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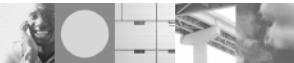
CS z/OS Management

Management agenda

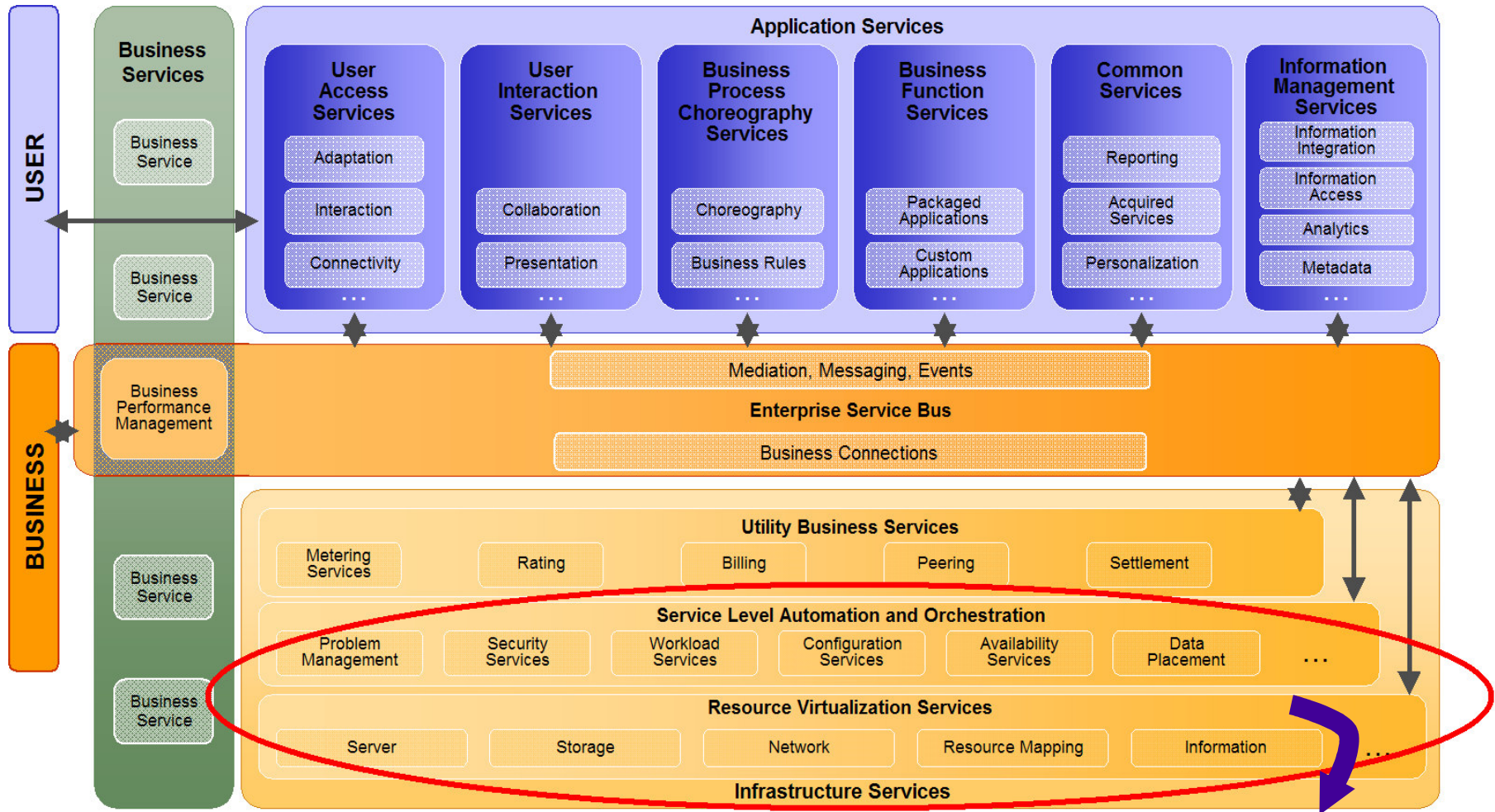
- Adding CIM management in support of the On-Demand infrastructure
- SNMP UDP IPv6 MIB support
- CTRACE optimization
- Netstat changes in z/OS V1R7



