

APPC and OTMA

Information Management software



Topics

- APPC and OTMA Shared Queues Enhancement
- APPC LU 6.2 Input/Output Edit Exit (DFSLUEE0) Enhancement
- OTMA ACEE
- OTMA DFS2082I for CM0
- Performance Enhancement
- MQ Message Expiration

APPC and OTMA Shared Queues Enhancement

APPC and OTMA SQ Enhancement

- New capability that removes the dependency on RRS in a Shared Queues environment for
 - APPC synchronous conversations and OTMA CM1 (send-then-commit) interactions
 - Applies only to synclevel=None | Confirm
 - Synclevel=Syncpoint still requires RRS

- Communications use XCF services

Implementation

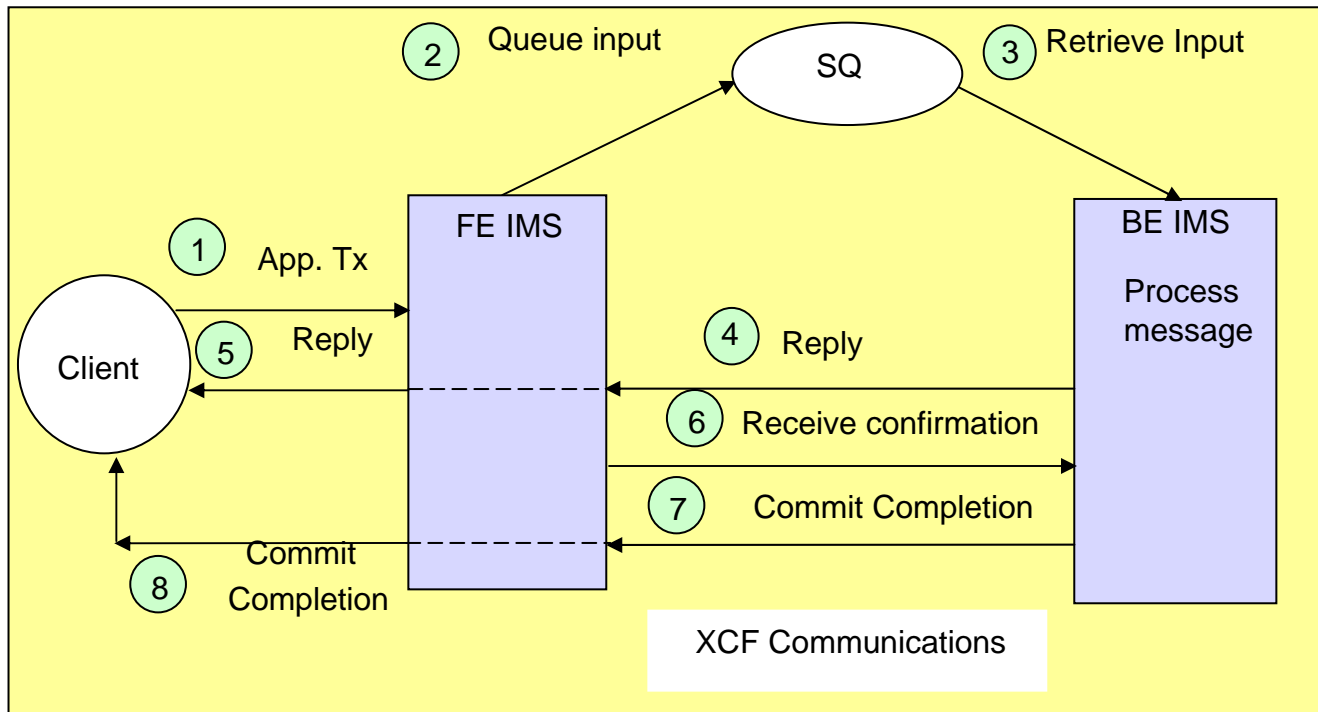
- New options for the existing AOS= parameter in DFSDCxxx to request the use of XCF
 - AOS=B: Synchronous transactions synclevel=NONE|CONFIRM can be processed in a back-end system using XCF communications
 - Note: Processing synclevel of SYNCPT depends on the RRS option
 - RRS=Y: transactions can be processed at either FE or BE, using RRS
 - RRS=N: transactions are only processed at the FE
 - AOS=S: allows synchronous transactions with synclevel of NONE|CONFIRM to be processed in a back-end system using XCF communications
 - Note: Processing synclevel SYNCPT is equivalent to AOS=F.
 - AOS=X: allows synchronous transactions with synclevel of NONE|CONFIRM to be processed in a back-end system using XCF communications
 - Note: Processing synclevel of SYNCPT is equivalent to AOS=N

