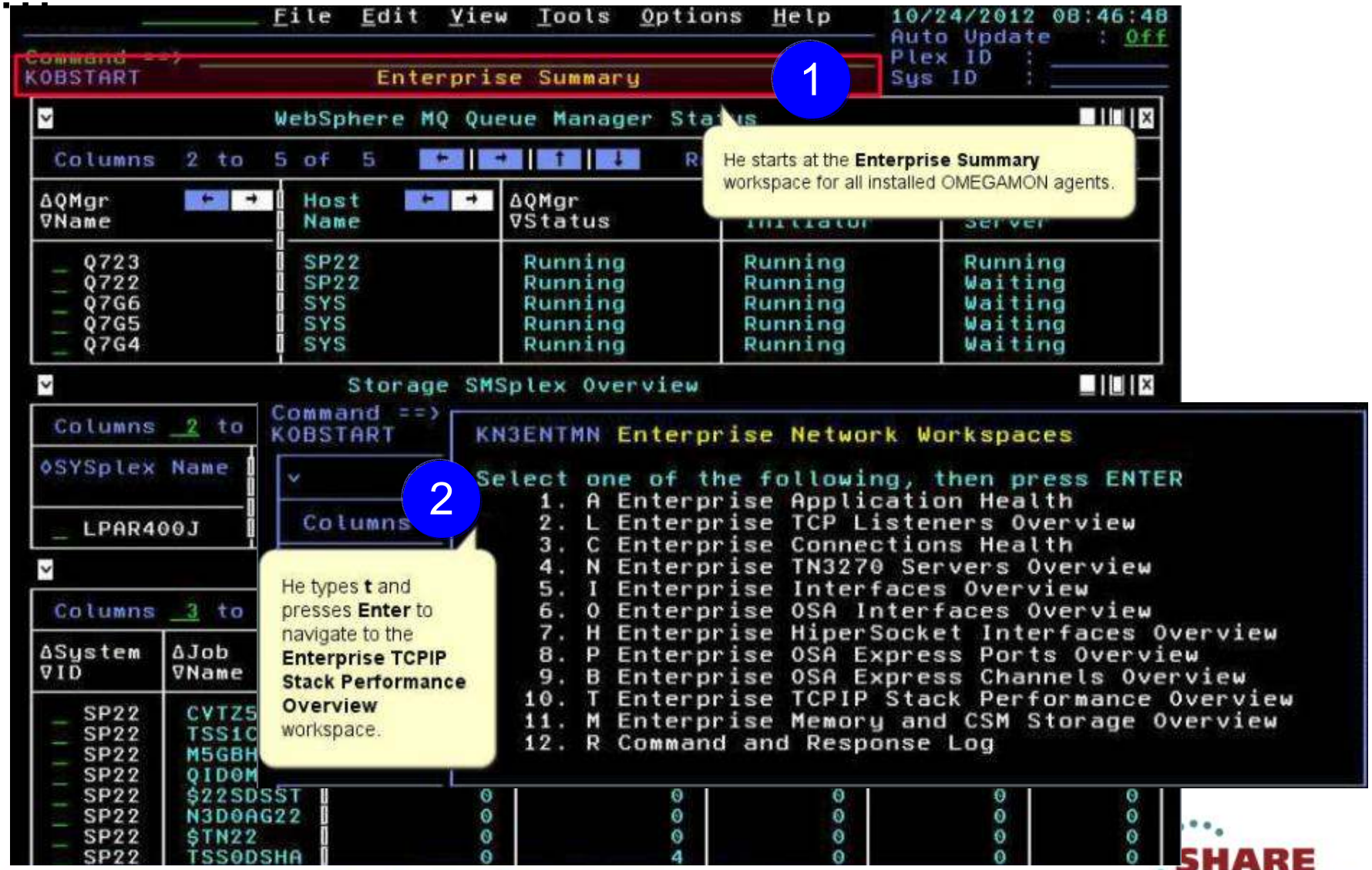
Scenario E:
Determining stack health using throughput

The setting:

A network systems programmer needs to identify issues with the throughput of network traffic through the z/OS TCP/IP stacks in the enterprise.

She is notified of slow network performance on one or more systems. These problems do not appear to be associated with any particular application

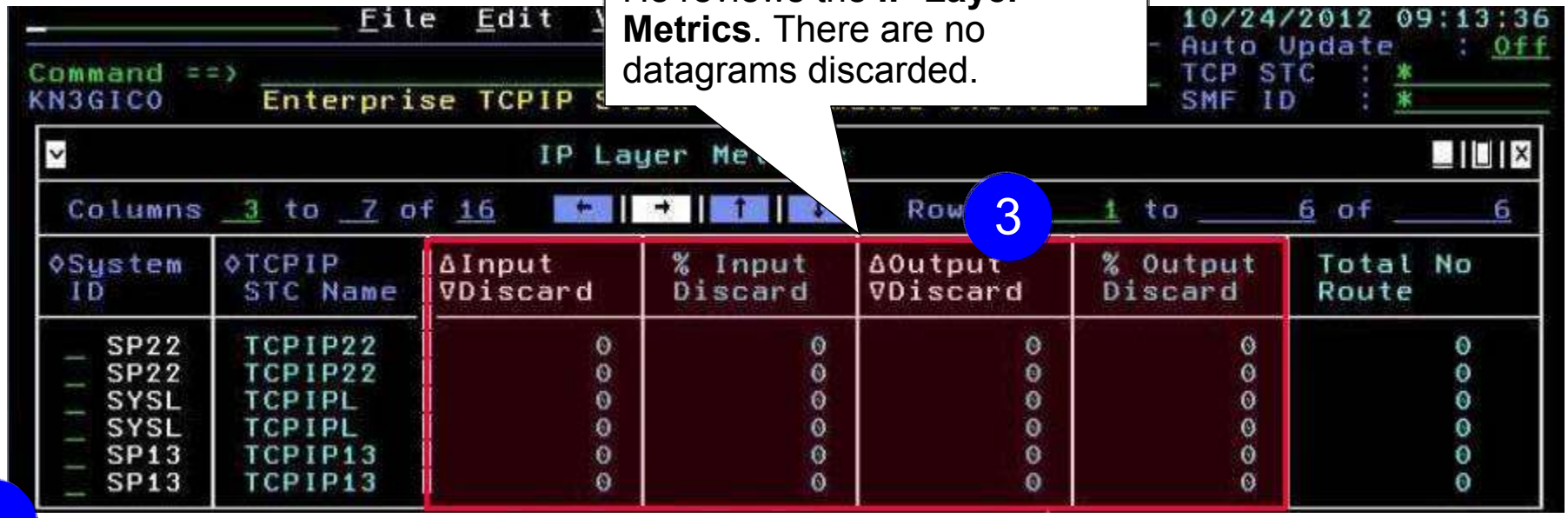
Determining stack health using throughput



Determining stack health using throughput ...