Adding Common Information
Model (CIM) management in
support of the On-Demand
infrastructure



On-Demand Operating Environment (ODOE)



➤ **Common Information Model (CIM) - one of the standards used for resource management!**

Introduction to CIM

➤ Web-Based Enterprise Management (WBEM) initiative

- ▶ Key initiative of the Distributed Management Task Force (DMTF)
 - The DMTF is a nonprofit association of industry members (including IBM) dedicated to promoting enterprise and systems management and interoperability.
- ▶ Set of management and Internet standard technologies developed to unify the management of distributed computing environments.
- ▶ Defines the protocols and interfaces for CIM.

➤ Important core standards that make up WBEM

- ▶ Common Information Model (CIM) Standard
 - Provides an object-oriented data model
 - Provides a common definition of management information for systems, networks, applications, and services, and allows for platform extensions
 - CIM schema - Set of classes that define the data to be managed
- ▶ CIM-XML (one example of the WBEM protocols)
 - Defines CIM messages (operations) in XML over HTTP (for example, GetInstance, GetClass)
 - How CIM management entities communicate

➤ Related links

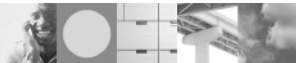
- ▶ DMTF - www.dmtf.org
- ▶ WBEM - www.dmtf.org/standards/wbem
- ▶ CIM schema v2.8 - www.dmtf.org/standards/cim/cim_schema_v28
- ▶ CIM client operations (for example, GetInstance) - www.dmtf.org/standards/documents/WBEM/DSP200.html



CIM management data

➤ CIM management data

- Defined by the CIM schema. The schema are written in a syntax called Managed Object Format (MOF).
- Class definitions define properties for each class
 - Some properties of the CIM_EthernetPort (ethernet interface) class are:
 - Interface type
 - Enabled state
 - Speed
- Platforms can add schema extensions for platform-specific classes and their properties
 - IBMzOS_EthernetPort
 - Add TcpipProcName as additional property
- Managed Object Format (MOF)
 - MOF is a language (based upon IDF-Interface Definition Language) and is used to describe management information. MOF is used to describe the CIM classes and the properties and methods associated with a class. See www.dmtf.org/education/mof for more information.