Note: (1) Choice of B|S|X is dependent on how syncpoint messages are to be processed

Example of a flow using XCF – Synclevel=NONE

AOS = B | S | X

The FE IMS queues the synchronous synclevel NONE message into the SQ structure with a newly defined indicator and waits to be notified when the response is available

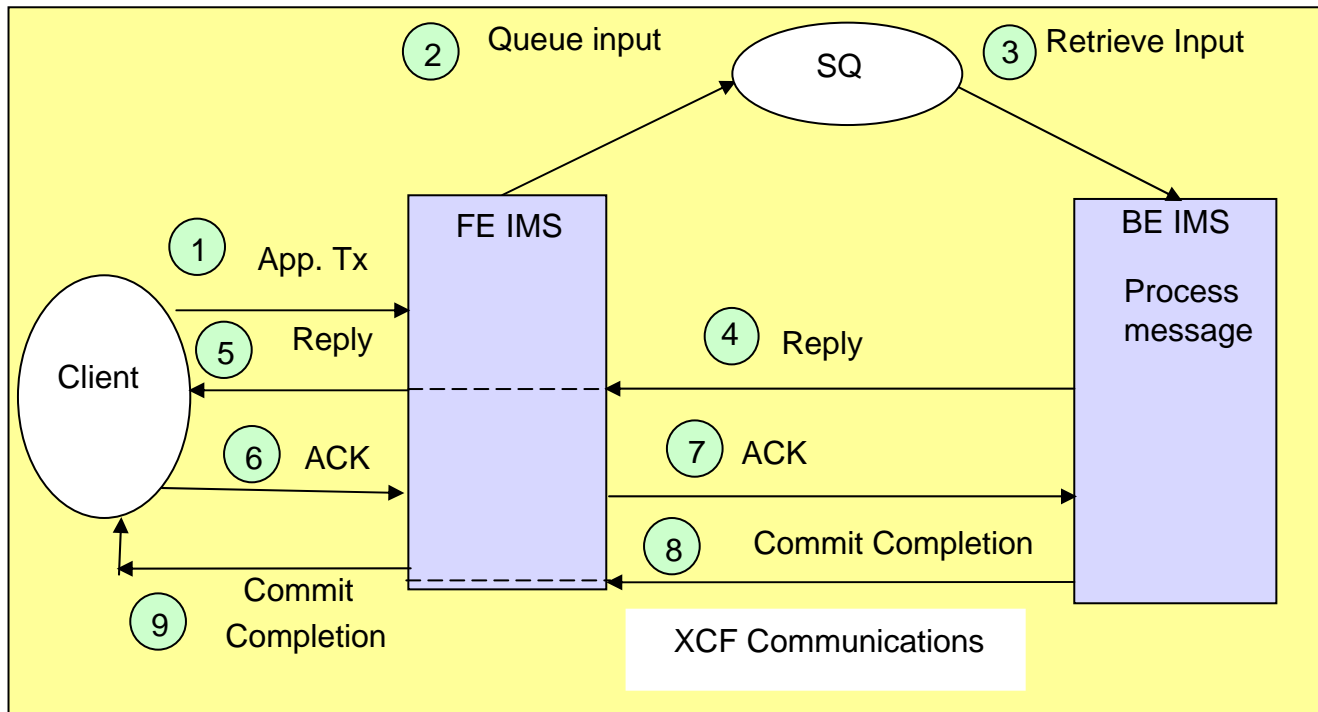


A BE IMS in the same SQ group retrieves the message and recognizes that the input message contains the XCF indicator

Example of a flow using XCF – Synclevel=Confirm

AOS = B | S | X

The FE IMS queues the synchronous synclevel CONFIRM message into the SQ structure with a newly defined indicator and waits to be notified when the response is available



A BE IMS in the same SQ group retrieves the message and recognizes that the input message contains the XCF indicator

