IBM Software Group - IMS

IMS22
IMS Connect – The Hows, Whys and Wherefores

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e business on demand.

What is IMS Connect?

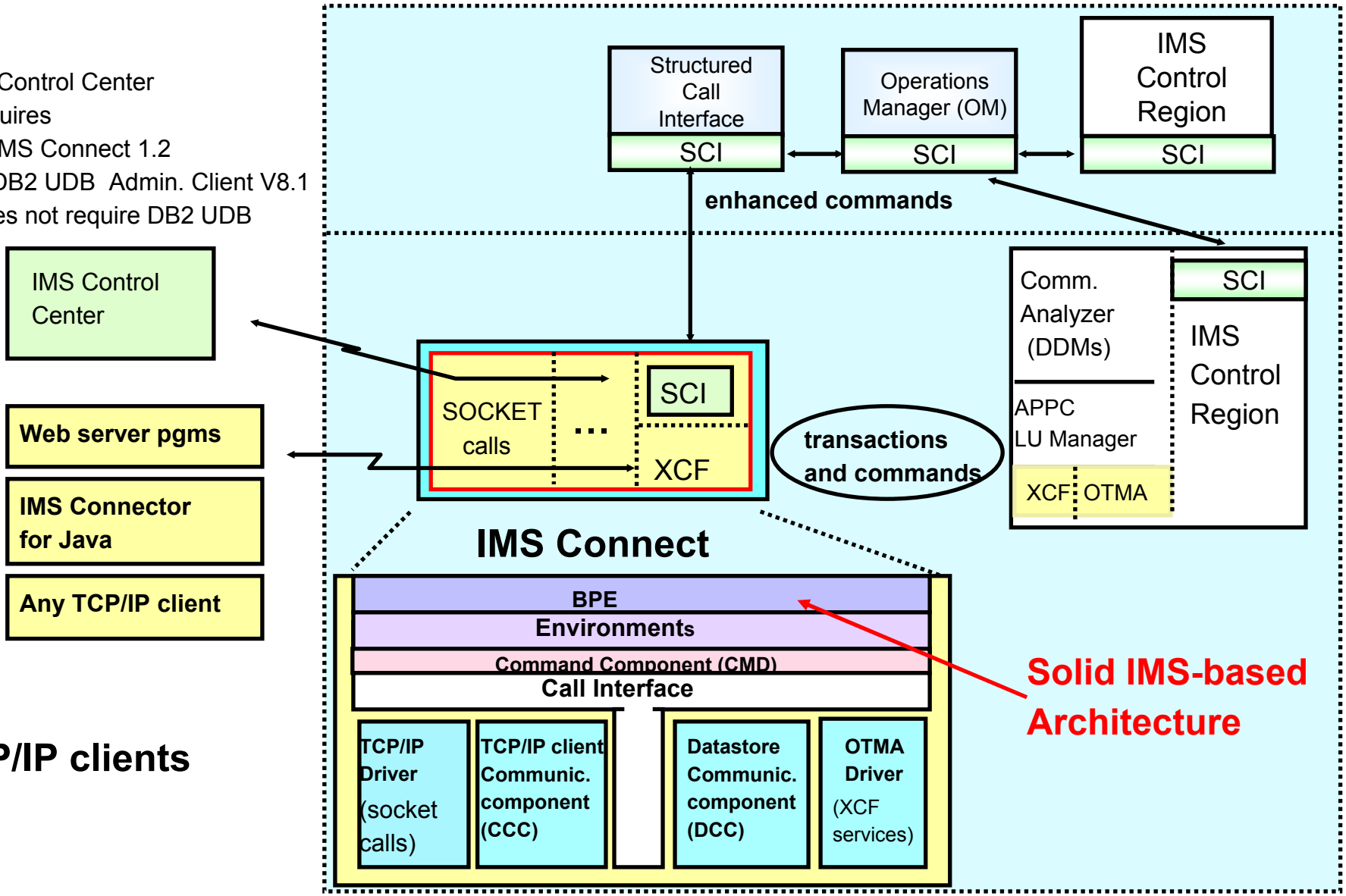
- **A product (5655-K52) that provides connectivity support between TCP/IP applications and IMS/TM**
  - Component ID 5655E51 (service), FMID HIC2210
  - Configured on an OS/390 or z/OS server
    - SMP installed and maintained
- **Part of IMS V9**  **new new new new new new new** 
- **Benefits and Value**
  - Supports TCP/IP sockets access to IMS transactions and commands
    - No requirement to modify existing IMS transactions
  - Provides a general purpose and structured interface
    - For the IMS Connectors
    - For user-written clients
  - Provides a strategic base for new connection technologies
    - IMSPLEX