Retrieving CIM management data

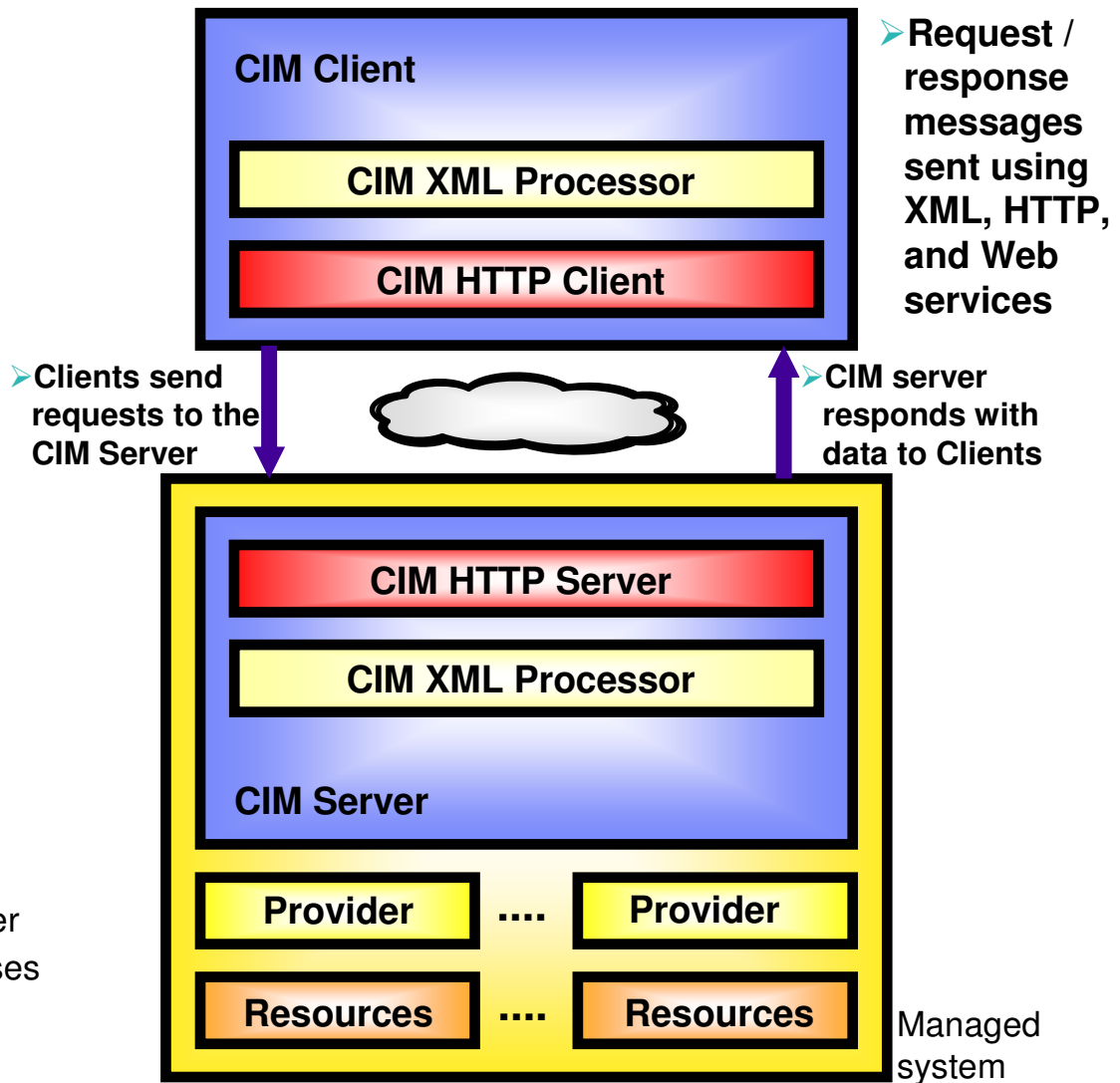
➤ **CIM servers are referred to as CIM Object Managers**

➤ **Similarities between CIM and SNMP**

- Platform extensions similar to enterprise-specific MIB modules
- CIM server similar to SNMP agent
- CIM providers similar to SNMP subagents
- Architected provider functions similar to SNMP requests. For example, CIM "<class>GetInstance" is similar to SNMP "get"

➤ **Providers**

- Accept requests for data from server
- Gather data in support of CIM classes
- Returns response with data



z/OS CIM functions

➤ IBM selects the OpenPegasus CIM server from the Open Group Consortium

- Implements the CIM/WBEM standards
- Ported to z/OS as a base element of V1R7
- Called the z/OS CIM server

➤ z/OS V1R7 CIM operating system (OS) class support:

- OS management profile instrumentation
 - ComputerSystem
 - OperatingSystem
 - Process (AS+USS)
 - Processor
 - FileSystem (USS)
 - Network
- OS Monitoring profile instrumentation
 - Performance metrics based on RMF data

**This is where
we're heading!!!!**



➤ z/OS CIM server

- For more information about the z/OS CIM Server, see *z/OS Common Information Model User's Guide*