Front-end Logging

- **New AOSLOG=Y|N keyword in the IMS DFSDCxxx proclib**
 - Specifies whether or not the FE system is to write a 6701 log record for:
 - Response messages returned from the BE system via XCF
 - Applicable to all synclevels (NONE, CONFIRM and SYNCPT)
 - Error messages returned from the BE system via XCF
 - Applicable to all synclevels of (NONE, CONFIRM and SYNCPT)
 - ID=TIB3
 - For diagnostics

- **/DIAGNOSE SET AOSLOG(ON|OFF)**
 - Enhancement to the /DIAGNOSE command to control AOSLOG capture for events related to APPC and OTMA synchronous transactions in a shared queues environment

6701 Log Record Example

INTERNAL TRACE RECORD										ID = TIB3										SEGNO=00										RECNO = 000002D5										TIME 22:49:45.249										DATE 2010.0810																																					
MSG PREF																																																																																							
0C65E040	000000	027A0000	0040D580	85D50000	F9F9F9F9	40404040	D1C1E5E3	D9C1D5D1	C5B81AA3	*.....	N.EN..9999	JAVTRANJE..T*	0C65E060	000020	68332B64	C0000000	0C732060	C8E6E2F1	40404040	40404040	40404040	C9D4E2F1	*.....	-HWS1	IMS1*	0C65E080	000040	40404040	C5B7CA11	CA942423	121000A8	C5B81AA3	68332B64	00000000	00000000	*	E....M.....YE..T.....*	0C65E0A0	000060	00000000	00000000	0C732060	00000000	00000000	C9D4E2F1	00000000	00000000	*.....	-.....IMS1.....*	0C65E0C0	000080	00000000	00000000	00000000	C5B81AA3	682A9C64	00000000	00000000	00000000	*.....	E..T.....*	0C65E0E0	0000A0	00000000	00000000							*.....		*													
MCI PREF																																																																																							
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APPL SGM																																																																																							
0C24CF98	000000								00680300	E896A440	*	YOU *	0C24CFA0	000008	A28595A3	7A40C8C9	40E3C8C5	D9C54040	40404040	40404040	40404040	40404040	*SENT: HI THERE		*	0C24CFC0	000028	40404040	40404040	40404040	40404040	40404040	40404040	40404040	40404040	*		*	0C24CFE0	000048			SAME AS ABOVE																																											
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DFSMSCE0

- TM and MSC Message Routing and Control User Exit (DFSMSCE0)
 - Allows queuing the message either with the RRS option or the XCF option

- On **input** to the exit, the following indicators are set

MSCE3XCF EQU X'80' - This is a global XCF enabled IMS system
MSCE3RRS EQU X'40' - This is a global RRS enabled IMS system

- On **output**, the exit can set

MSTR2XCF EQU X'02' - Message is to be queued globally to the SQ with the XCF indicator. Only for synclevel of NONE or CONFIRM
MSTR2RRS EQU X'01' - Message is to be queued globally to the SQ with the RRS indicator. Only for synclevel of NONE or CONFIRM

- If both options are set, IMS will use the XCF indicator option and ignore the RRS indicator option

Errors

- Error conditions in this environment can produce either a message or an abend
 - DFS2088I - APPC/OTMA SMQ Enablement inactive. Reason = 040
 - Means AOS= B|S|X specified but MINVERS < 12.1
 - DFS2089I - APPC/OTMA SMQ ENABLEMENT ACTIVE [RRS IS USED] XCF IS USED. | XCF AND RRS ARE USED]
 - New: Abend U0109 in the back-end IMS
 - IMS did not deliver a response for the APPC synchronous| OTMA (CM1) transaction, or, the LU 6.2 device or OTMA client returned a negative acknowledgment (NAK) to the output message of the synclevel(confirm) synchronous|CM1 transaction using XCF communications
 - RC=01 means BE received a NAK from the FE
 - RC=02 means FE terminated or restarted
 - Transaction instance is ended but program and transaction are not stopped
 - Abends in the front-end continue to see U0119

IMS Commands

- Enhancements to the output of /DISPLAY commands

- /DIS A DC, /DIS A REG, /DIS OTMA

- New statuses in APPC/OTMA SHARED QUEUE STATUS –
LOCAL=**status1** GLOBAL=**status2**

- **status1** can be one of the followings

ACTIVE-RRS
ACTIVE-XCF
ACTIVE-RRS/XCF
FORCE-RRS
FORCE-RRS/XCF
INACTIVE
UNSUPPORTED

- **status2** can be one of the followings:

ACTIVE-RRS
ACTIVE-XCF
ACTIVE-RRS/XCF
CHECK
INACTIVE

- New text that shows the AOSLOG setting

IMS Commands ...

