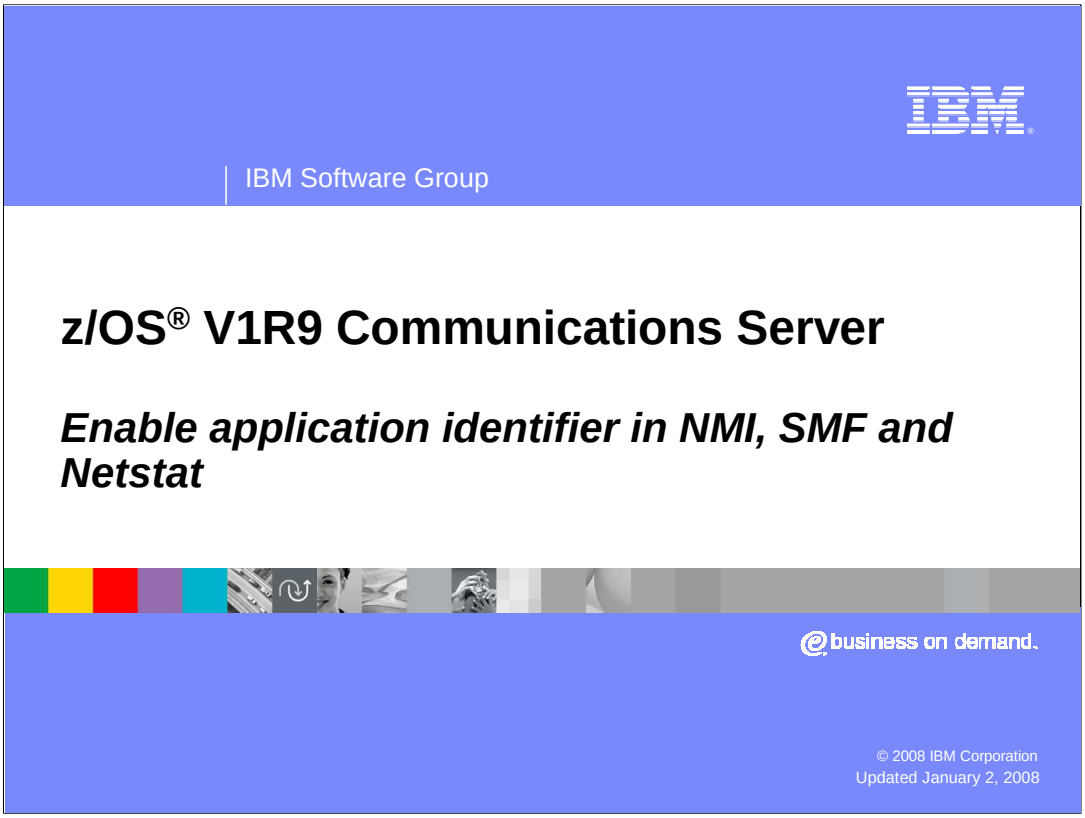


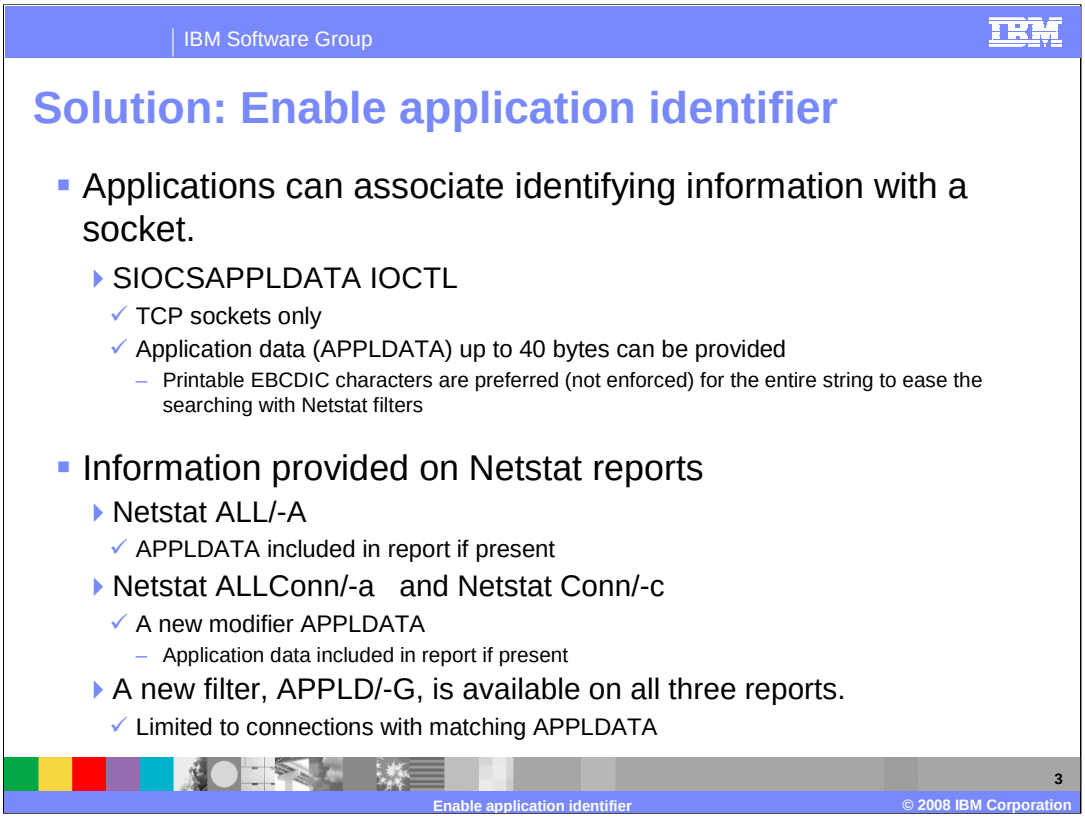

This presentation describes the changes made in z/OS V1R9 Communications Server in the area of systems management to enable the application identifier in NMI, SMF and Netstat.

## Problem: Need to quickly identify connections

- Customers need to quickly identify TCP connections for key applications.
- Support should be similar to the Netstat support that displays connections with Telnet-specific information. UNIX, and other things
