IMS 12 Transaction Manager Enhancements

Share Session 8575

Suzie Wendler
IBM

IMS TM Enhancements

- APPC and OTMA Shared Queues Enhancement
  - Removes the dependency on RRS for Synlevels None|Confirm

- APPC LU 6.2 Input/Output Edit Exit (DFSLUEE0) Enhancement

- OTMA Enhancements

- WMQ Message Expiry Support

- IMS Connect Enhancements

- IMS-IMS Connectivity
  - OTMA Support for Asynchronous IMS-IMS Communications
  - MSC TCP/IP Support

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) Applies only to synclevel=None | Confirm
    - Synclevel=Syncpoint still requires RRS
  - Communications use XCF services
  - New options for the existing AOS= parameter in DFSDCxxx

- Benefit
  - Using XCF rather than RRS allows 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 for Multiple OTMA Clients

- New capability that creates, shares and **caches** a <u>**single**</u> ACEE associated with a RACF userid

  - Shared across multiple OTMA member clients (TMEMBER)

- AND… a 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
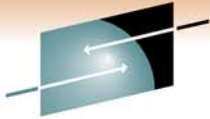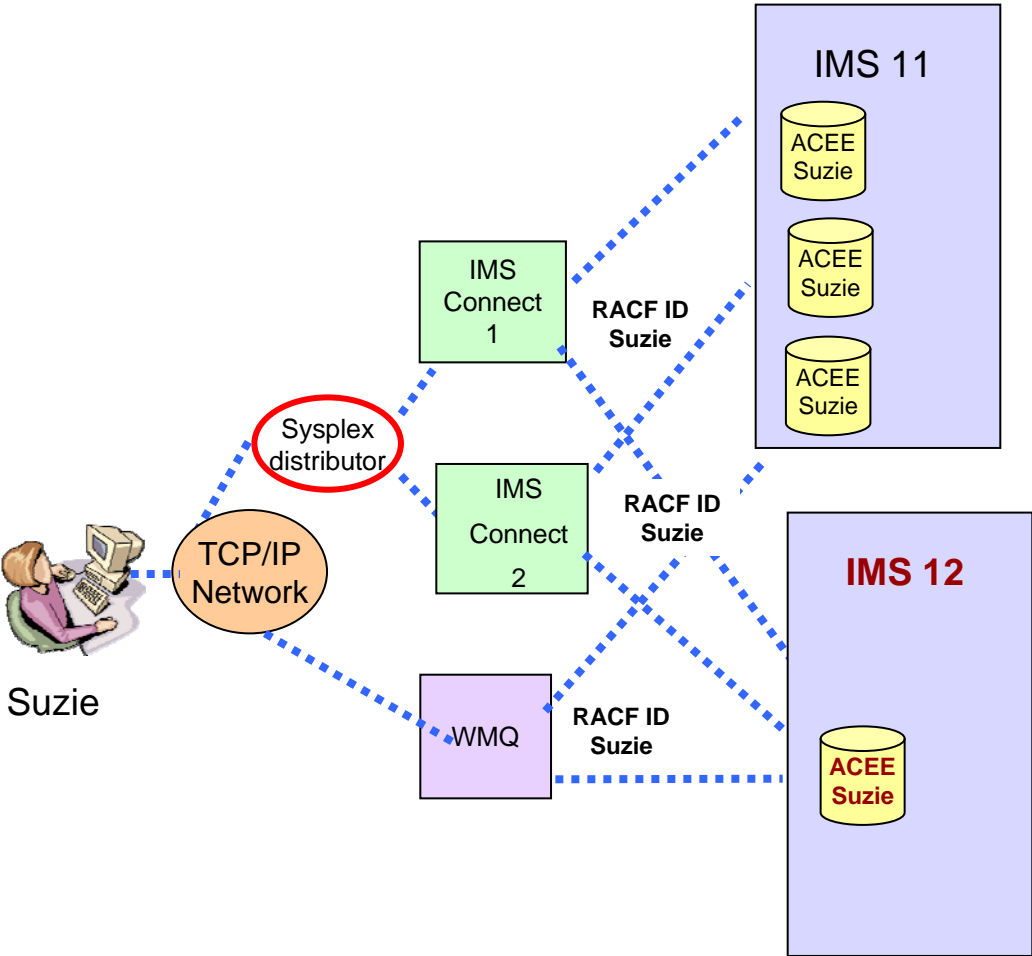
– More storage

– 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

IMS 11

ACEE Suzie

ACEE Suzie

ACEE Suzie

IMS Connect 1

RACF ID Suzie

Sysplex distributor

TCP/IP Network

IMS Connect 2

RACF ID Suzie

IMS 12

Suzie

WMQ

RACF ID Suzie

ACEE Suzie

Solution
Single ACEE cache

Benefits of OTMA ACEE Enhancements

- 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 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 Transacton Expiration SPE

- IMS Transaction Expiration SPE

- APARs PM05984 (IMS10) / PM05985 (V11)

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

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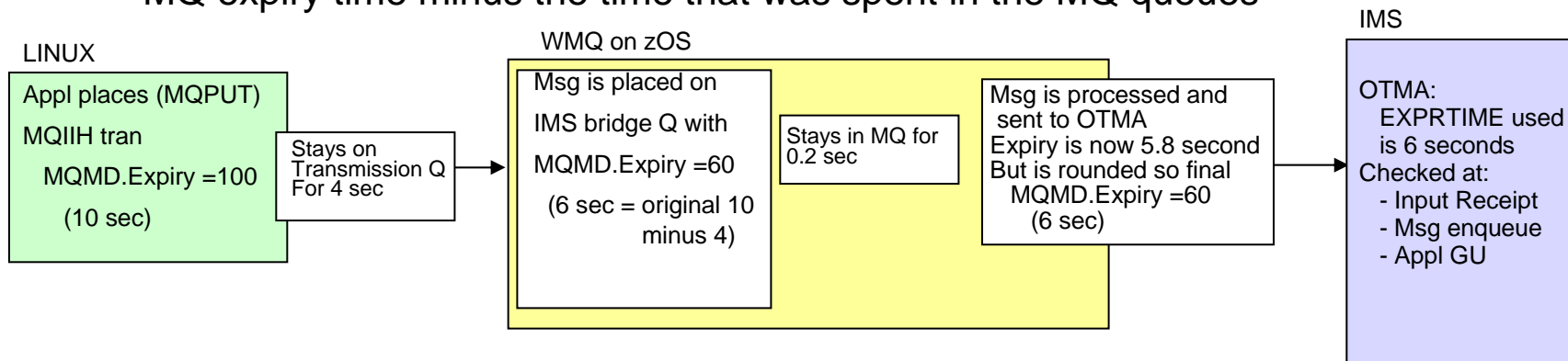   ***Tmember xxxx Tpipe xxxx***