- Example

```
XX,/DIS A DC
DFS000I      VTAM STATUS AND ACTIVE DC COUNTS
DFS000I      VTAM ACB OPEN          -LOGONS DISABLED
DFS000I      IMSLU=N/A.N/A          APPC STATUS=DISABLED  TIMEOUT=  0
DFS000I      OTMA GROUP=N/A        STATUS=NOTACTIVE     IMS1
DFS000I      APPC/OTMA SHARED QUEUE STATUS - LOCAL=ACTIVE-XCF GLOBAL=ACTIVE-XCF
DFS000I      APPC/OTMA SHARED QUEUES LOGGING=Y
DFS000I      APPC/OTMA RRS MAX TCBS - 40 ATTACHED TCBS - 1 QUEUED  RRSWKS-  0
DFS000I      APPLID=APPL8          GRSNAME=              STATUS=DISABLED
DFS000I      LINE ACTIVE-IN -      1 ACTIV-OUT -         0
DFS000I      NODE ACTIVE-IN -      0 ACTIV-OUT -         0
DFS000I      LINK ACTIVE-IN -      0 ACTIV-OUT -         0
```

IMS Commands ...

- Example of /DIS ACTIVE REG output
 - New status of WAIT-XCF and TERM-WAIT XCF
 - New text: TMEM:tmember-name TPIPE:tpipe-name for OTMA and LUNAME:networkid.luname for APPC

```

24,/DIS A REG
DFS000I      REGID JOBNAME      TYPE  TRAN/STEP      PROGRAM  STATUS              CLASS  IMS1
DFS000I      Jmprgn      JMP   NONE      IMS1
DFS000I      1 IMSMPPA      TPI   APOL11 IMS1  APOL1      WAIT-RRS/PC        1,2,3,4
DFS000I      URID:      C2D6B6917DE82000000000001010000 ORIGIN: IMS2
DFS000I      2 IMSMPPB      TPI   APOL12 IMS1  APOL1      TERM-WAIT RRS      1,2,3,4
DFS000I      URID:      C2D6B6917DE83000000000001010000 ORIGIN: IMS2
DFS000I      3 IMSMPPC      TPI   APOL13 IMS1  APOL1      WAIT-XCF           1,2,3,4
DFS000I      TMEM:      HWS1              TPIPE: CLIENT01  ORIGIN: IMS2
DFS000I      4 IMSMPPD      TPI   APOL14 IMS1  APOL1      TERM-WAIT XCF      1,2,3,4
DFS000I      LUNAME: IMSNETWK.LU62IMS1 ORIGIN: IMS2
DFS000I      JBPRGN      JBP   NONE      IMS1
DFS000I      BATCHREG    BMP   NONE      IMS1
DFS000I      FPRGN      FP    NONE      IMS1
DFS000I      DBTRGN      DBT   NONE      IMS1
DFS000I      DBRICTAB    DBRC              IMS1
DFS000I      DLISDEP     DLS           IMS1

```

Setup Considerations

■ Considerations

- Choice of AOS = B|S|X is dependent on how syncpoint messages are to be processed
- An IMS restart (NRE/ERE) is required to change the AOS= and AOSLOG= settings
- DBRC MINVERS of 12.1 is required
 - All IMS systems in a Shared Queues group must be at this level to enable the enhancement
 - IMS systems at lower version using the same RECON datasets will not be able to join the SQ group
 - IMS systems at lower versions using a different RECON dataset will still be able to join the SQ group, but may experience U711

Setup Considerations ...