➤ IBM eServer CIM support

- For information regarding the implementation of CIM management data across the eServer platforms, see *IBM eServer Common Information Model*



z/OS V1R7 CS CIM support

- **CS in z/OS V1R7 creates the z/OS CS CIM classes and provides the CIM network providers**
- **Support CIM schema Version 2.8**
- **Created z/OS CS platform schema extensions to the CIM classes:**
 - ▶ IBMzOS_EthernetPort - Subclass of CIM_EthernetPort
 - Supports all the IPv4 Ethernet interfaces configured to the TCP/IP stacks on the MVS image
 - Added TcpipProcName as platform-specific property
 - ▶ IBMzOS_IPProtocolEndpoint - Subclass of CIM_IPProtocolEndpoint
 - Supports all the IPv4 addresses configured to the TCP/IP stacks on the MVS image
 - Added TcpipProcName as platform-specific property
 - ▶ IBMzOS_CSNetworkPort - Subclass of CIM_SystemDevice
 - Supports the association between a computer system (an MVS image) and the network ports (network interfaces) configured to the computer system
 - z/OS CS provides data only for associations between an MVS image and the IPv4 Ethernet interfaces configured to the TCP/IP stacks on the image.
 - ▶ IBMzOS_NetworkPortImplementsIPEndpoint - Subclass of CIM_PortImplementsEndpoint
 - Supports the association between a network port (network interface) and the IP addresses configured on the interface.
 - z/OS CS provides data only for associations between an IPv4 Ethernet interface and its IP addresses.

z/OS V1R7 CS CIM support (continued)

- **One CIM provider created per z/OS CIM class**
- **Provides data for IPv4 Ethernet interfaces and IP addresses**
- **Access to TCP/IP stack data controlled by security resource**
 - Resource is required if user ID associated with the client of the z/OS CIM server is not defined as a z/OS UNIX superuser.
 - Resource name is: EZB.CIMPROV.sysname.tcpname
 - Resource defined in the SERVAUTH class
 - Access is granted if the user ID associated with the client of the z/OS CIM Server is permitted for read access to the resource.
- **Providers installed in the /usr/lpp/tcpip/lib HFS directory**
- **z/OS CS CIM class definition and provider registration files installed in the /usr/lpp/tcpip/mof HFS directory**
 - Already integrated into z/OS CIM Server
 - Shipped due to service considerations
 - The class definitions can be reviewed to determine platform-specific properties
 - Platform specific properties also documented in the *IP Configuration Guide*

How to enable CIM network support

- **No configuration necessary to activate the z/OS CS CIM provider support**
 - Providers automatically loaded by CIM server on first request for class data.
- **The z/OS CIM server must be configured and activated in order for the data supported by the z/OS CS CIM providers to be available to clients.**
- **Security resource must be defined for clients whose user IDs are not defined as z/OS UNIX superusers.**
 - See the *IP Configuration Guide* for more information about defining this resource.
- **z/OS CS CIM data class definitions and provider registration information (in MOF syntax) installed in new HFS directory /usr/lpp/tcpip/mof.**

IPv6 UDP MIB

Version-neutral UDP MIB

- **Enhanced the TCP/IP subagent to support the version-neutral UDP management data in the IETF internet draft version of the UDP-MIB.**
 - Data defined in UDP-MIB from draft-ietf-ipv6-rfc2013-update-03.txt (4/2004)

- **Added the following version-neutral UDP management data to the TCP/IP Enterprise-specific MIB module:**
 - ibmTcpiMvsUdpEndpointTable - provides counters and additional data
 - ibmTcpiMvsUdpMcastTable - provides data regarding UDP sockets that are receiving multicast data

- **Enhanced the following Netstat reports to display the remote IP address and port values for connected UDP sockets:**
 - ALL/-A
 - ALLCONN/-a
 - BYTEINFO/-b
 - CONN/-c
 - SOCKETS/-s

UDP management data enhancements

➤ **Standard UDP-MIB data supported:**

- udpHCInDatagrams/udpHCOutDatagrams
 - 64-bit UDP transport layer counters
 - Complement existing 32-bit counters
- udpEndpointTable
 - Provides local/remote IP address and port information for all UDP endpoints