  - 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

LINUX

WMQ on zOS

IMS

Appl places (MQPUT)
MQIIH tran
  MQMD.Expiry =100
    (10 sec)

Stays on Transmission Q For 4 sec

Msg is placed on
IMS bridge Q with
MQMD.Expiry =60
  (6 sec = original 10 minus 4)

Stays in MQ for 0.2 sec

Msg is processed and
  sent to OTMA
Expiry is now 5.8 second
But is rounded so final
  MQMD.Expiry =60
    (6 sec)

OTMA:
  EXPRTIME used
  is 6 seconds
Checked at:
  - Input Receipt
  - Msg enqueue
  - Appl GU

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,

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    > or just discarding the expired message.
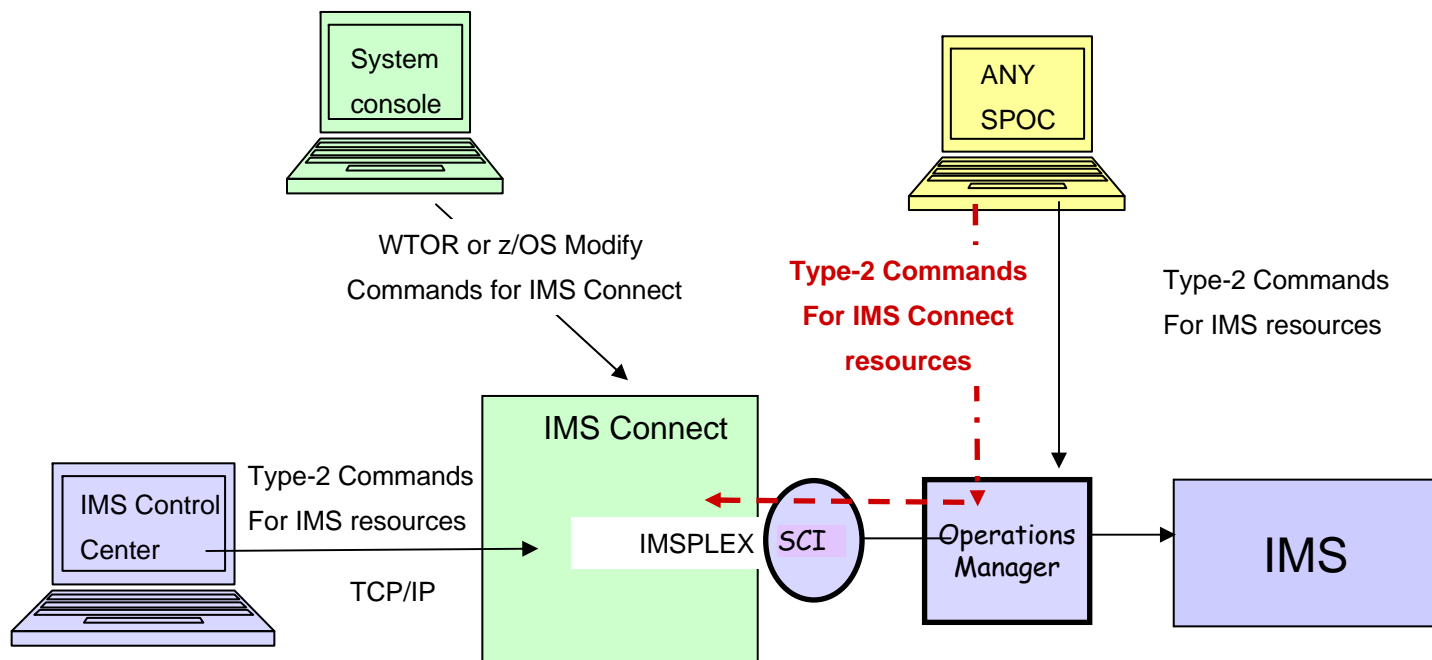
Migration and Benefits

- 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

New Type-2 Commands for IMS Connect

- New Type-2 commands for IMS Connect resources

  - QUERY IMSCON
  - UPDATE IMSCON

- Conform to the IMS command structure using the OM API
  - Processed by OM clients, e.g., TSO SPOC, REXX SPOC API, Batch SPOC, IMS Control Center, etc.

- Can coexist with the previous WTOR and z/OS Modify commands
  - No changes to the existing command functionality

The Environment

- New command environment for IMS Connect

System console

ANY SPOC

WTOR or z/OS Modify
Commands for IMS Connect

Type-2 Commands
For IMS Connect
resources

Type-2 Commands
For IMS resources

IMS Connect

IMS Control Center

Type-2 Commands
For IMS resources

IMSPLEX SCI

Operations Manager

IMS

TCP/IP

QUERY

> QUERY **IMSCON** TYPE(type) NAME(name1, name2,...)
>
> FILTER(filter) SHOW(attribute(s))

- TYPE = Type of resource in IMS Connect

  - ALIAS - aliases of associated ODBMs (VIEWIA)
  - CLIENT – active IMS Connect clients (no equivalent – information in VIEWPORT)
  - CONFIG – IMS Connect status and activity (VIEWHWS)
  - DATASTORE – datastores or IMS systems (VIEWDS)
  - IMSPLEX – information about the IMSPLEX (VIEWIP)
  - LINK – MSC logical link (no equivalent)
  - MSC - MSC physical link (VIEWMSC - new for IMS to IMS TCP/IP Communications)
  - ODBM – ODBMs and associated IMS aliases (VIEWOD)
  - PORT – TCPIP port and associated clients (VIEWPORT)
  - RMTIMSCON - remote IMS Connect and associated send clients (VIEWRMT - new for IMS to IMS TCP/IP Communications)
  - SENDCLNT – send clients (no equivalent - new for IMS to IMS TCP/IP Communications)
  - UOR - display unit of recovery identifier (VIEWUOR)

UPDATE

UPDATE IMSCON TYPE(*type*) NAME*(name1, name2,...)*
        START(condition1,condition2,…) STOP(condition1,condition2,…)
        SET(condition1,condition2,…)