- Considerations...
 - Different AOS parameter settings in different IMS systems
 - May complicate the environment
 - Understand the impact

APPC and OTMA SQ Enhancements Benefits

- **Benefit**
 - Using XCF rather than RRS
 - Allow IMS to be the syncpoint manager
 - Enhances the performance of the commit processing by eliminating
 - RRS logging overhead
 - Potential RRS commit processing bottleneck
 - Overhead associated with communicating with an external syncpoint manager

LU 6.2 Input/Output Edit Exit (DFSLUEE0) Enhancement

- A new return code (RC=2) for asynchronous conversation requests
 - Requests that an undeliverable message be dequeued
 - Previously, IMS would requeue the message

- Benefit
 - Greater control over undeliverable asynchronous output

OTMA ACEE Reduction

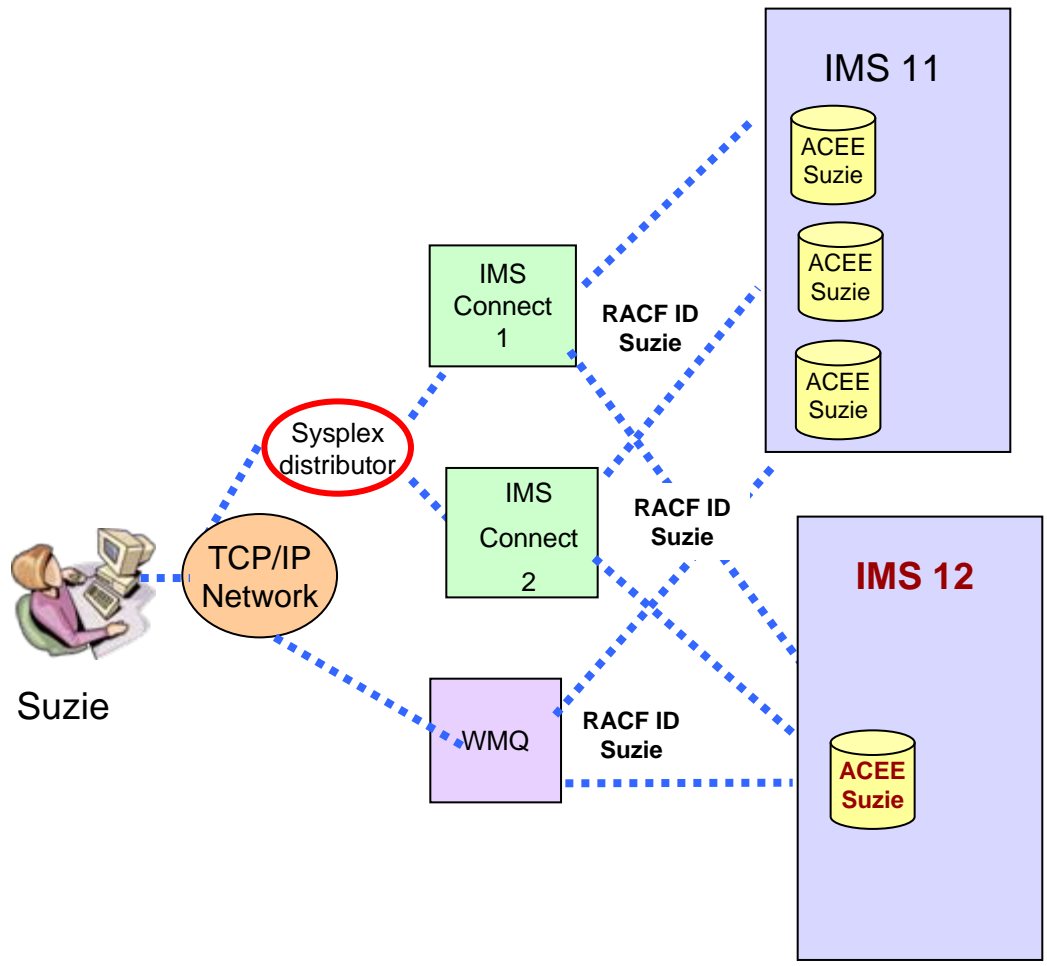
OTMA ACEE Reduction for Multiple OTMA Clients

- New capability that creates, shares and **caches** a **single** ACEE associated with a RACF userid
 - Shared across multiple OTMA member clients (TMEMBER)

- New maximum ACEE aging value during client-bid
 - 999999 seconds (11.5 days)
 - Previously 68 years
 - Range: 300 seconds to 999999 seconds
 - If OTMA receives a value less than 300, the value is reset to 0 and OTMA will not refresh ACEEs

- A cached ACEE has an aging value based on the OTMA member client with the lowest value

Challenge Addressed: Multiple ACEEs for the same User



- More storage
- More RACF calls to create an instance of an ACEE
- Possible security exposure if a change has to be made to a user profile
 - Different versions of the ACEE based on which OTMA client is used