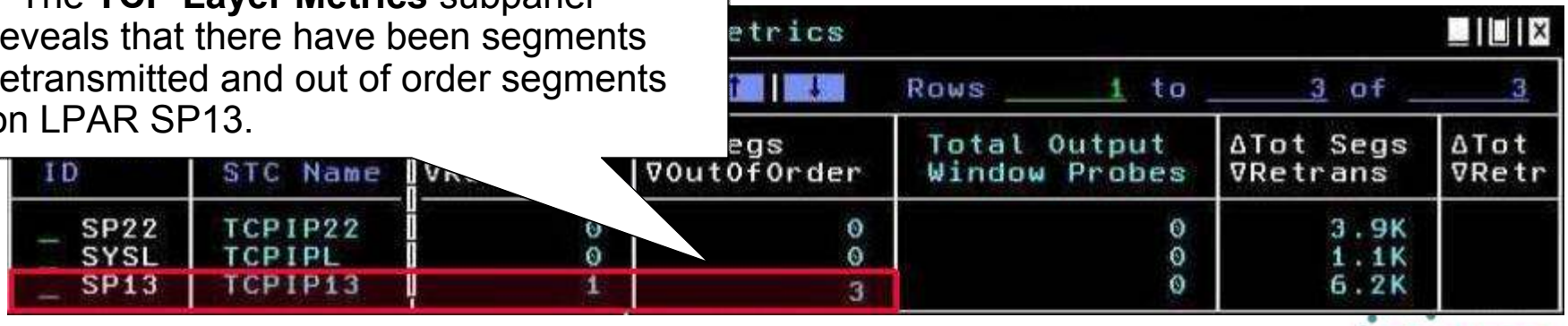
He reviews the **IP Layer Metrics**. There are no datagrams discarded.

3



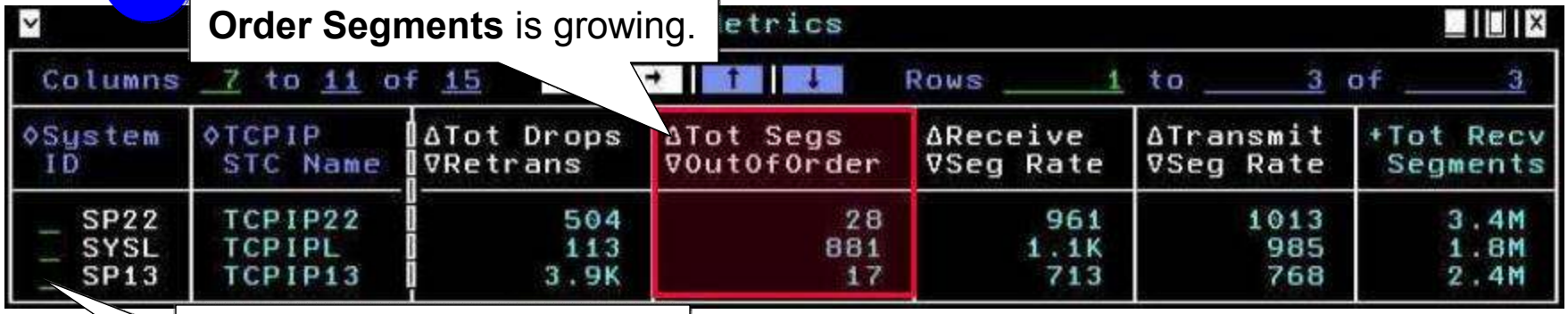
4

The **TCP Layer Metrics** subpanel reveals that there have been segments retransmitted and out of order segments on LPAR SP13.



Determining stack health using throughput ...