- TYPE = Type of resource in IMS Connect
  - ALIAS – IMS aliases and associated ODBMs (STARTIA,STOPIA)
  - CLIENT – TCPIP clients (STOPCLNT)
  - CONFIG – IMS Connect configuration status and activity (CLOSEHWS,
            SETOAUTO, SETPWMC, SETRACF, SETRRS, RECORDER, SETUID)
  - CONVERTER – Refresh XML converters (REFRESH – new IMS Connect enhancement)
  - DATASTORE – update datastore status (OPENDS,STARTDS, STOPDS)
  - IMSPLEX – update connection to the IMSplex (OPENIP,STARTIP,STOPIP)
  - LINK – MSC logical link (STOPLINK - new for IMS to IMS TCP/IP Communications)
  - MSC - MSC physical link (STARTMSC/STOPMSC - new for IMS to IMS TCP/IP Communications)
  - ODBM – ODBMs and associated IMS aliases (STARTOD/STOPOD)
  - PORT – TCPIP port and associated clients (OPENPORT/STOPPORT)
  - RACFUID – update RACF userid caching (REFRESH – new IMS Connect enhancements)
  - RMTIMSCON - remote IMS Connect and associated send clients (STARTMRT/STOPRMT - new for
              IMS to IMS TCP/IP Communications)
  - SENDCLNT – send clients (STOPSCLN – new for IMS to IMS TCP/IP Communications)

XML Converter Refresh

- New Command to refresh an XML converter file that is already in use

  > UPDATE IMSCON TYPE(CONVERTER)…
  > xx,REFRESH CONVERTER NAME(*cvtrname*)
  > F hws,UPDATE CONVERTER NAME(*cvtrname*) OPTION(REFRESH)

  - Supported by all command interfaces: Type-2, WTOR, z/OS Modify

- Converter files continue to be:
  - Generated using RDz
  - Loaded by IMS Connect from STEPLIB/JOBLIB/LNKLST

- Benefit
  - More timely ability to change and implement converter files
    - Without requiring an IMS Connect restart

New IMS Connect Recorder Trace Records

- New level of tracing adds records for TCP/IP and XCF sends/receives

  ICONTR – TCP/IP Receive

  ICONTS – TCP/IP Send

  ICONIR – IMS OTMA Receive

  ICONIS – IMS OTMA Send

  - Requires the use of the BPE External Trace support introduced in IMS 11

    - Due to the amount of data that can be produced

  - Requires tracing to be set to LEVEL(HIGH)

- Benefit

  - Additional trace points provide the ability to capture client errors for improved problem determination and analysis

  - The use of BPE external tracing allows large amounts of data to be captured

New IMS Connect Recorder Trace Records …

F HWS1,UPDATE TRACETABLE NAME(RCTR) OWNER(HWS) **LEVEL(HIGH)** EXTERNAL(YES)
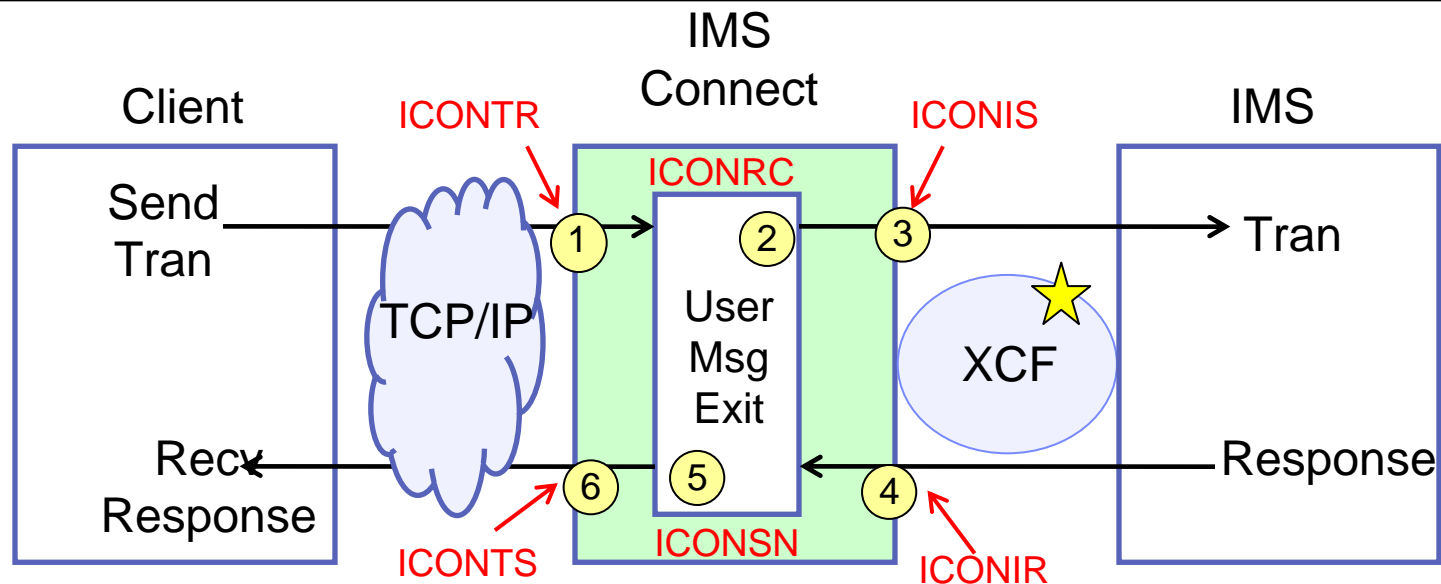
① ICONTR – Receive from TCP/IP ② ICONRC – User Msg Exit Receive ③ ICONIS – Send to IMS

⑥ ICONTS – TCP/IP Send to Client ⑤ ICONSN – User Msg Exit XMIT ④ ICONIR – Receive from IMS

⭐ **No** ICONIS/ICONIR support for the SCI interface (type-2 commands and ODBM)

IMS Connect - RACF Return Codes

- Previously, IMS Connect returned RSM RC=08 RSN=40 for any and all security violations

  - No indication of specific reason,

    - E.g. invalid userid, incorrect password, password expired, etc.