Solution
Single ACEE cache

Command Enhancement

- /DISPLAY OTMA command response shows the ACEE aging value for each OTMA client

```
/DIS OTMA
```

```
Response:
```

```
GROUP/MEMBER   XCF-STATUS   USER-STATUS   SECURITY   TIB   INPT   SMEM   DRUEXIT   T/O   ACEEAGE
```

```
XCFGRP1
```

```
-IMS1           ACTIVE   SERVER           FULL           8000           N/A           0
-HWS1           ACTIVE   ACCEPT TRAFFIC   FULL           0 5000           HWSYDRU0     239   3600
-HWS2           ACTIVE   ACCEPT TRAFFIC   FULL           0 5000           HWSYDRU0     239   7200
-HWS3           ACTIVE   ACCEPT TRAFFIC   FULL           0 5000           HWSYDRU0     239   0
```

```
*09121/172200*   IMS1
```

- Cached ACEEs that are uniquely used by HWS1 and HWS2 have aging values of 3600 and 7200 respectively
- Cached ACEEs that are used by both HWS1 and HWS2 have an aging value of 3600
- HWS3 has no aging value and a non-cached ACEE is created for users that use this TMEMBER client

Considerations

■ Performance

- For multiple OTMA clients, e.g., multiple copies of IMS Connects and WebSphere MQs
 - Potential reduction of total number of RACROUTE REQUEST=VERIFY (RACF I/Os) to create ACEEs for userids
- When an expired RACF ACEE is detected for an input transaction
 - An asynchronous request updates the cached ACEE
 - The input transaction gets an ACEE for transaction authorization
 - Deleted when authorization is complete

■ Operational

- Refresh commands
 - /SECURE OTMA REFRESH TMEMBER *membername* and /SECURE OTMA REFRESH
 - Same effect
 - Both commands work on the one and only one OTMA ACEE table for all users.

Considerations ...

■ Security

- OTMA detects obsolete RACF ACEEs via an internal IMS timer
- Every two minutes, OTMA performs an ACEE cleanup operation for 10 expired userids
- Reduction of maximum Aging Value to 11.5 days could increase RACF I/Os if more refreshes are done

■ Environments, e.g, IMSplex, with mixed IMS Versions

- Could have wide differences in the maximum aging values for ACEE refreshes
 - IMS 12 – 999999 seconds
 - IMS 10 and IMS 11 - 2147483647 seconds

Benefits

■ **Cached ACEEs**

- Reduce the system storage requirements while providing better security and performance
 - Only one copy of the ACEE instead of multiple per OTMA client
 - Reduced storage usage
 - Reduced security exposure
 - Improved performance
- Provide consistency
 - Same security result regardless of which OTMA client is used

■ **Lower maximum ACEE aging value**

- Triggers faster ACEE cache refresh
 - Reduces security exposure, e.g., userid is revoked or access permissions are changed