5 Scrolling to the right, he notices that **Total Out of Order Segments** is growing.

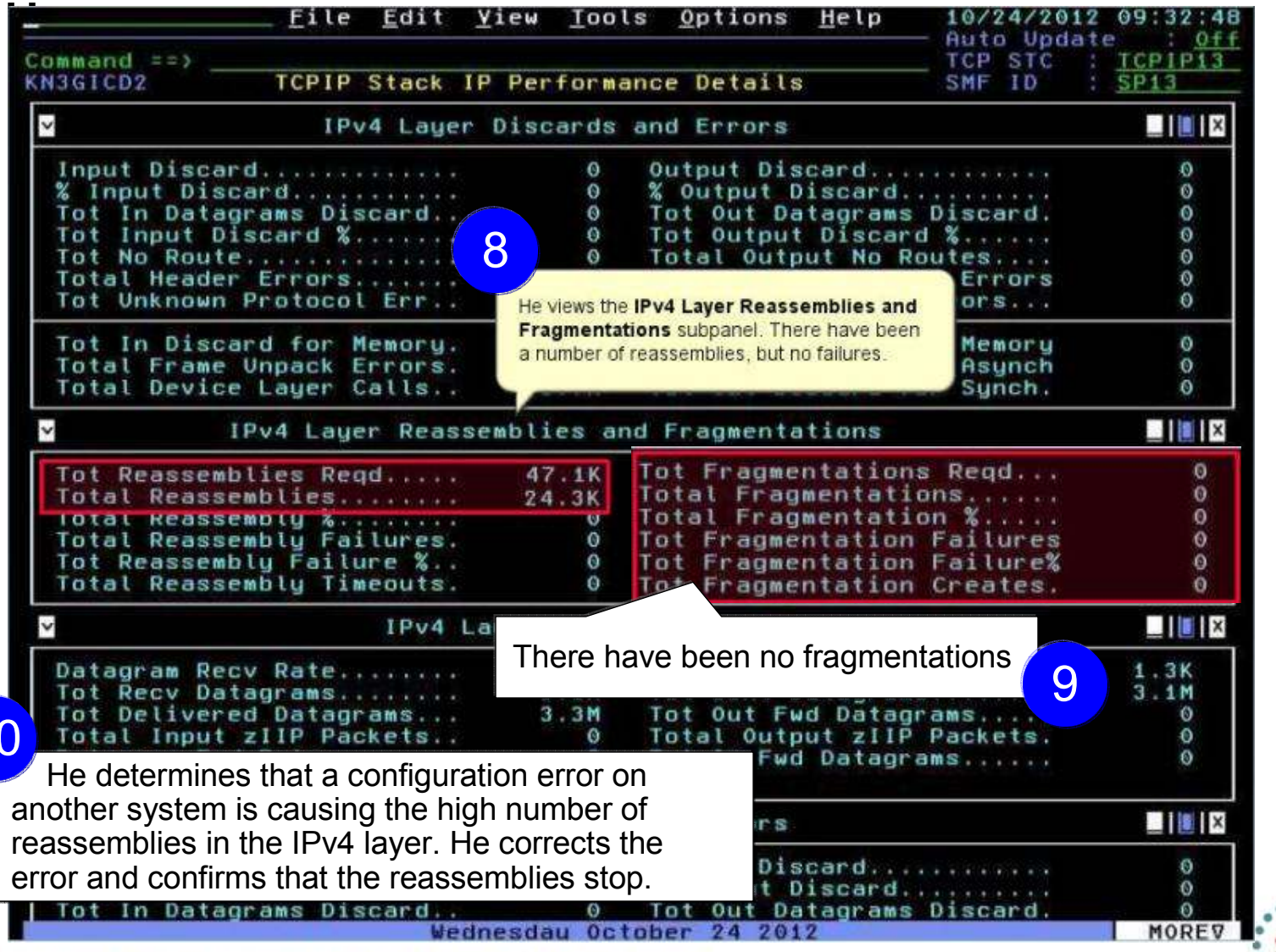


6 He types */* and presses **Enter** next to **SP13** to display the **Options Menu**.

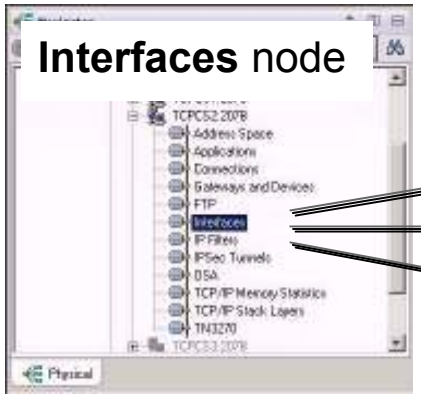
He types **I** and presses **Enter** to navigate to the **TCPIP Stack IP Performance Details** workspace

7

Determining stack health using throughput

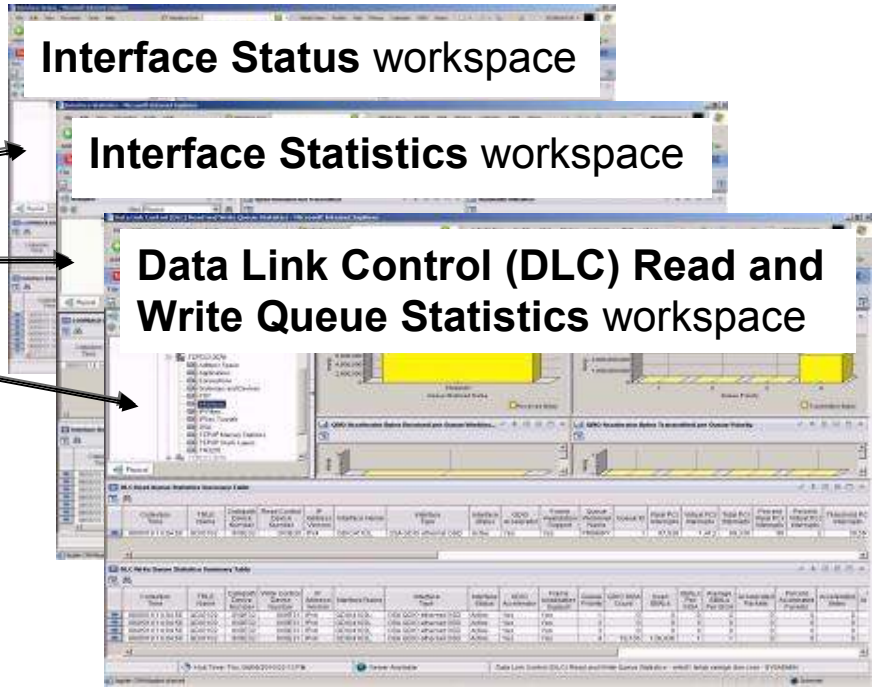


Improved Diagnostics and decreased CPU utilization

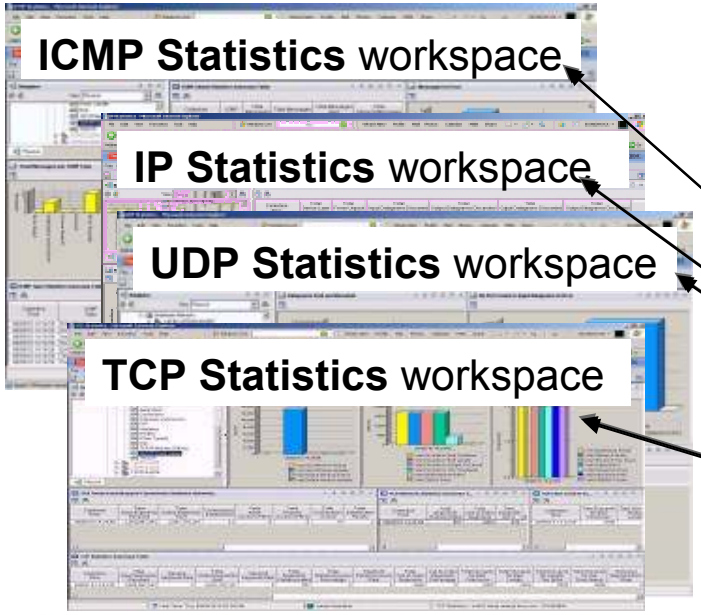


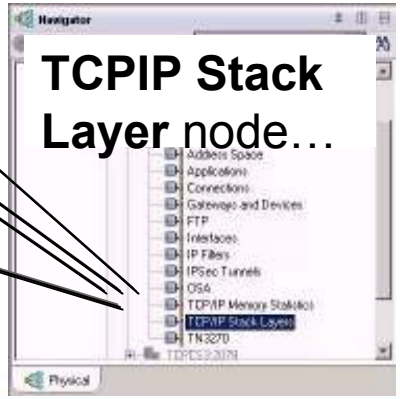
Source changed:

- Old: SNMP
- New: Callable NMI



Additional data collected





Improved Diagnostics and decreased CPU utilization

Gateways:

Gateways (Routing table) collected via IOCTL
- Lower CPU
- Reduce SNMP

Additional and improved routing information

Gateways

Collection Time	Network Address	First Hop	Link or Interface Name	Subnet Mask	Subnet Value	Link or Interface Status	Route Status	Route Type	MTU Value	Dynamic Route	Network Route	IP Version
08/05/10 13:54:56	172.17.0.0	<direct>	LCS4102L	255.255.0.0	172.17.0.0	Ready	Active	ICMP	1500	Yes	Yes	IPv4
08/05/10 13:54:56	127.0.0.1	<direct>	LOOPBACK	HOST	127.0.0.1	Ready	Active	Static	65535	No	No	IPv4
08/05/10 13:54:56	10.62.0.0	<direct>	IUTIQDFEL	255.255.255.0	10.62.0.0	Ready	Active	Static	8192	No	Yes	IPv4
08/05/10 13:54:56	10.93.2.2	<direct>		HOST			Active	Static	576	No	No	IPv4
08/05/10 13:54:56	10.11.7.2	<direct>	MPC417	H			Inactive	Static	0	No	No	IPv4
08/05/10 13:54:56	10.12.1.2	<direct>	MPC4212L				Inactive	Static	0	No	No	IPv4
08/05/10 13:54:56	10.11.3.2	<direct>	MPC4132L				Inactive	Static	0	No	No	IPv4
08/05/10 13:54:56	10.11.1.2	<direct>	MPC4112L	H			Inactive	Static	0	No	No	IPv4
08/05/10 13:54:56	10.11.2.7	<direct>	MPC4172L	H			Inactive	Replaceable Static	4096	No	No	IPv4

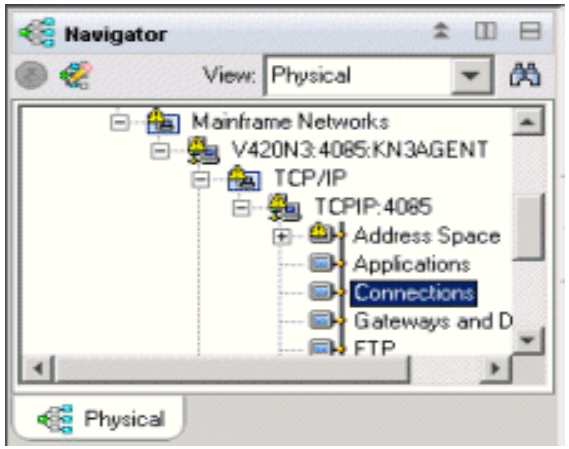
Dynamic Virtual IP Addresses (DVIPAs) reported in Gateways (formerly in Interfaces) table

OSA-Express:

- Speed diagnosis of OSA and interface problems by following links from OSA to Gateways or Interfaces workspaces
- Each instance of the monitoring agent does not need to collect OSA data for each instance of the monitoring agent in your environment
  - Collect OSA performance statistics from a single LPAR that is sharing the OSA adapter
  - OSA is the only data that is collected via SNMP. You may choose not to configure or run the SNMP daemon on systems where you do not collect OSA data

Improved Diagnostics and decreased CPU utilization

From **Connections** node…



- Connections
- UDP Endpoints
- TCP Listeners
- TCP Connections
- Application Connections
- Application UDP Endpoints
- Application TCP Listeners
- Application TCP Connections
- TCP Connections Link

Improve overall TCP/IP performance with additional visibility:

- Monitoring the sent and received data queued for TCP connections
- Monitoring Application Transport–Transport Layer Security (AT-TLS)
- Defining the Local Port attribute numerically (sorting)
- Displaying connection state for all connection types
- Enabling the remaining Connections node workspaces for product-specific Take Action commands

Support for zEnterprise mainframe server improves application availability

OMEGAMON XE for Mainframe Networks provides:

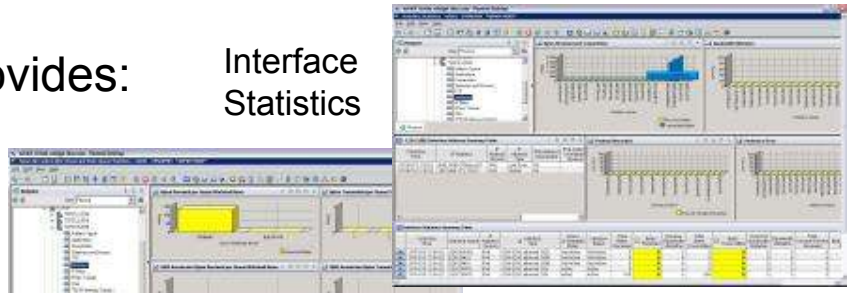
Visibility into the zEnterprise IntraNode Management Network (INMN) and zEnterprise IntraEnsemble Data Network (IEDN)

- Isolate and analyze traffic flowing over zEnterprise private networks

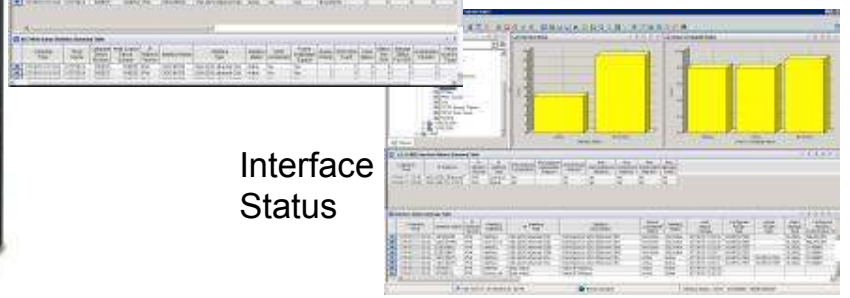
Visibility into z/OS applications and connections using the new zEnterprise Management Network with performance metrics that are useful in debugging problems

