



IBM eServer™

FTP: Other Enhancements

@business on demand software

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Agenda - Other FTP enhancements



- 1 Improved network management capabilities
- 2 Limited UTF-8 data transfer and storage
- 3 FTP Status / Locstat Display Enhancements
- 4 Miscellaneous FTP updates

FTP
Improved network management
capabilities

Background information - Type 119 SMF records

➤ Type 119 SMF records may be written to two interfaces

- **System Management Facilities (SMF)**

- Many elements of z/OS® write SMF records
 - An SMF record describes an event
 - 120 different Types of SMF event records described in z/OS V1R7.0 MVS™ System Management Facilities (SMF)
- CS for z/OS writes type 118 and type 119 records
 - Type 118 is very old and is not being enhanced - has been stabilized since z/OS V1R2
 - Users are encouraged to migrate to use the type 119 records, which contains much more information than the old type 118 records do
- Type 118 and type 119 records described in the IP Configuration Reference.

- **Network Management Interface (NMI) for obtaining real time event data**

- Only CS for z/OS writes to this interface
- Some Type 119 records are NMI only
 - Described in IP Programming Reference, Network Management chapter
 - Some NMI only records are FTP events

➤ Some Type 119 Events are FTP events

- SMF record subtypes distinguish FTP events from other CS events

Pre-z/OS V1R8 FTP-related Type 119 records (SMF and NMI)

119 Record subtypes	Description	TCP/IP component event	Reason	SMF (written to SYS1.MANU2)	NMI?
3(x'3')	FTP Client Transfer Completion	FTPC	Events: 1 Append 2 Retrieve 3 Store	Yes	Yes
70(x'46')	FTP Server Transfer Completion	FTPS	Events: 1 Append 2 Delete 3 Rename 4 Retrieve 5 Store 6 Store Unique	Yes	Yes
72(x'48')	FTP Server Logon Failure	FTPS	Events: 1 Login Failure	Yes	Yes
101(x'65')	FTP Client Transfer Initialization	FTPC	Events: 1 Append 2 Retrieve 3 Store	No	Yes
100(x'64')	FTP Server Transfer Initialization	FTPS	Events: 1 Append 2 Delete 3 Rename 4 Retrieve 5 Store 6 Store Unique	No	Yes

Overview of FTP management enhancements in z/OS V1R8

➤ **Add new events and data for the Network Management Interface for FTP for improved real-time tracking of FTP client and server activity on z/OS:**

- New Type 119 records are NMI only - never written to SMF
- FTP client activity
 - FTP client login failure record
 - written when a login attempt fails
 - FTP Client Session record
 - written at login time
 - written again when session ends
- FTP server activity
 - FTP Server Session record
 - written at login time
 - written again when session ends

➤ **Enhance all Type 119 NMI and SMF FTP records for better correlation between the FTP type 119 records and other information sources:**

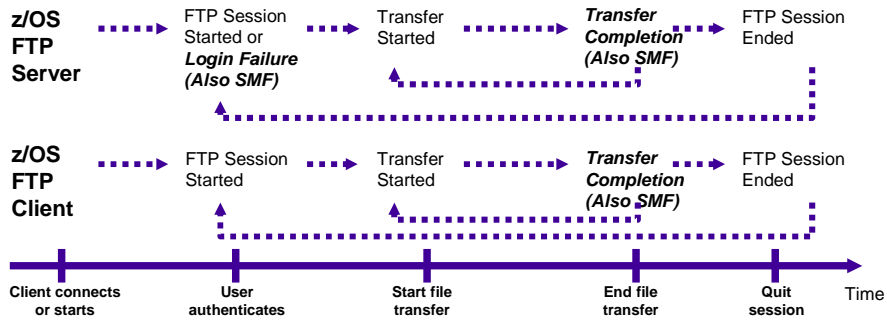
- SMF as well as NMI records are enhanced
- Add TCP connection IDs
 - correlate SMF record to TCP activity - realtime monitoring of data connection progress
- Add Activity Logging Session ID to server records
 - correlate SMF record to FTP log messages - combine with FTP server activity logging details about FTP sessions
- Add user login ID to client FTP records
 - up to sixty three bytes of user id recorded

New FTP-related Type 119 records (SMF and NMI)

Record name	119 Record subtypes	Reason	SMF (written to SYS1.MAN)?	NMI?
FTP Client Login Failure	102 (x'66)	Events: 1 Unsuccessful Login	No	Yes
FTP Client Session	103 (x'67)	Events: 1 Successful Login 2 Session End ▪ contains session end date/time ▪ contains Client Error Code	No	Yes
FTP Server Session	104 (x'68)	Events: 1 Successful Login 2 Session End ▪ contains session end date/time	No	Yes