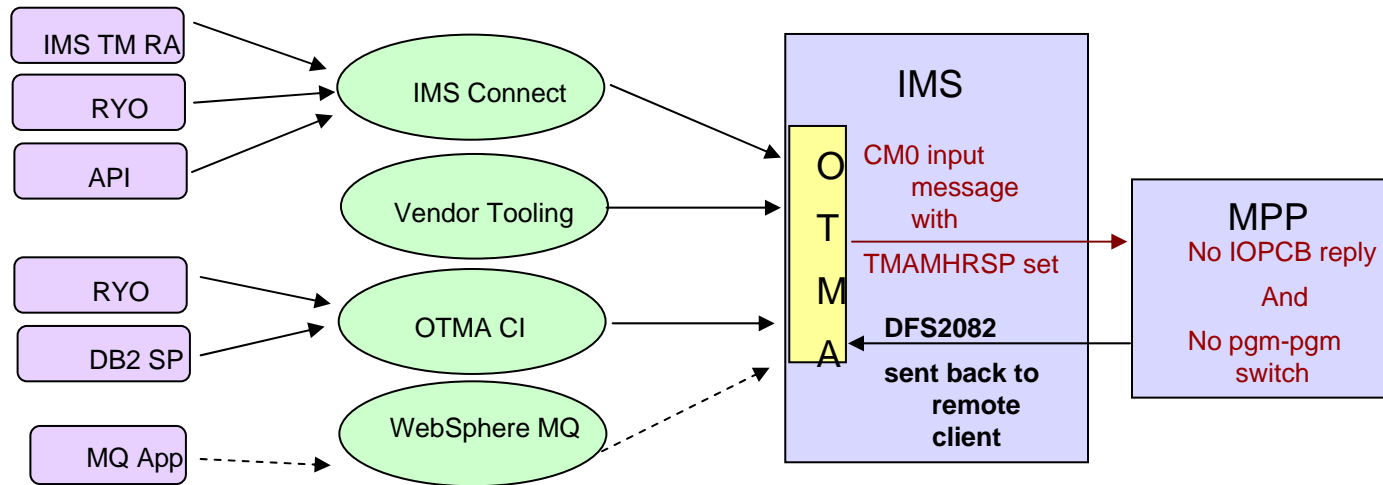
OTMA DFS2082 for CM0

DFS2082I for CM0

- CM1 (Send-then-Commit) transactions rely on DFS2082
 - To end the outstanding wait if the IMS transaction does not send IOPCB reply
- Conversion from the use of CM1 to CM0 (Commit-then-send)
 - For remote programs waiting for a reply
 - May result in a hang until timeout if there is no IOPCB reply
- Enhancement
 - A new commit-then-send (CM0) optional flag to request DFS2082
 - Specified on an input CM0 transaction message
 - Triggers OTMA to send the DFS2082 message if
 - The IMS application does not reply to the IOPCB
 - Nor message switches to another transaction
 - Does not apply if the transaction is a switched-to program in a program-program switch scenario

Implementation

Optional flag: **TMAMHRSP** can be set in the OTMA state data prefix



- IMS Connect exploitation
 - New IRM flag IRM_F3_DFS2082 allows CM0 client applications to request the DFS2082 msg
 - Connect sets the TMAMHRSP flag in the OTMA state data header
 - Message exit routines HWSSMPL0 and HWSSMPL1
- IMS TM Resource Adapter
 - New InteractionSpec property CM0Response
 - Internally, IMS TM RA sets the TMAMHRSP flag in the OTMA state data header which is passed to IMS Connect and on to IMS
- WebSphere MQ is looking at the new capability

Benefit

- DFS2082 for CM0
 - Eases the CM1 to CM0 application conversion
 - Reduces the unnecessary timeout in remote applications
 - Which impacts the performance if the remote application has to wait for a timeout before continuing to the next request

OTMA Performance Enhancement

OTMA Performance

- Reduced path length for OTMA transaction processing
 - Simplification in logic when validating a TPIPE name
 - Only when a new tpipe name is received on a message
 - Instead of when each message is received
 - APARs PM20292 (V10) / PM20293 (V11)
 - Shipped with the ICAL enhancements

- Benefit
 - Improved OTMA performance

V11 SPE – Transaction Expiration and WebSphere MQ V7.0.1 Support for Message Expiry

DFS3688I

- IMS Transaction Expiration SPE

- APARs PM05984 (IMS10) / PM05985 (V11)

- Sends DFS3688I message instead of DFS555I or DFS2224I message for transaction expiration during application GU phase

DFS3688I Transaction *aaaaaaaa* expired: EXPRTIME=*nnnnnn*, ELAPSE=*ssssss*
Tmember xxxxx Tpipe xxxx