➤ **TCP/IP Enterprise-specific UDP data supported:**

- ibmTcipMvsUdpEndpointTable - augments the entries in the udpEndpointTable
 - 32-bit and 64-bit datagram and byte counters
 - Connection ID and resource name
 - Last activity value
 - Socket options
 - Information regarding UDP sockets that are sending multicast data
- ibmTcipMvsUdpMcastTable - provides information regarding UDP sockets that are receiving multicast data

➤ **IETF UDP-MIB internet draft shipped with product**

- Because IETF internet drafts expire in six months, the version of the IETF UDP-MIB internet draft supported by V1R7 is shipped with the product and installed in the HFS in the /usr/lpp/tcpip/samples directory as file udpmib mi2.



Netstat enhancement in support of new UDP MIB

➤ Netstat reports display the remote IP address and port values for connected UDP sockets:

-Reports enhanced:

- ALL/-A
- ALLCONN/-a
- BYTEINFO/-b
- CONN/-c
- SOCKETS/-s

-Previous releases' Netstat CONN/-c display of UDP Remote IP address and port for connected sockets:

▪Foreign Socket: *.*

-V1R7 Netstat CONN/-c display of UDP Remote IP address and port for connected sockets:

```
USER18  0000003D  UDP
  Local Socket:  ::ffff:0.0.0.0..1555      (AF_INET6 socket connected to IPV4)
  Foreign Socket: ::ffff:9.42.105.99..1555
USER18  00000039  UDP
  Local Socket:   9.42.103.27..4444      (AF_INET socket)
  Foreign Socket: 9.42.105.99..4444
USER18  0000003C  UDP
  Local Socket:   1::1..1444             (AF_INET6 socket)
  Foreign Socket: 3::3..1444
```

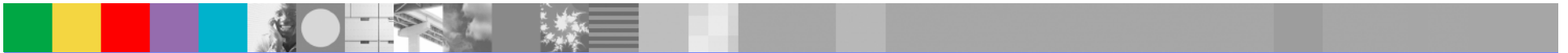

Things to think about

➤ **Deprecated SNMP UDP management data**

- The status of 'deprecated' for MIB objects means that the objects are still supported but they will either become obsolete in the future, or they have been replaced by better objects.
 - If the objects were deprecated because they have been replaced, then management applications should plan on migrating their support to the replacement.
- Network management applications may not support deprecated management data.
- Deprecated standard UDP management data from the new UDP-MIB
 - New UDP-MIB from IETF internet draft deprecates the SNMP table, udpTable.
- Deprecated UDP management data from the TCP/IP Enterprise-specific MIB
 - ibmTcpiMvsUdpTable
 - ibmTcpiMvsUdpEndpMcastTable

➤ **Netstat display of remote IP address and port for connected UDP sockets**

- Automated programs that process Netstat report output may have to be updated



CTRACE optimization

CTRACE changes

➤ Reduce processing for SYSTCPIP tracing

- ▶ Add specialized trace calls that collect a minimum of information.
- ▶ Trace only one contiguous data area (less than 256 bytes)

➤ Add the PFSMIN and TCPMIN options to the SYSTCPIP CTRACE.

- ▶ The PFSMIN option writes a minimum trace entry for each PFS module.
- ▶ The TCPMIN option writes a minimum trace entry for specific events during TCP processing.

➤ There are four new CTRACE options for SYSTCPIP

▶ PFSMIN

- The PFSMIN option writes a small amount of trace data for each PFS module

▶ TCPMIN

- The TCPMIN option writes a small amount of trace data at strategic points in TCP protocol processing.

▶ ALLMIN

- Combines PFSMIN, TCPMIN, INIT, OPCMDS, and OPMSGS options.

▶ EID

- Allows tracing only for specific trace records. The EID keyword should only be used with the direction of IBM service personnel.

➤ There are two new CTRACE options for IPCS

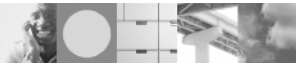
- ▶ PFSMIN
- ▶ TCPMIN



Things to think about

- **Do not mix the PFS and PFSMIN options**
- **Do not mix the TCP and TCPMIN options**

You will be just collecting the data twice.