- The new identifying data should be provided with existing connection information records by the provided management interfaces:
  - Netstat
  - SMF
  - NMI



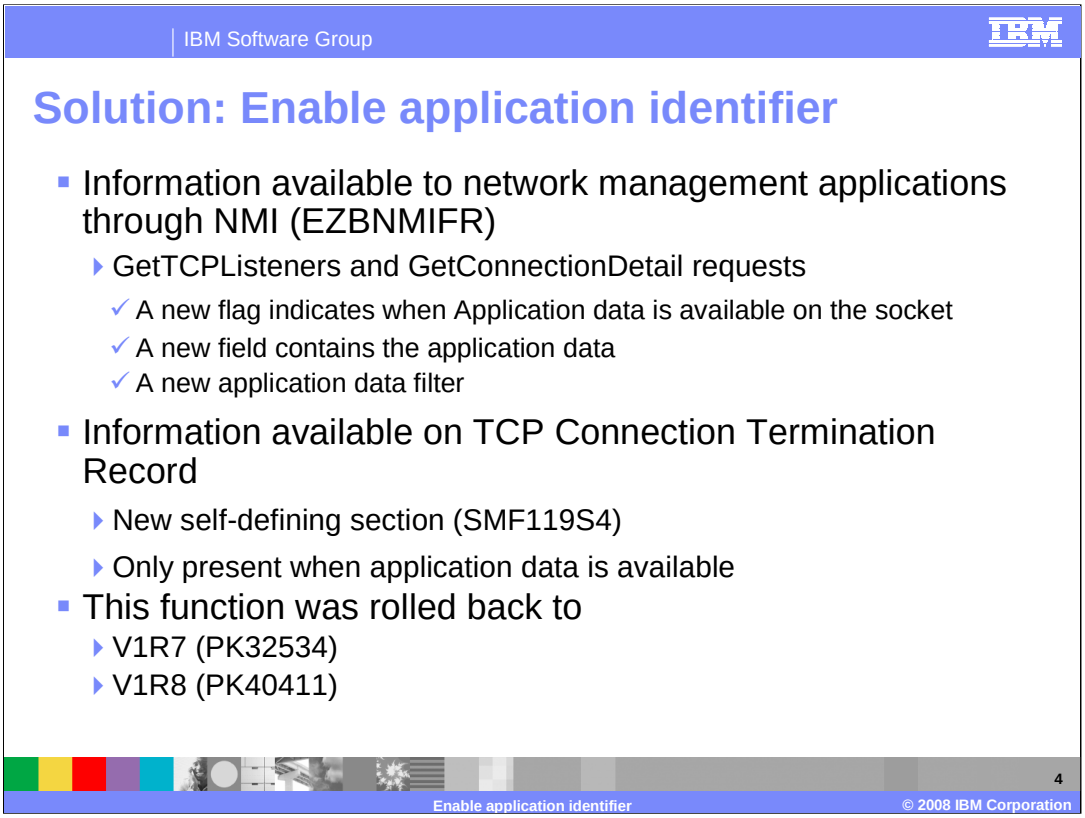

Often a user on the telephone with a problem does not know TCP/IP resource information like IP addresses and port numbers. Instead they know high level information about the application they are using.