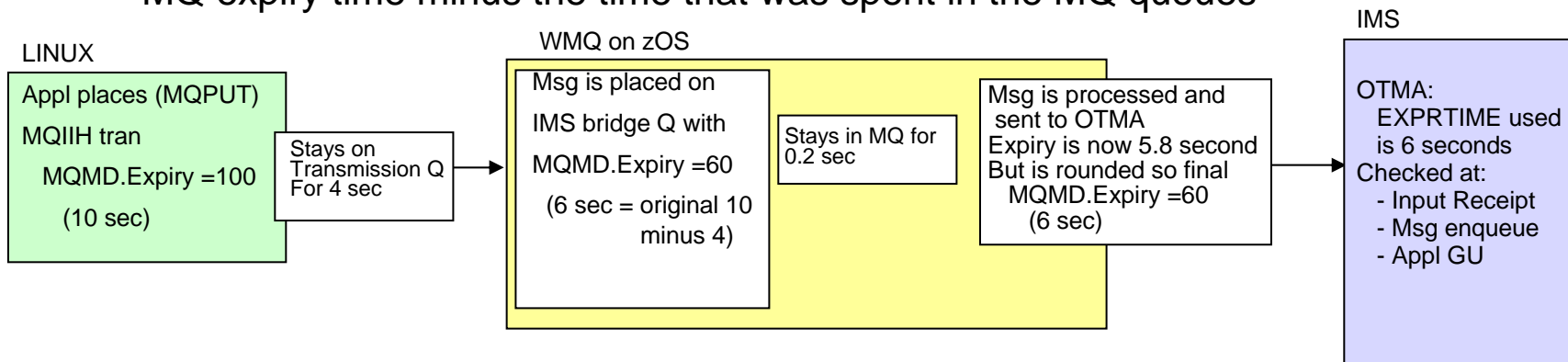
- Enhancement only affects **OTMA** messages
- Expired non-OTMA messages already receive DFS3688I
 - PK86426/UK47070 (V11) – non-OTMA transaction expiration is V11 only
DFS3688I Transaction *aaaaaaaa* expired: EXPRTIME=*nnnnnn*, ELAPSE=*ssssss*

MQ Message Expiration

- Extension of the WebSphere MQ (WMQ) Message Expiry facility to include the IMS transaction expiration function (WMQ 7.01)
 - A new service parameter
 - CSQ6SYSP SERVICE = 0000000001 or also specified through the SET SYSTEM SERVICE(0000000001) command
 - Used in conjunction with other queue manager service parameters
 - e.g. if queue manager already uses service parm 0040 then setting the new service would result in 0040000001
 - Provides toleration of an OTMA NACK_FOR_TRANS_EXPIRED response from IMS through the OTMA support
 - Leverages WMQ expiry processing as if the message had expired prior to sending the message to OTMA

MQ Message Expiration ...

- User-Specified Expiry time (message-level)
 - A value is passed to IMS if an MQ message expiry time (MQMD.Expiry) exists for the message AND the service parameter is set
 - Value is in 10ths of a second
 - **The residual expiry time for the message is built into the OTMA interface**
 - MQ expiry time minus the time that was spent in the MQ queues



From the remote application perspective (business as usual):

- The MQPUT application will be unaware of an expiry unless it specifies a Report option which can
 - > include the generation of an expiry report which will be sent to the specified reply-to queue,
 - > passing the remaining expiry interval from a request message to a response message,
 - > or just discarding the expired message.

MQ Message Expiration ...

- IMS Transaction Expiration (transaction-level)
 - Set in IMS
 - TRANSACT macro EXPRTIME value
 - IMS DFSINSX0 user exit routine
 - DRD commands: CREATE TRAN or UPDATE TRAN
 - Can be overridden by MQ Message Expiry value in the message
 - Implication
 - WMQ application is not aware of an IMS expiration value or that the message may expire even without an MQMD.Expiry specification

Message Expiry

- Transaction (Input) Message Expiry in IMS (3 phases)
 - During Input Receiving Phase or Enqueuing Phase
 - NAK is sent to the WMQ IMS Bridge with OTMA sense code x'0034'
 - Reason code
 - X'0001' - transaction was cancelled right after OTMA receives it from XCF.
 - X'0002' - transaction was cancelled before OTMA enqueues it.
 - Input message is flagged as expired and then discarded
 - A 67D0 log record that indicates OTMA detected an expired transaction and canceled the input message

Message Expiry ...

- Transaction Input Message Expiry in IMS...
 - During GU Phase (IMS application issues GU,IOPCB)
 - Abend 0243, and
 - DFS3688 message with tmember and tpipe names is sent to the MQ IMS bridge
 - With flag TMAMEXPR EQU X'04', set in the byte 2 of OTMA control data prefix for the message, indicating 'message expiry'
 - 67D0 log record that indicates OTMA detected an expired transaction and canceled the input message

Migration and Benefits

- **DFS3688I**
 - Applications/users will see a DFS3688I message instead of DFS555I/DFS2224I when an input message is discarded in GU Phase
- **WMQ support**
 - When Enabled
 - WMQ applications may need to be coded to expect either a DFS3688I messages or a NAK with OTMA sense code x'0034' for message expiry in IMS
- **Benefits**
 - Extends IMS transaction expiration function to WMQ
 - Standardizes the message (DFS3688I) that is sent out to remote clients when the transaction input message has expired