  - With IMS 12, enhancements to RACF Return Codes:

    - In the Request Status Message (RSM) for RYO and the IMS SOAP Gateway
      - RSM_RACFRC
    - In the OTMA User Data section for the IMS TM Resource Adapter
      - OMUSR_RACF_RC
      - New IMS Connect Protocol level indicates support
        OMUSR_PROLEV = OMUSR_PR03

- Benefit

  - Improved explanation and understanding of security violation

IMS Connect – RACF Userid Caching

- Existing IMS Connect security with RACF=Y

  - Limited caching of RACF Utoken

    - Consecutive requests on a persistent socket with the same Userid/Password/Group

- IMS 12 enhancement with RACF=Y

  - Common cache for userids across ALL sessions and ALL ports

    - HWSCFG HWS statement: UIDCACHE={N|Y} , UIDAGE=aging_value

```
     xx,VIEWHWS

                  HWSC0001I    HWS ID=HWS1     RACF=Y  PSWDMC=R
                  HWSC0001I       UIDCACHE=Y   UIDAGE=300
                  HWSC0001I       MAXSOC=2000   TIMEOUT=6000
                  HWSC0001I       NUMSOC=6       WARNSOC=80%  WARNINC=5%
                  HWSC0001I       RRS=Y   STATUS=ACTIVE
                  HWSC0001I       VERSION=V12 IP-ADDRESS=009.030.218.050
                  HWSC0001I       SUPER MEMBER NAME=     CM0 ACK TOQ=
                  HWSC0001I     ADAPTER=Y
```

CM0 ACK NoWait for RYO Clients

- Existing protocol for Roll Your Own (RYO) clients requires

  - CM0 Send-Receive interactions to receive a timeout notification after ACK/NAK

    - Receive and timeout flow adds unnecessary overhead to the client application

- New option of NoWait on ACK or NAK

  - Indicates the remote client will not issue subsequent receive

Previous CM0 send-receive flow
Send request Receive response Send ACK Receive T/O

New CM0 send-receive flow
Send request Receive response Send ACK NoWait

(no need to issue receive for final timeout)

- Benefit

  - Greater efficiency and simplified interaction

   - Eliminates need for extra send after an ACK/NAK

Partial Read Status

- New READ client status

  - The message has been received by IMS Connect but is not yet considered a complete input message

    - Should be transient but can be an indicator of a problem
    - Affects VIEWPORT, VIEWHWS, QUERY MEMBER, QUERY PORT, QUERY IMSCON command output

- Benefit

  - Facilitates the detection of a remote application programming error

    - Invalid length specification of an input message

IMS Connect User Exit Load Modules

- IMS Connect ships load modules for User Exits
  - HWSUNIT0, HWSJAVA0, HWSSMPL0, HWSSMPL1
    - Previously, working samples were provided but always had to be assembled and bound
      - Even if no changes were made to the provided source samples

- Benefit
  - Eases installation and maintenance processing if the user exits are to be used unchanged

IMS to IMS TCP/IP Connectivity

- Enhancements to leverage TCP/IP networks for communications between IMS systems for:

  - OTMA Support for Asynchronous IMS-IMS Communications
    - Uses one-way message communications (ALTPCB)
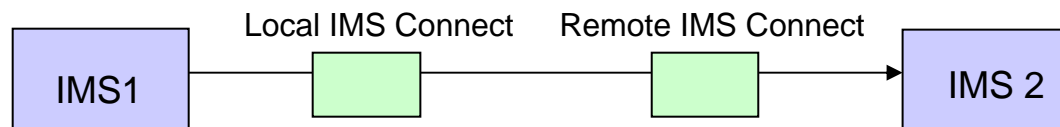
  - TCP/IP-Type Physical Links (MSC)
    - Request and response message communications
      - IMS Connect processes both the request and response messages as one-way asynchronous messages
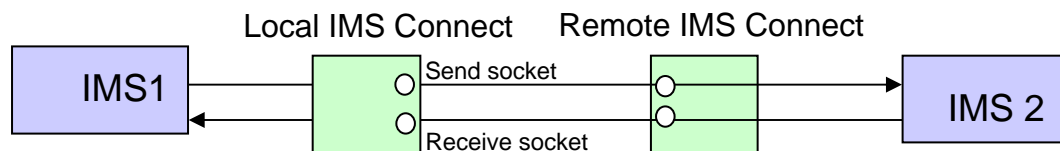
Asynchronous IMS-IMS TCP/IP Support

- TCP/IP connections between the local and remote IMS systems
  - Are managed by IMS Connect to IMS Connect communications
    - Without having to write client code or invoke additional gateways
      - The goal is simplification and ease of use

Example:
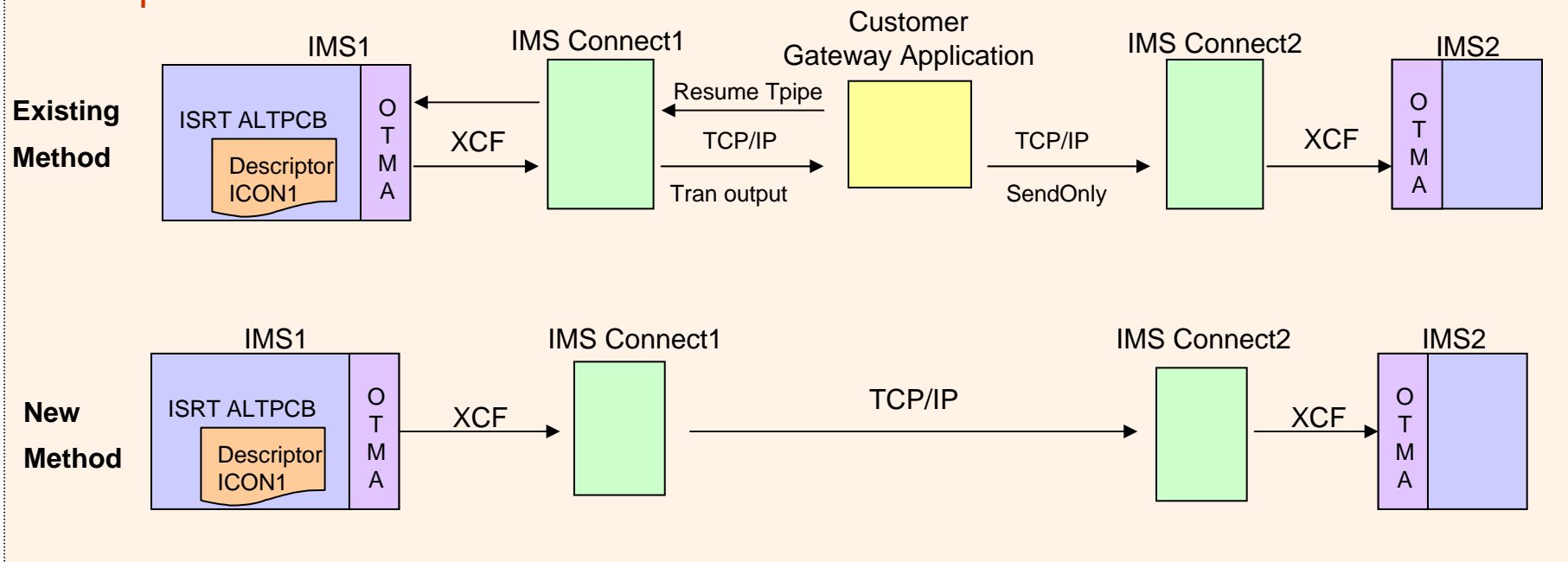
Asynchronous IMS-IMS TCP/IP Support ...