To help real time problem determination, capacity planning, and accounting applications, TCP/IP applications can now associate identifying information with the socket resources they use.

A new IOCTL command is provided to allow applications to associate up to 40 bytes of identifying information with a TCP socket. Application supplied data exists for the life of the socket. It can be replaced by the application at any time. It can be removed by setting it to all nulls or all blanks. Information is inherited from listener to new connections when they are placed on the backlog. It is up to each exploiting application to document the content, format and meaning of the information provided. The application should uniquely identify itself at the beginning of string. Strings beginning with three character IBM product identifiers are reserved for IBM use. IBM product identifiers begin with a letter in the range A to I. Printable EBCDIC characters are preferred, but are not enforced, for the entire string to ease the searching with Netstat filters. If an application chooses to use non-printable characters, they will be displayed by Netstat as '.' (dot). Users entering APPLD filters will need to enter a wildcard character (? or *) to match the non-printable characters stored in the string.

Customers can easily locate and display connections used by the applications since the unique application data is provided on Netstat reports. Application data is always displayed on the TSO Netstat ALL and z/OS UNIX® netstat –A report if it is present. Application data is only displayed on the MVS and TSO Netstat ALLConn and COnn reports and the z/OS UNIX netstat -a and netstat –c reports when explicitly requested with either the APPLDATA modifier or the APPLD/-G filter. The filter is also supported on the Netstat ALL/-A commands. The filter supports wildcard searches. Wildcards supported are question mark ( ?), which matches exactly one arbitrary character, and an asterisk ( *), which matches zero or more arbitrary characters. The filter provided results in a case insensitive search.



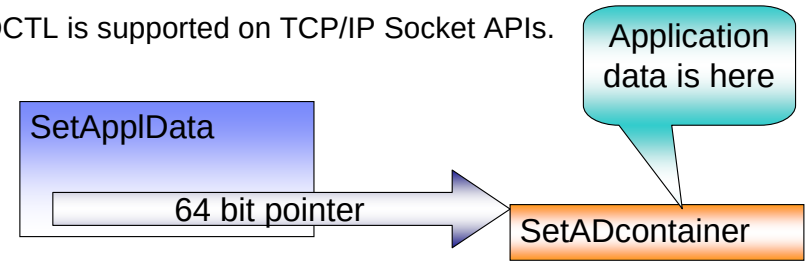

The application data is also available to network management applications through the Network Management Interface. EZBNMIFR is a callable polling-type interface that returns the status of connections, listeners, and endpoints at a given point in time. The caller can specify filters that limit the returned data to a specific set of information. GetTCPListeners requests information about all listening TCP sockets. GetConnectionDetail requests information about all connected TCP sockets. This support adds a new flag, NWMTCPLApplDataSet, that indicates when ApplData is available on a socket and a new field, NWMConnApplData, containing the ApplData for these two requests. These requests may be filtered in several ways to reduce the number of sockets included in the results. This support adds a new filter that only matches sockets that have ApplData available and that matches the supplied filter. The application data filter can have wildcard characters. Use a question mark (?) as a wildcard for a single character and an asterisk (*) as a wildcard for zero or more characters. The filter is case insensitive. The macro, EZBNMRHA, and header, EZBNMRHC, are supplied to assist in writing applications that use the NMI.

This solution also allows customers or vendor tools to identify these connections in TCP/IP SMF records written at connection termination. Application data is added to the SMF Type 119 TCP Connection Termination Record as a new self-defining section. This record is produced when a TCP connection is terminated. The macro, EZASMF77, and header, EZASMF, are supplied to assist in writing programs that process SMF records. Application data is available when the SIOCSAPPLDATA IOCTL is used to supply ApplData on the parent listening socket or on the connected socket. Application data can be deleted from a socket by using the SIOCSAPPLDATA IOCTL to supply ApplData that is all blanks or all nulls (x'00').

This support was rolled back to z/OS V1R7 and V1R8 at the request of other IBM applications that are interested in exploiting it.