Netstat changes

Netstat changes in z/OS V1R7

- **Starting in z/OS V1R7, all MVS console Netstat reports include "END OF THE REPORT" to clarify the end of the display report.**

- **Netstat ALL report changes**
 - Displays an additional byte in the bit map of socket options for a UDP socket entry.
 - Displays, for listening port, if the server has been quiesced for DVIPA Sysplex Distributor workload balancing.
 - Displays if port sharing is being used by a listening port and if so, displays the type of port sharing (BASE or WLM).
 - Displays, for a listening port, the number of active connections. Displays the server's accept efficiency fraction (SEF)
 - Displays the remote IP address and port values for connected UDP sockets.

- **Netstat ALLCONN and CONN report changes**
 - Filters the connection list display to exclude or include connections using AT-TLS Policy. For connections using AT-TLS Policy, the report can also be filtered to display only connections that are:
 - Using a current rule with current actions
 - Within one group
 - Using a stale rule or at least one stale action.
 - In addition, the report was changed as follows:
 - Displays the remote IP address and port values for connected UDP sockets.

- **Netstat BYTEINFO report changes**
 - Report changed to display the remote IP address and port values for connected UDP sockets.



Netstat changes in z/OS V1R7 *(continued)*

➤ Netstat CONFIG report changes

- Displays the setting of IPSECURITY on IPCONFIG and the SECCLASS setting on DYNAMICXCF on IPCONFIG.
- Displays the length of the routing prefix on the dynamic XCF IPv6 address when specified on the IPCONFIG6 DYNAMICXCF statement.
- Displays new information (AUTOREJOIN) in the Sysplex Monitor section.

➤ Netstat DEVLINK report changes

- Displays the appropriate SPEED for an OSA-Express 10 gigabit Ethernet adapter.
- Displays the SECCLASS values for the displayed links.
- Displays information about IPv6 HiperSockets interfaces.
- Displays whether an IPAQENET link is enabled for TCP segmentation offload.

➤ Netstat ND report changes

- Report is enhanced to display IPv6 addresses on HiperSockets internal LANs to which this stack has a route.

➤ Netstat PORTLIST report changes

- Changed to indicate if a new type of port sharing is being used (WLM).

➤ Netstat SOCKET report changes

- Report changed to display the remote IP address and port values for connected UDP sockets.



Netstat changes in z/OS V1R7 (*continued*)

➤ Netstat TELNET report changes

- Report in short format is changed to display the BytesIn and BytesOut fields in two forms.

➤ Netstat TTLS new report

- The GROUP [,DETAIL] option lists information for AT-TLS groups.
- The CONN=connid [,DETAIL] option lists AT-TLS information for the specified connection.

➤ Netstat VCRT report changes

- In V1R7, the DETAIL report is changed to display additional route related information.

➤ Netstat VDPT report changes

- Indicates if a new distribution method ServerWLM is being used.
- Displays the Target Server Responsiveness (TSR), and, in the DETAIL display, the component fractions for the Target Connectivity Success Rate (TCSR), the Connection Establishment Rate (CER), and the Server's accept Efficiency Fraction (SEF).

➤ Netstat VIPADCFG report changes

- If the stack has left the sysplex group, new messages (EZZ2502I and EZZ2503I) will precede the report.
- Message EZZ2505I precedes the report to indicate if the VIPADYNAMIC configuration information cannot be displayed at this time.
- The VIPA Distribute information will contain data for backup, as well as active, dynamic VIPAs.
- Displays configured VIPAROUTE information.
- The IPAddr filter is added to provide the report for a specific IP address.
- A new subheading is added to the end of the report for deactivated dynamic VIPA information.

Netstat changes in z/OS V1R7 *(continued)*

➤ **Netstat VIPADYN report changes**

- Displays the status of VIPAROUTE information.



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