- Filter on Outbound Interface Name to show connections using the new INMN and IEDN interfaces

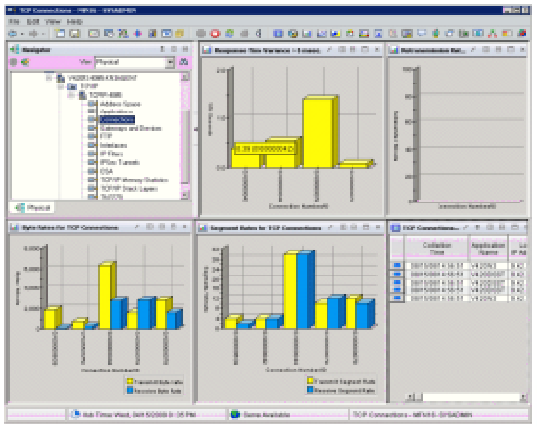
Interface Statistics



DLC Read and Write Queue Statistics



Interface Status



TCP Connections

Improved resource usage with more control over data collection

```
------------------ SPECIFY COMPONENT CONFIGURATION (Page 2)--------------
Command ===>

 Specify the following global information:

  OSA Statistics Collection:                              ==> Y  (Y,N)

  Interface Statistics Collection:                        ==> Y  (Y,N)

  Interface Data Link Control Statistics Collection:      ==> Y  (Y,N)

  TCP/IP Stack Layer Statistics Collection:               ==> Y  (Y,N)
```

Configuration Tool

The ability to turn data collection on and off is now available for the following types of data (at system and stack level):

- OSA Statistics
- Interface Statistics
- Data Link Control (DLC) Read and Write Queue Statistics
- Stack Layer Statistics

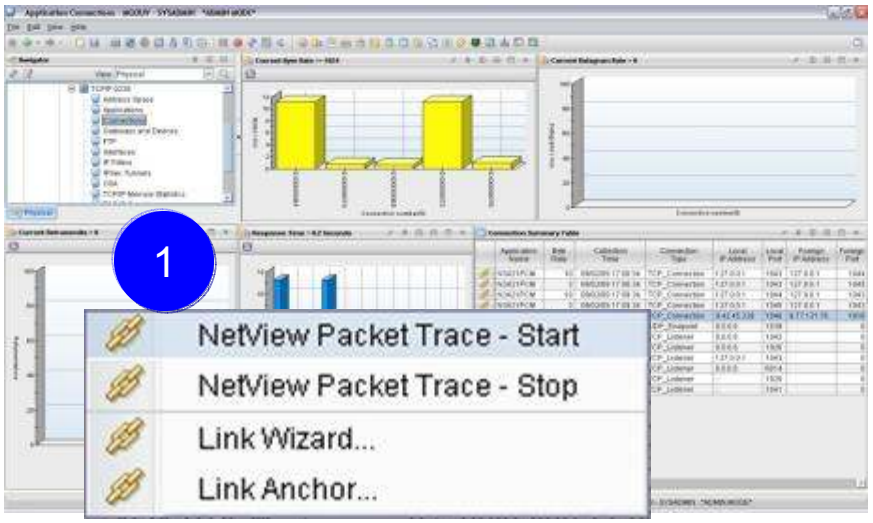
- Four new attributes for the four new configurable data collection options:

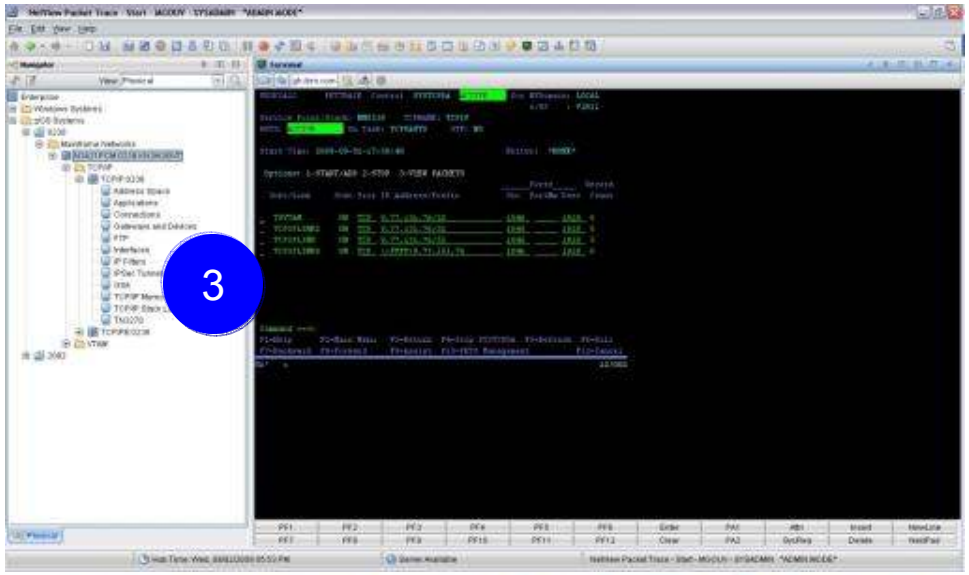
TCP Collector Status

Connections And Applications Collection	IP Security Collection	OSA Statistics Collection	Stack Layer Statistics Collection	Interface Statistics Collection	Data Link Control Statistics Collection	Routing Table Collection	Routing Table Collection Frequency	TN3270 Server Collection	TN3270 Data Display Interval	F Colle
Yes	Yes	Yes	Yes	Yes	Yes	Yes	10	Yes	2	Yes
Yes	No	Yes	Yes	Yes	Yes	Yes	10	Yes	2	Yes
Yes	No	Yes	Yes	Yes	Yes	Yes	10	Yes	2	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	10	Yes	2	Yes

Greater synergy with IBM Tivoli NetView for z/OS

- Launch in context to start or stop a NetView packet trace
  1. Select TCP connection to trace
  2. Logon to NetView
  3. View packet trace definitions after link script completed