Enhanced FTP management capabilities through new NMI application event reporting

- Which FTP client or server sessions are currently active?
- Which FTP server sessions did USERXYZ have during the last two hours?
- Which file transfers did not complete successfully since last night?
- For active file transfers, status monitoring is possible by combining information from other NMI real-time interfaces to query transfer progress



Things to think about

➤ Concerns for changed FTP SMF records:

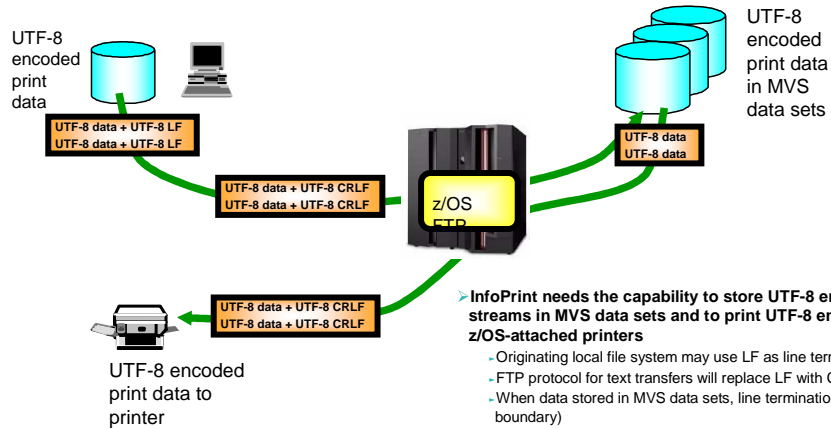
- Client User Name ID
 - in its own section in the record
- Other new fields
 - added at the end of the subtype specific section in each record.
- Programs that obtain SMF data by using the self-defining sections of our record mappings will most likely be unaffected.
- Customers who want to use the new fields will have to modify their existing programs.

➤ Concerns for new FTP SMF records:

- If you have enabled NMI:SYSTCPSM in your TCPIP.PROFILE, you cannot configure FTP or TCP/IP to omit to write the new records to the data space.

FTP
Limited UTF-8 data transfer and
storage

FTP support of UTF-8 encoded InfoPrint print data sets



➤ **z/OS FTP still needs a few modifications to fully support all Unicode codepages and conversions**

➤ **InfoPrint needs the capability to store UTF-8 encoded print data streams in MVS data sets and to print UTF-8 encoded print data on z/OS-attached printers**

- Originating local file system may use LF as line termination
- FTP protocol for text transfers will replace LF with CRLF
- When data stored in MVS data sets, line termination is implicit (record boundary)

➤ **Binary transfer cannot be used**

- Would preserve the LF character in the MVS data set

➤ **Traditional text transfer cannot be used either**

- Would require unwanted codepage conversion

➤ **New specific Unicode support is needed:**

- Apply text transfer processing in terms of line termination handling
- Process data as-is (without code page conversion)

Extending multi-byte processing with improved UTF-8 support

➤ **Extend existing multi-byte support:**

- Add MBDATACONN=(UTF-8,UTF-8) configuration option
 - Allows user to configure UTF-8 as data connection encoding
 - network transfer code page
 - file system code page
 - Supported by both z/OS FTP client and server
 - UTF-8 data can be send over the FTP data connection and stored as UTF-8 data in HFS files or in MVS data sets
 - Note that there is no support for converting to other code pages during the transfer
 - Also, note that this support is UTF-8 specific - it does not cover other Unicode encodings

➤ **Enhance Unicode Byte-Order Mark (BOM) processing by z/OS FTP**

- UNICODEFILESYSSEMBOM {ASIS|NEVER|ALWAYS} configuration option
 - Allow user to configure whether z/OS FTP will store Unicode file with a BOM
 - Support by both z/OS FTP client and server

➤ **Add more flexibility in dealing with multi-byte transfers from FTP partners that do not end with an End-Of Line (EOL)**

- MBREQUIRELASTEOL {TRUE|FALSE} configuration option
 - Allow user to configure whether z/OS FTP will tolerate or reject a missing EOL on the last record received
 - Supported by both z/OS FTP client and server
 - APAR PQ96201 was an interim attempt at fixing this issue

Supported codepages for multi-byte transfers (ENCODING MBCS)