- OTMA

  - Sends OTMA remote ALTPCB messages to IMS Connect using new destination information

    - OTMA destination descriptors or DFSYDRU0 exit Routine

- IMS Connect

  - Receives OTMA ALTPCB messages from a local IMS and sends them to the remote IMS Connect for processing in the remote IMS

    - Enhanced IMS Connect configuration specifications

ALTPCB destination is resolved using an OTMA Destination Descriptor or the DFSYDRU0 exit

IMS Connect configurations defines the connection to the remote Partner
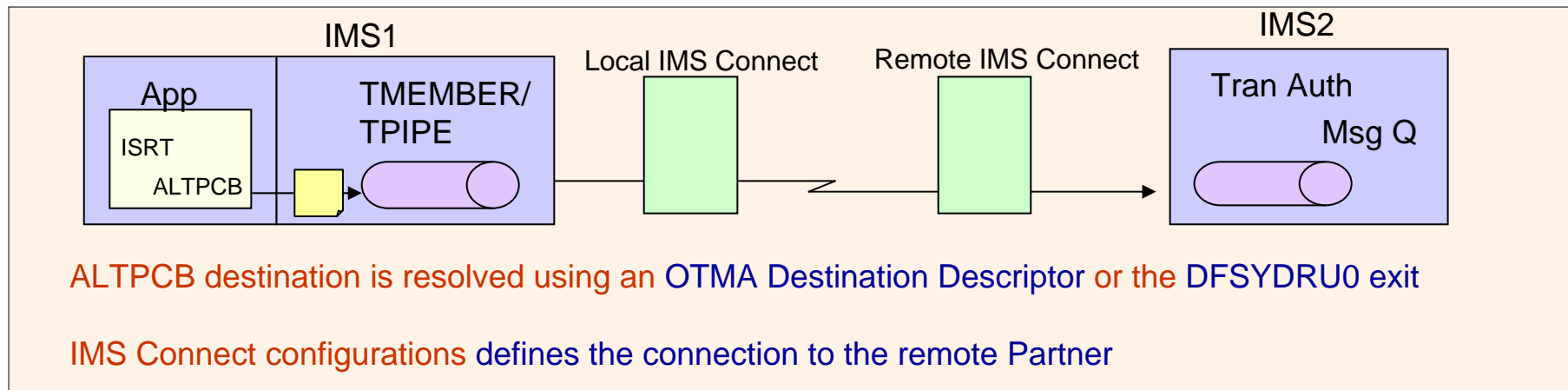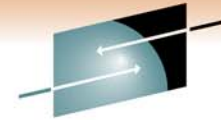
OTMA Support – Message Flow Details

IMS1

App	TMEMBER/ TPIPE		Local IMS Connect

CHNG ..DESC1

ISRT ALTPCB

LLZZ | TRANABC| DATA

Descriptor DESC1 → **WAIT_R**

XCF → **ICON1**

OTMAHDR | LLZZ | TRANABC | DATA
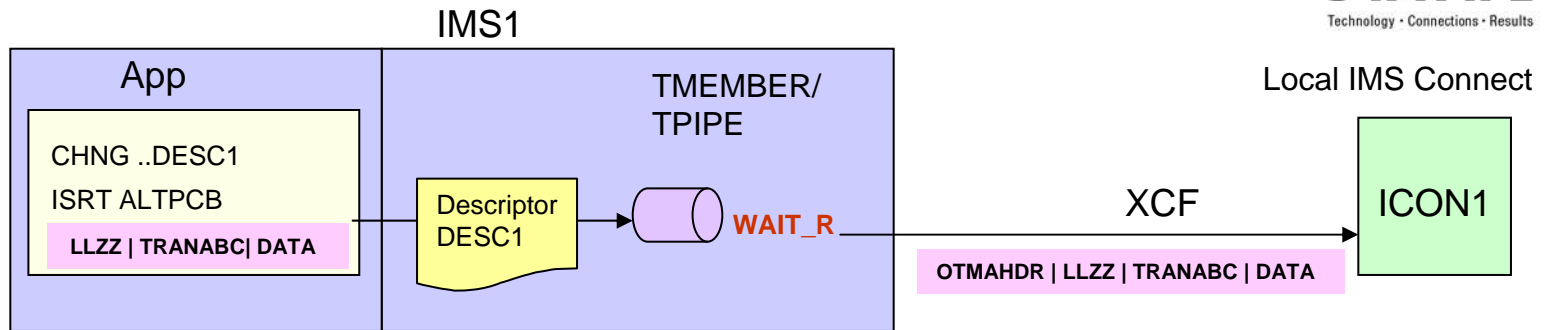
```
D DESC1    TYPE=IMSCON TMEMBER=ICON1 RMTIMSCON=ICON2 RMTIMS=IMS2
D DESC1    USERID=USER01
```

- **IMS Application**
  - Issues CHNG call to set the destination name (descriptor)
    - IMS resolves this destination using an OTMA destination descriptor by the same name or through DFSYDRU0 specifications
  - Issues ISRT ALTPCB to send the message to a remote IMS

- OTMA
  - Using information from either the descriptor or exit
    - Sends the message to the local IMS Connect from a regular TPIPE queue
    - Builds the OTMA header
  - Waits for ACK/NAK
    - TPIPE queue is in a new **WAIT_R** status during this wait

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IMS Connect Configurations

IMS1

```
App            TMEMBER/
               TPIPE
ISRT                              WAIT_R
ALTPCB
```

XCF → ICON1

Descriptor
DESC1

Descriptors or
DFSYDRU0 exit

```
HWS=(ID=ICON1,XIBAREA=100,RACF=N)
TCPIP=(HOSTNAME=TCPIP,PORTID=(8888),
      ...
DATASTORE=(ID=IMS1,GROUP=XCFGRP1,MEMBER=ICON1,
      TMEMBER=IMS1,DRU=HWSYDRU0,APPL=APPLID1)

RMTIMSCON=(ID=ICON2,HOSTNAME=ICON2.IBM.COM,
          PORT=9999,AUTOCONN=N,PERSISTENT=Y,
          IDLETO=60000,RESVSOC=10,USERID=USER01,
          APPL=APPL01)
```