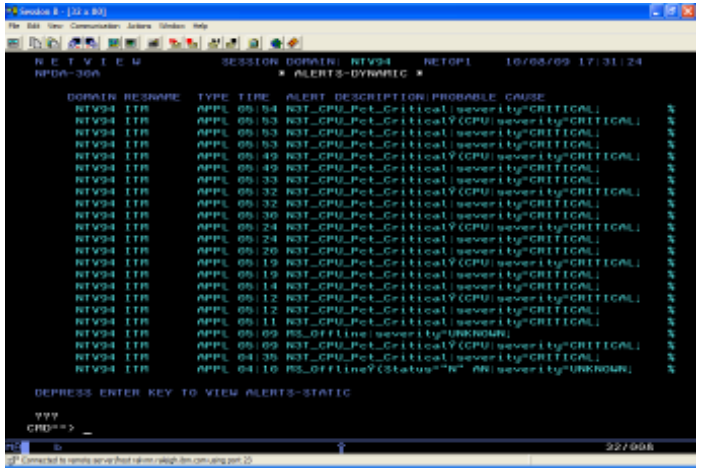


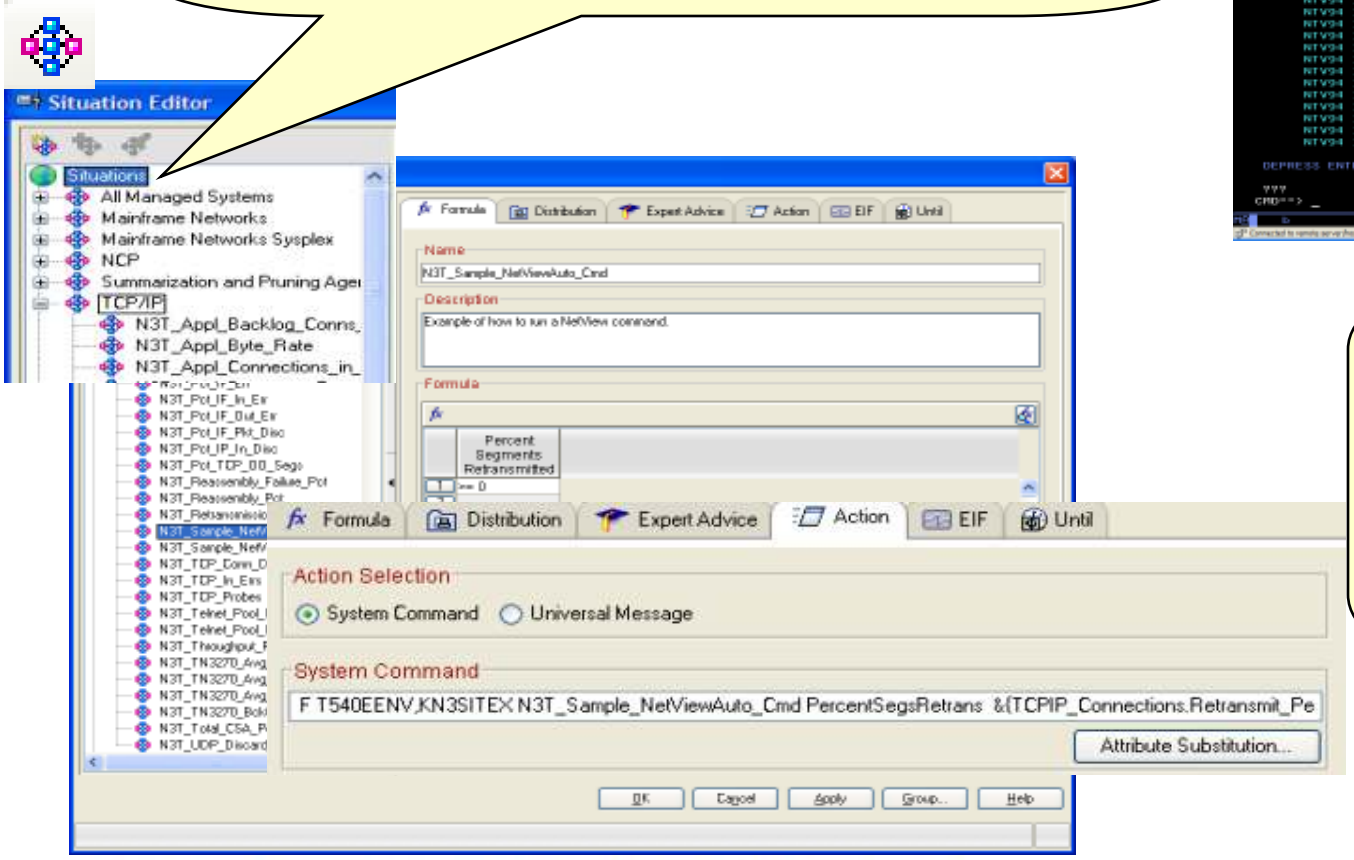


Greater synergy with IBM Tivoli NetView for z/OS

Sample situations trigger NetView for z/OS automation

- Execute command in NetView address space
- Send situation information in message





Sample NetView for z/OS automation

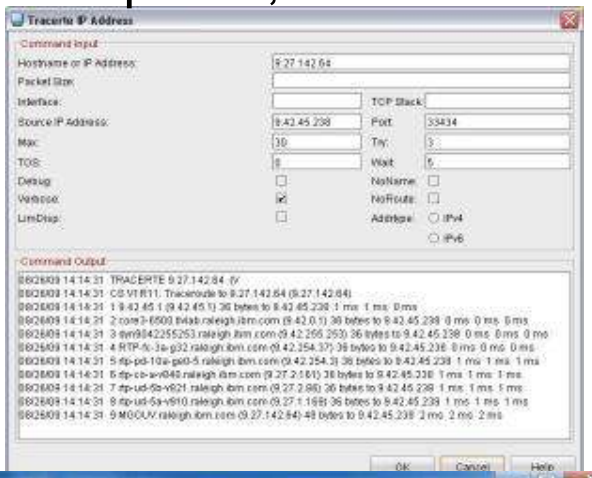
- Recognize messages
- Recognize situation events
- Parse message text
- Parse Situation event

Improved management through additional Take Action commands

- NSLookup and Tracerte added to Ping and Drop
- Available for Connections, TCP Connections, UDP Endpoints, TCP Listeners, and TN3270 Server Sessions