# IOCTL details

- The SIOCSAPPLDATA command is '8018D90C'x
- Two control blocks:
  - SetApplData
    - ✓ Eye catcher – SetAD_eye1
    - ✓ Version – SetAD_ver
    - ✓ Length of SetaDContainer – SetAD_len
    - ✓ Pointer to SetADContainer
  - SetADcontainer
    - ✓ Eye catcher – SetAD_eye2
    - ✓ Application data
- This IOCTL is supported on TCP/IP Socket APIs.







As with any IOCTL socket command, a unique socket command variable following by a structure to map the IOCTL request data. This slide illustrates the structure elements and their relationship. Note that the structure containing the application data can optionally reside above the 2G bar.

The SIOCSAPPLDATA IOCTL data structures are in assembler and C/C++. The assembler macro, EZBYAPPL, is located in the SEZANMAC dataset. The C/C++ header, EZBYAPLC, is located in SEZANMAC and in /usr/lpp/tcpip/include/ezbyaplc.h

## Display command example

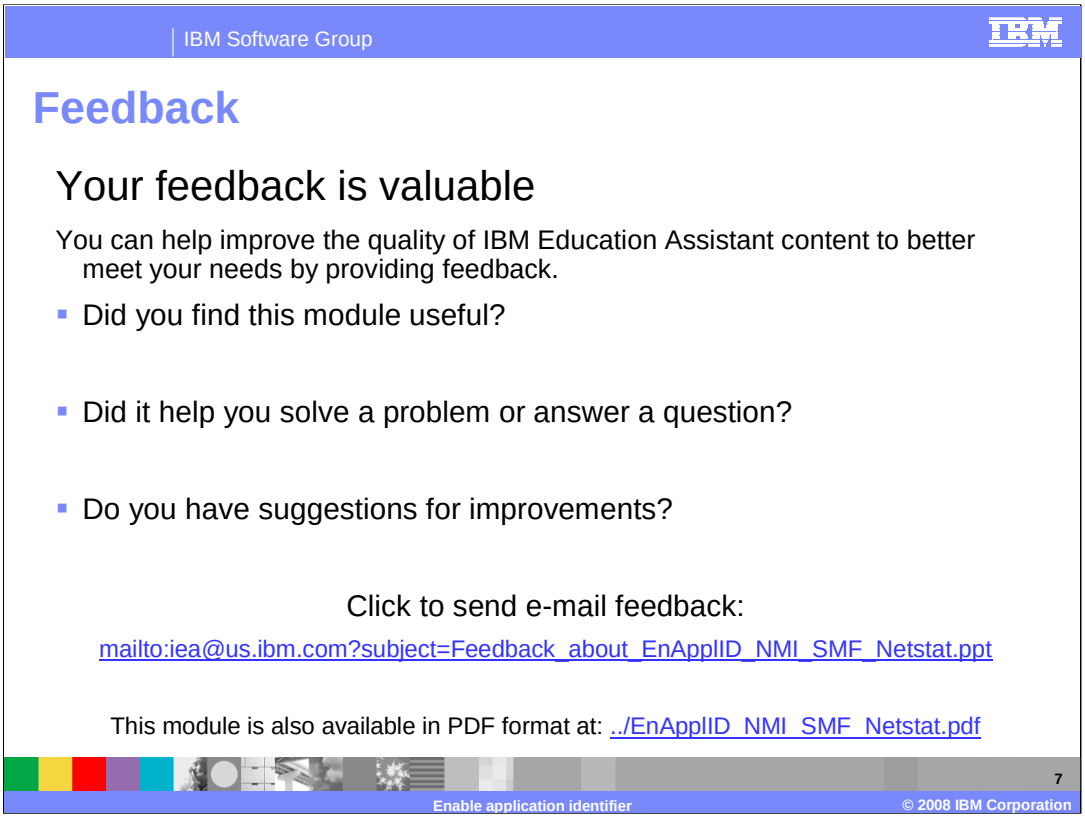
- **Two lines added to end of Netstat reports:**

  Application Data:
  "....."

- **"Non printable" characters displayed as a period "."**
- **"Printable" characters:**
  - **<space>**
  - **Special characters .<(+&!$*);-/|,_>?:#@'="**
  - **Lower case alpha a .. z**
  - **Upper case alpha A .. Z**
  - **Numeric 0 .. 9**




Applications can place non-printable characters in the string. Netstat will display them as '.'. Only printable characters may be entered in Netstat filters. Non-printable characters must be skipped over with wild card characters in the filter.

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