SendOnly with ACK
LLLL|IRM|LLZZ|TRANABC |DATA

```
D DESC1
TMEMBER=ICON1
RMTIMSCON=ICON2
RMTIMS=IMS2
RMTTRAN=TRANABC
USERID=USERXYZ
```

TCP/IP

ICON2

```
HWS=(ID=ICON2,XIBAREA=100,RACF=Y)
TCPIP=(HOSTNAME=TCPIP,PORTID=(9999),
      MAXSOC=50,TIMEOUT=5000,EXIT=(HWSSMPL0,HWSSMPL1))
DATASTORE=(ID=IMS2,GROUP=XCFGRP1,MEMBER=ICON2,
      TMEMBER=IMS2,DRU=HWSYDRU0,APPL=APPLID1
```

And finally … the Return ACK / NAK

SHARE
Technology · Connections · Results

IMS1

App
TMEMBER/
TPIPE

ISRT
ALTPCB

WAIT R

XCF

ICON1

SendOnly with ACK

Descriptor
DESC1

Descriptors or
DFSYDRU0 exit

TCP/IP

IMS2

ICON2

XCF

Tran Auth

Msg Q

ACK / NAK
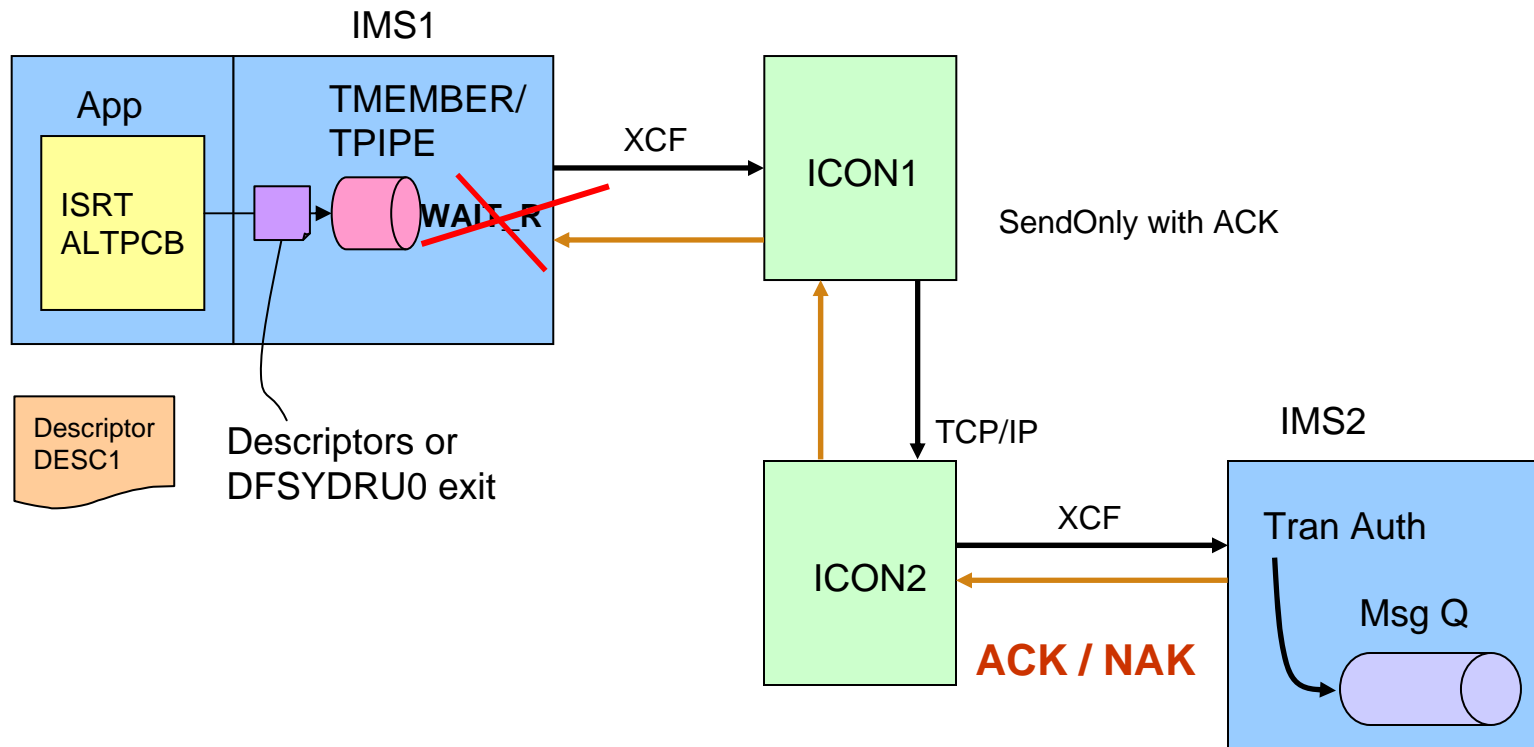
IMS2 performs transaction authorization,
if necessary, and ACKs or NAKs the
message

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2011

Usage and Benefits

- Usage

  - IMS applications: ISRT ALTPCB

  - IMS environment: destination descriptor or a DFSYDRU0 exit routine

  - IMS Connect: configuration specifications

- Benefits

  - Supports TCPIP communications to invoke transactions between IMS systems without having to create or maintain a separate gateway solution

    - IMS-provided and supported solution
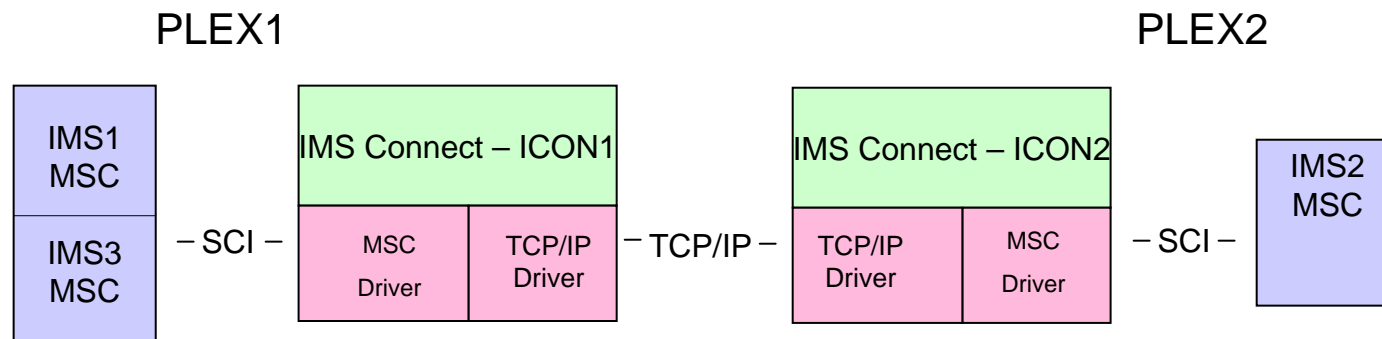
MSC TCP/IP