TEP Scenario:

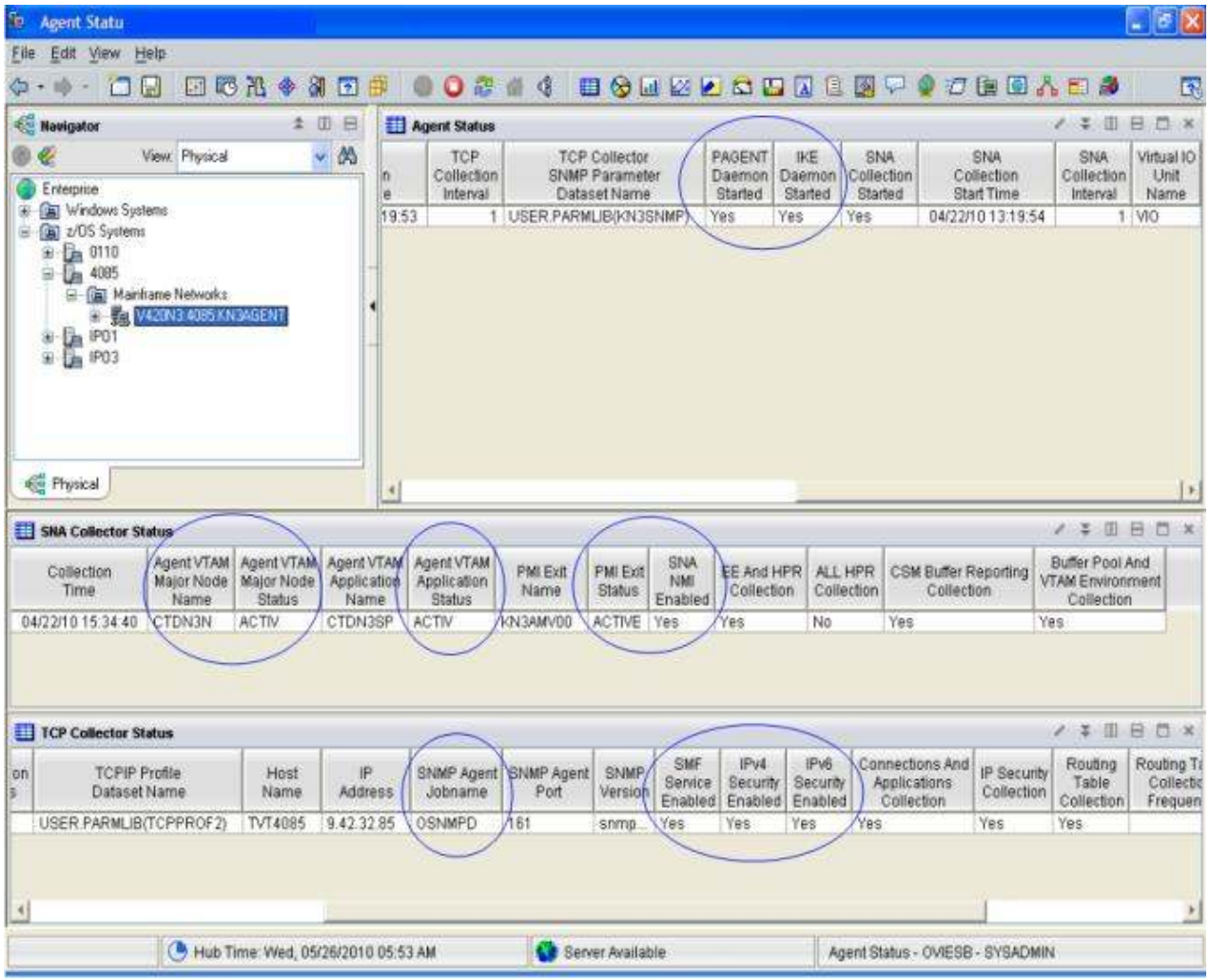
- Situation alert created when connection experiences slow response time
- SME navigates to Connections workspace and sees high retransmission rate for a connection
- Is there high congestion in the network?
- Right clicks on the row for connection and choose Tracerte to display Tracerte dialog.
- Issues Tracerte to understand route between the two hosts and if router that is not working



Enhanced 3270 Scenario:

- Situation alert created when connection experiencing slow response time
- SME navigates to Application TCP Listeners and Connections workspace and identifies connection
- SME types the "/" option to display a list of options
- Types "D" to display the Drop dialog
- Issues Drop and verifies connection dropped