Support for:	file_system_codepage:	network_transfer_codepage:
Chinese Standard GB18030	IBM-1388 or UTF-8	IBM-5488
BIG5	IBM-937	IBM-950 or BIG5
EUCKANJI	IBM-930	IBM-eucJP
JIS78KJ (JISROMAN)	IBM-930	IBM-5053
JIS78KJ (ASCII)	IBM-939	IBM-5055
JIS83KJ (JISROMAN)	IBM-930	IBM-5052
JIS83KJ (ASCII)	IBM-939	IBM-5054
KSC5601	IBM-933	IBM-949
SCHINESE	IBM-935	IBM-1381
SJISKANJI	SJISKANJI IBM-930 or IBM-939	IBM-932 or IBM-eucJC
TCHINESE	IBM-937	IBM-948
UNICODE FILE TRANSFER	UTF-8	UTF-8

FTP status and Locstat display
enhancements

FTP status information

- **The FTP client locstat subcommand will display the output of all the known client status information and does not take any parameters.**
- **The FTP server STAT command currently displays all of the known server status information**
 - RFC959 does discuss an optional parameter to specify a file or directory where the information comes from but no option to specify which type of server information is requested
- **Since the number of options in the z/FTP client and the z/OS FTP server is quite large, the client locstat subcommand and the server STAT command have been enhanced to support an additional option**
- **Client:**
 - locstat option
- **Server:**
 - From z/OS FTP client: status (option)
 - From non-z/OS FTP client: QUOTE XSTA (option)

Locstat/Status example

- Locstat dconntime to output the value of the DCONntime statement for the FTP client

```
EZA1460I Command:  
locstat dconntime  
EZA2811I DCONNTIME is 120  
EZA1460I Command:
```

- Status (asatrans to output the value of the ASAtans statement on the FTP server

```
EZA1460I Command:  
status (asatrans  
EZA1701I >>> XSTA (asatrans  
211-ASA control characters in ASA files opened for text processing  
211-will be transferred as ASA control characters.  
211 *** end of status ***  
EZA1460I Command:
```


Things to think about

- **There are no migration concerns, as the end user will be able to use the locstat and status subcommands as they were in pre-V1R8 environments.**

- **When using OEM or pre-V1R8 client**
 - Use quote XSTA option to get the information. For example:
 - QUOte XSTA VCOUNT
 - to get number of volumes an allocated data set may span from the FTP server's perspective when issued from an FTP client

- **New stat keyword option works only with the z/OS V1R8 server or later**
 - Does not work with other servers, or with earlier releases of the z/OS server

FTP
Miscellaneous FTP updates

Background - FTP server reply codes

➤ **Every FTP server reply starts with a reply code**

- 125 Sending data set /etc/protocol
- 250 Transfer completed successfully.
- 331 Send password.
- 425 Cannot open data connection.
- 550 Command RETR fails: /bogus/file does not exist.

➤ **Reply codes are architected in RFCs**

- 959 - File Transfer Protocol
- 1123 - Requirements for Internet Hosts -- Application and Support
- 2428 - FTP Extensions for IPv6 and NATs
- and others

➤ **The leading digit is most significant**

➤ **See RFC 959 for the significance of each reply code digit**

Replies for data transfer completed

- **z/OS FTP server replies with reply code 250 after file transfer**
- **Some FTP servers reply 226 after a file transfer**
- **RFC 959 - File Transfer Protocol says:**
"the server sends a reply (226) after closing the data connection (or if the connection is left open, a "file transfer completed" reply (250) and the user-PI should wait for one of these replies before issuing a new transfer command)."
- **RFC 959 is CLEAR that a server sends 226 or 250 after a file transfer**
- **z/OS FTP has always closed the data connection and sent reply 250**
 - Should really have been a 226 reply in that specific case (closing the data connection)
- **Changing the FTP server now could impact customers**
- **New z/OS FTP server configuration option to determine if 250 or 226 replies should be sent:**
 - REPLY226 {TRUE|FALSE}

FTP client search order for user's client FTP.DATA enhanced with command-line parameter

➤ TSO search order in z/OS V1R8:

- 1 **-f client start parameter**
- 2 SYSFTPD DD statement
- 3 tso_prefix.FTP.DATA
- 4 userid.FTP.DATA
- 5 /etc/ftp.data
- 6 SYS1.TCPPARMS(FTPDATA) data set
- 7 tcpip_hlq.FTP.DATA file

➤ UNIX® search order in z/OS V1R8:

- 1 **-f client start parameter**
- 2 \$HOME/ftp.data
- 3 userid.FTP.DATA
- 4 /etc/ftp.data
- 5 SYS1.TCPPARMS(FTPDATA) data set
- 6 tcpip_hlq.FTP.DATA file

Example:

```
ftp -f "/u/user1/ftp.data" 127.0.0.1
```

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