- Support for MSC communications across a TCP/IP network

  - A new physical link MSPLINK TYPE=TCPIP

    - Provides a mechanism to
      - Take advantage of TCP/IP networks
      - Complement or backup existing SNA/VTAM links
      - Take advantage of potentially higher bandwidths

    - Supports operational compatibility with other link types (CTC, MTM, VTAM)
      - Starting, stopping, updating, displaying, and assigning resources

  - Only between IMS 12 systems
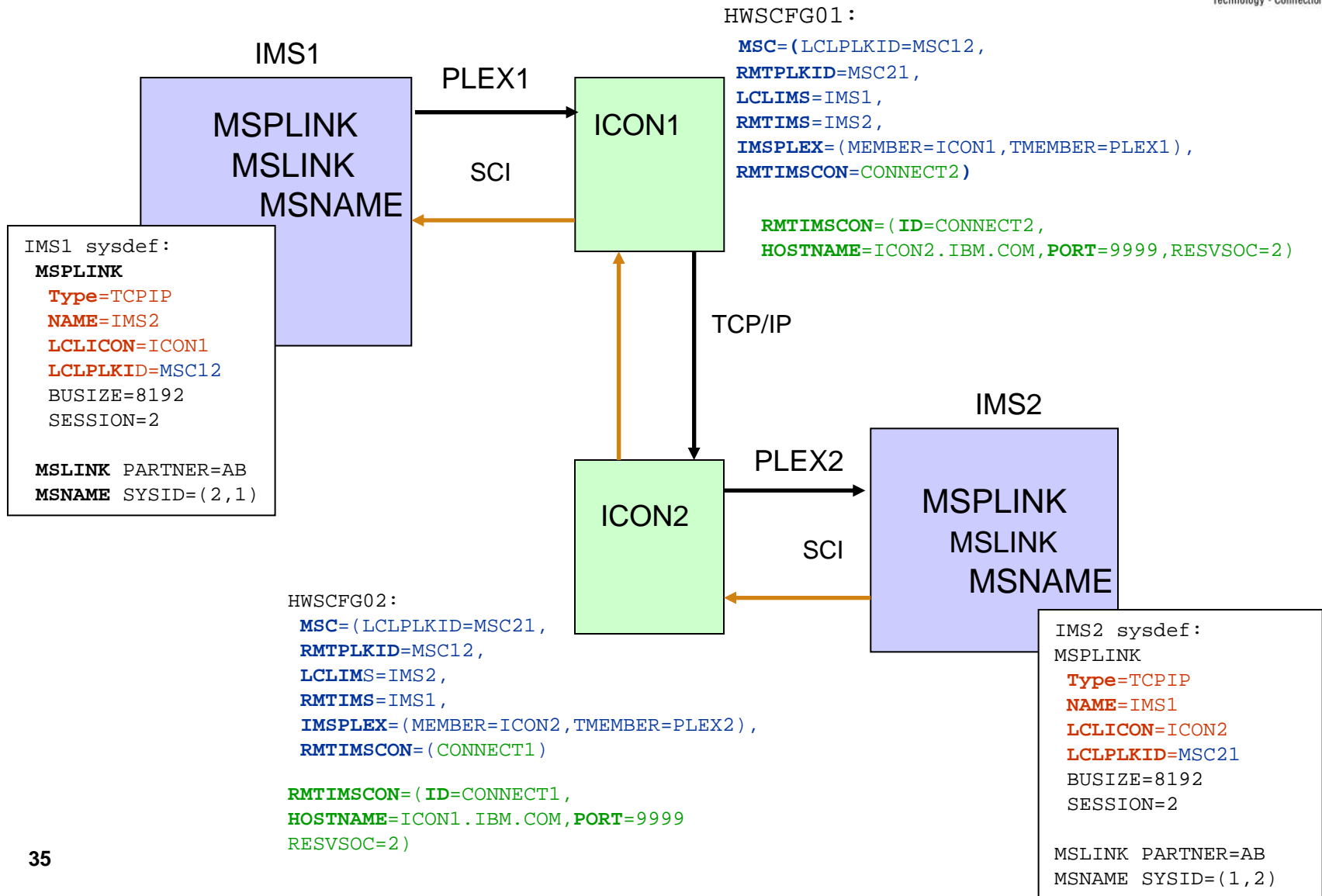
MSC TCP/IP …

- MSC TCP/IP leverages IMS Connect and the Common Service Layer

  - IMS Connect sends/receives messages via the TCP/IP network
    - IMS Connect manages the TCP/IP communications
    - IMS MSC manages the message processing

  - CSL provides the Structured Call Interface (SCI) for communications between IMS components including IMS Connect
    - Each IMS and its local MSC-routing IMS Connect system must be part of the same IMSplex
      - IMSPLEX= plexname parameter in the Common Layer Section of the DFSDFxxx of IMS proclib
    - The Operations Manager (OM) is not required but recommended
      - For type-2 command support

MSC TCP/IP …

- IMS to IMS Connect functionality
  - Isolates TCP/IP from the IMS Control Region
    - Uses the existing IMS Connect TCP/IP support
  - Provides a new MSC driver as well as TCP/IP driver for MSC
  - Supports communication with IMS via the Structured Call Interface (SCI)

PLEX1   PLEX2

IMS1 MSC		IMS Connect – ICON1			IMS Connect – ICON2			IMS2 MSC
IMS3 MSC	– SCI –	MSC Driver	TCP/IP Driver	– TCP/IP –	TCP/IP Driver	MSC Driver	– SCI –	

Example: Configuration Definitions

IMS1

PLEX1

```
HWSCFG01:
  MSC=(LCLPLKID=MSC12,
  RMTPLKID=MSC21,
  LCLIMS=IMS1,
  RMTIMS=IMS2,
  IMSPLEX=(MEMBER=ICON1,TMEMBER=PLEX1),
  RMTIMSCON=CONNECT2)

    RMTIMSCON=(ID=CONNECT2,
    HOSTNAME=ICON2.IBM.COM,PORT=9999,RESVSOC=2)
```