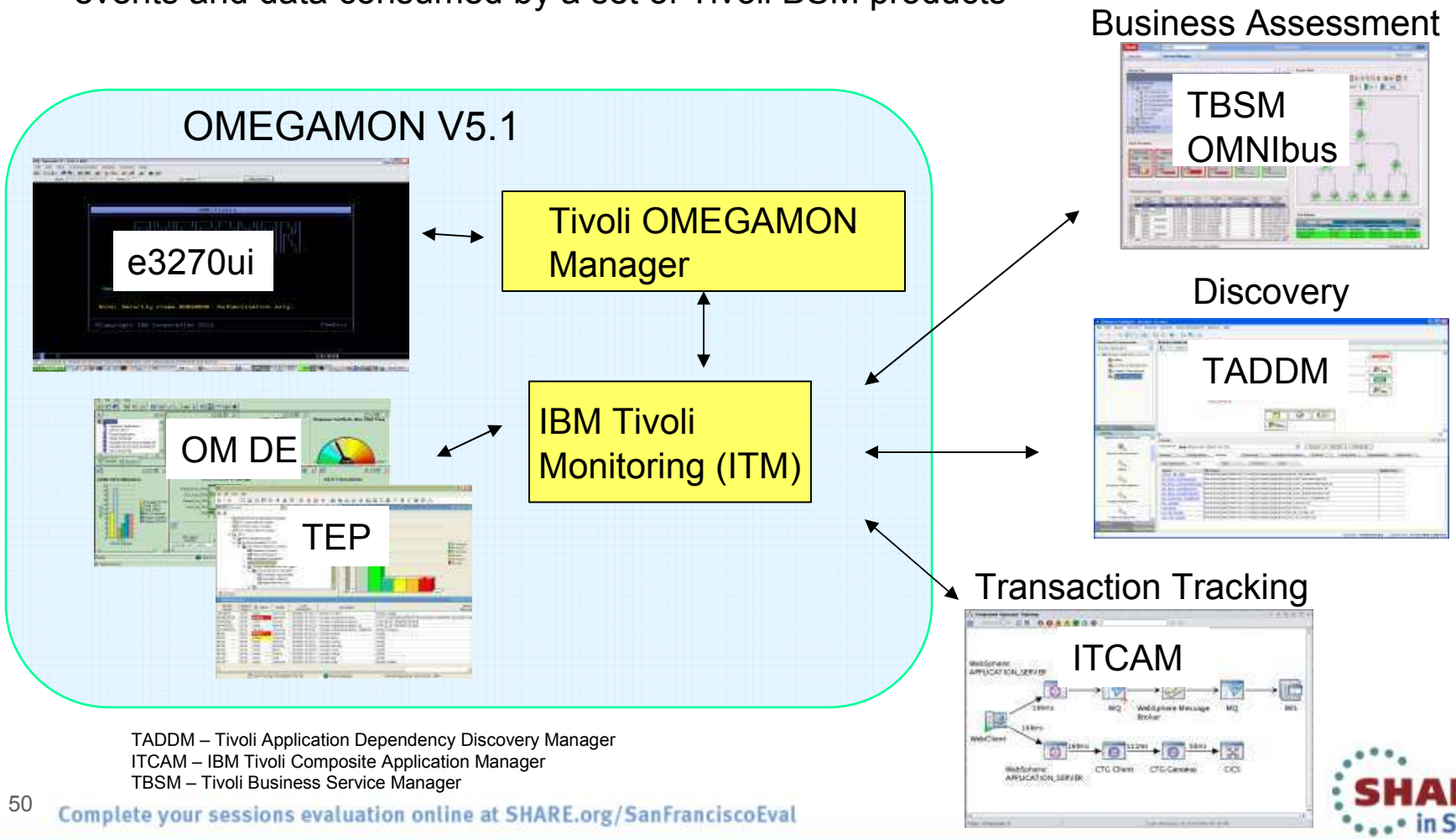
Improved troubleshooting of data collection problems



- Agent Status workspace provides configuration and status information about the agent and its data collectors.
- Troubleshoot data collection problems resulting in missing or incomplete data
  - After an install or upgrade
  - After the agent has been running for some time
- New attributes display status of data collection interfaces

OMEGAMON integrates within a total System z Business Service Management solution

OMEGAMON Portfolio provides performance and availability visibility for System z events and data consumed by a set of Tivoli BSM products



TADDM – Tivoli Application Dependency Discovery Manager
ITCAM – IBM Tivoli Composite Application Manager
TBSM – Tivoli Business Service Manager

Business success is directly dependent on the health of underlying IT systems, applications, and networks

- Complexity of today's enterprise environments demands solutions that integrate across the enterprise
- IBM in unique position to deliver monitoring and management solutions across enterprise subsystems, including mainframe network
- IBM Tivoli OMEGAMON XE for Mainframe Networks V5.1 key to system and network availability and performance, providing Visibility, Control, and Automation

Tivoli System z Sessions at SHARE

Tuesday

9:30	12617: What's New with System z Monitoring with OMEGAMON	
11:00	12789: OMEGAMON v5 Enhanced 3270 Hands-on Lab	
1:30	12616: Speeding Performance Problem Solving by Breaking Down Silo Domain Views on Your z/OS Systems	
4:30	12780: Understanding The Impact Of The Network On z/OS Performance	

Wednesday

11:00	12880: Automated Performance Management Using IBM Tivoli: Techniques And Best Practices	
1:30	12779: What's New for z/OS Network Performance Monitoring with OMEGAMON	
4:30	12781: Using NetView for z/OS for Enterprise-Wide Event Management and Automation	Golden Gate 4

Thursday

8:00	12901: Managing the Mainframe From an End-to-End Perspective	Golden Gate 6
9:30	12774: Get Up and Running With NetView IP Management	Golden Gate 3
9:30	12791: Improve Service Levels with Enhanced Data Analysis	Golden Gate 6
11:00	12790: Learn How to Leverage System z in Your Cloud	Golden Gate 6

Session 12799

What's New for z/OS Network Performance Monitoring with OMEGAMON

Dean Butler
(butlerde@us.ibm.com)

Reference Materials

Product Documentation

- OMEGAMON XE information Center: http://pic.dhe.ibm.com/infocenter/tivihelp/v15r1/index.jsp
- IBM Tivoli OMEGAMON XE for Mainframe Networks:
  - Planning and Configuration Guide, **SC27-4447**
  - New Enhanced 3270 User Interface Guide, **SC27-4450**
  - Tivoli Enterprise Portal User's Guide, **SC27-4446**
  - Troubleshooting Guide, **SC27-4448**
  - Parameter Reference, **SC27-4449**

- IBM Tivoli OMEGAMON XE and Tivoli Management Services on z/OS: Common Planning and Configuration Guide: **SC23-9734**

New IBM Tivoli OMEGAMON XE and Tivoli Management Services: Enhanced 3270 User Interface Guide: **SC22-5426**

Technotes

- OMEGAMON XE for Mainframe Network v5.1.0 GA technote:
  - http://www.ibm.com/support/docview.wss?uid=swg21614258
- High Availability z/OS Hub TEMS support Technote
  - http://www-01.ibm.com/support/docview.wss?uid=swg21326770
- Troubleshooting no data conditions on the OMEGAMON Enhanced 3270 User Interface
  - http://www-01.ibm.com/support/docview.wss?uid=swg21610269

Community, Forum, Wiki

- OMEGAMON XE for Mainframe Networks Community/Forum Support Site:
  - http://www-01.ibm.com/software/sysmgmt/products/support/R118663G41228S30-community.html
- Tivoli System z Monitoring and Application Management:
  - https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/Tivoli%20System%20z%20Monitoring%20and%20Application%20Management/page/OMEGAMON%20XE%20for%20Mainframe%20Networks
- OMEGAMON XE for Mainframe Networks Wiki:
  - https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/Tivoli%20System%20z%20Monitoring%20and%20Application%20Management/page/OMEGAMON%20XE%20for%20Mainframe%20Networks
- Service Management Connect:
  - https://www.ibm.com/developerworks/servicemanagement/