MSPLINK
MSLINK
MSNAME

ICON1

SCI

```
IMS1 sysdef:
 MSPLINK
  Type=TCPIP
  NAME=IMS2
  LCLICON=ICON1
  LCLPLKID=MSC12
  BUSIZE=8192
  SESSION=2

 MSLINK PARTNER=AB
 MSNAME SYSID=(2,1)
```

TCP/IP

IMS2

PLEX2

ICON2

MSPLINK
MSLINK
MSNAME

SCI

```
HWSCFG02:
 MSC=(LCLPLKID=MSC21,
 RMTPLKID=MSC12,
 LCLIMS=IMS2,
 RMTIMS=IMS1,
 IMSPLEX=(MEMBER=ICON2,TMEMBER=PLEX2),
 RMTIMSCON=(CONNECT1)

 RMTIMSCON=(ID=CONNECT1,
 HOSTNAME=ICON1.IBM.COM,PORT=9999
 RESVSOC=2)
```

```
IMS2 sysdef:
 MSPLINK
  Type=TCPIP
  NAME=IMS1
  LCLICON=ICON2
  LCLPLKID=MSC21
  BUSIZE=8192
  SESSION=2

 MSLINK PARTNER=AB
 MSNAME SYSID=(1,2)
```

Enhanced I/O Statistics

- Enhanced Query MSLINK Show (Statistics)
  - Added elapsed times for SCIs, ICONs, and TCPIP
    - I/O statistics reported in SCI, ICON, and TCP/IP elapsed times
      - SendIO_Times
        - Tot_SCI_SendIO_Time, Tot_ICON_SendIO_Time, Tot_TCPIP_SendIO_Time …
        - Hi_SCI_SendIO_Time, Hi_ICON_SendIO_Time, Hi_TCPIP_SendIO_Time …
        - Low_SCI_SendIO_Time, Low_ICON_SendIO_Time, Low_TCPIP_SendIO_Time …
      - ReceiveIO_Times
        - Tot_SCI_RecIO_Time, Tot_ICON_RecIO_Time, Tot_TCPIP_RecIO_Time…
        - Hi_SCI_RecIO_Time, Hi_ICON_RecIO_Time, Hi_TCPIP_RecIO_Time…
        - Low_SCI_RecIO_Time, Low_ICON_RecIO_Time, Low_TCPIP_RecIO_Time…

2011
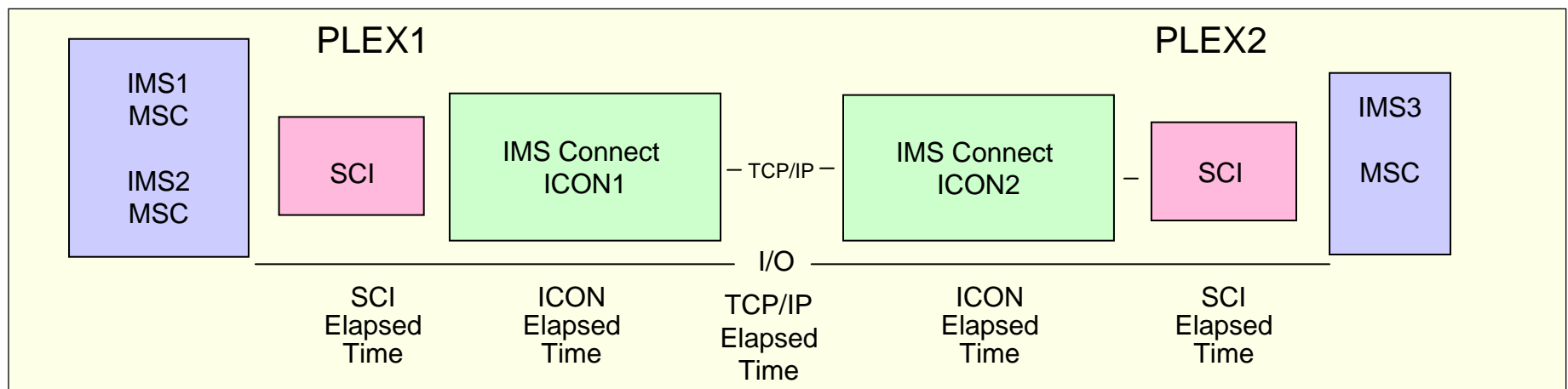
MSC TCP/IP - Benefits

- Benefits
  - Takes advantage of TCP/IP networks for MSC
    - Can potentially provide for a higher MSC bandwidth
  - Supports different configurations
    - Coexistence with or backup of VTAM/SNA links
    - Increases availability
      - Logical links can be moved between VTAM and TCPIP
    - Flexibility
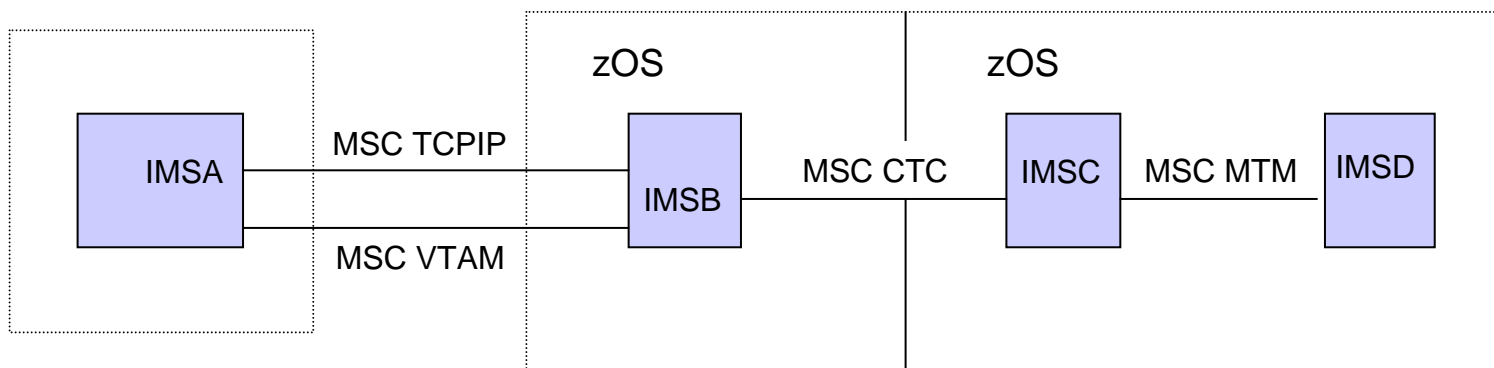
Summary

- IMS 12 continues to enhance:

  - APPC

  - OTMA

  - IMS Connect

- And introduces new ways to support

  - IMS-IMS Communications