IMS Connect Architecture

- **Executes in a separate MVS Address Space than IMS**
- **Functions as a TCP/IP server for communication with external clients**
  - Uses MVS XCF Services to access IMS OTMA
    - Transactions and commands
  - Configuration supports
    - Multiple IMS Connects accessing the same IMS system
    - A Single IMS Connect accessing multiple IMS systems
- **Provides IMSPLEX support for enhanced commands**
  - Requires IMS V8 - Operations Manager (OM)
  - Interfaces between an IMS Control Center client and OM
    - Uses the Structure Call Interface (SCI)

IMS Connect Architecture …

IMS Control Center
-Requires
IMS Connect 1.2
DB2 UDB Admin. Client V8.1
- Does not require DB2 UDB



TCP/IP clients

Background

- **IMS Connect V1.1**
  - Improved Performance with Persistent Sockets
  - EnhancedDump formatting capability
  - Enhanced manageability with SMP/E Install/Maintenance
  - Asynch output capability with IMS V7
  - Send only capability: Connect, Send (sendonly) , Disconnect
- **IMS Connect V1.1 enhancements**
  - Local/390 support
  - Unicode
  - ACK/NAK required notification support
- **End of Service – 11/30/2003**

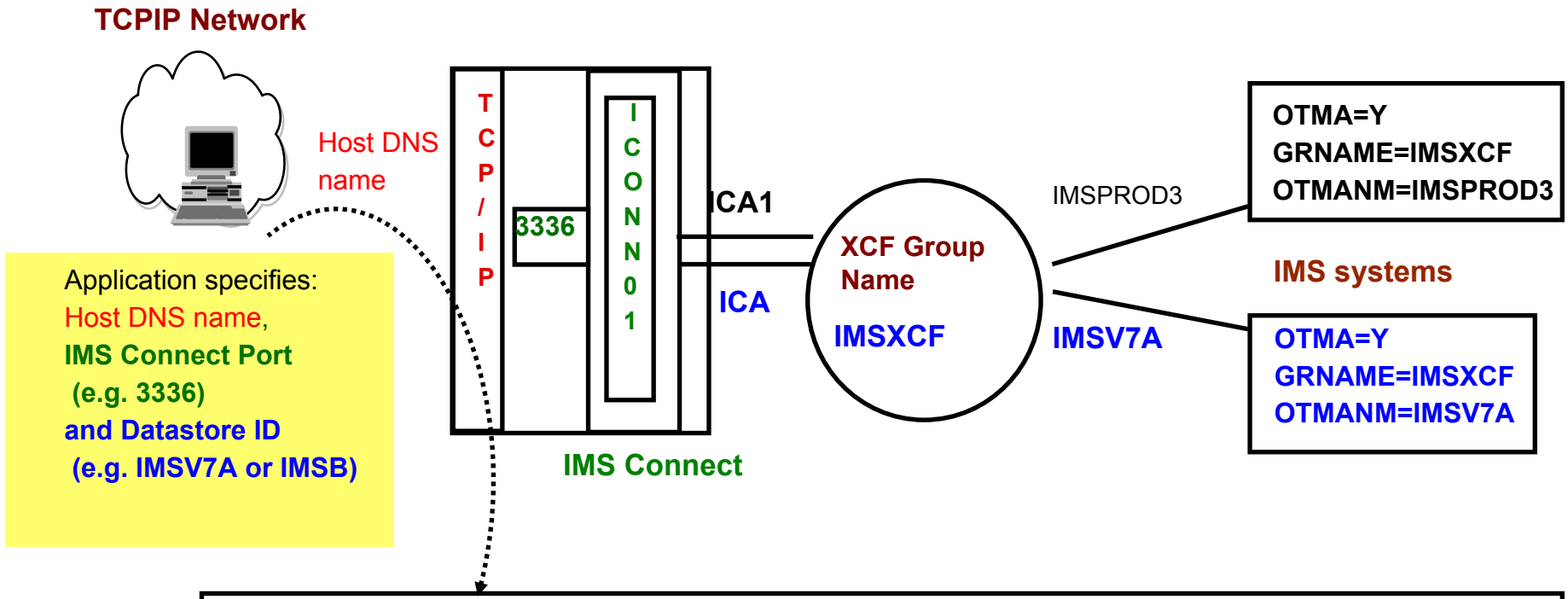
Background …

- **IMS Connect V1.2**
  - IMS Connector for Java J2EE Runtime support for WebSphere access
    - Used with VAJava/WASADIE's IMS Connector for Java
  - Two-phase Commit Support in Local 390/zOS environments
  - Security enhancements
    - Passticket support
    - Trusted User support
  - More Granular timeout (eg. by transaction)
  - User message exit limitation relief
  - Auto reconnect to a recycled IMS system
  - IPV6 support
  - IMS V8 support - Operations Manager distributed interface
- **Marketing Withdrawal – 09/03/2003**
- **End of Service – 04/30/2005**

Background …

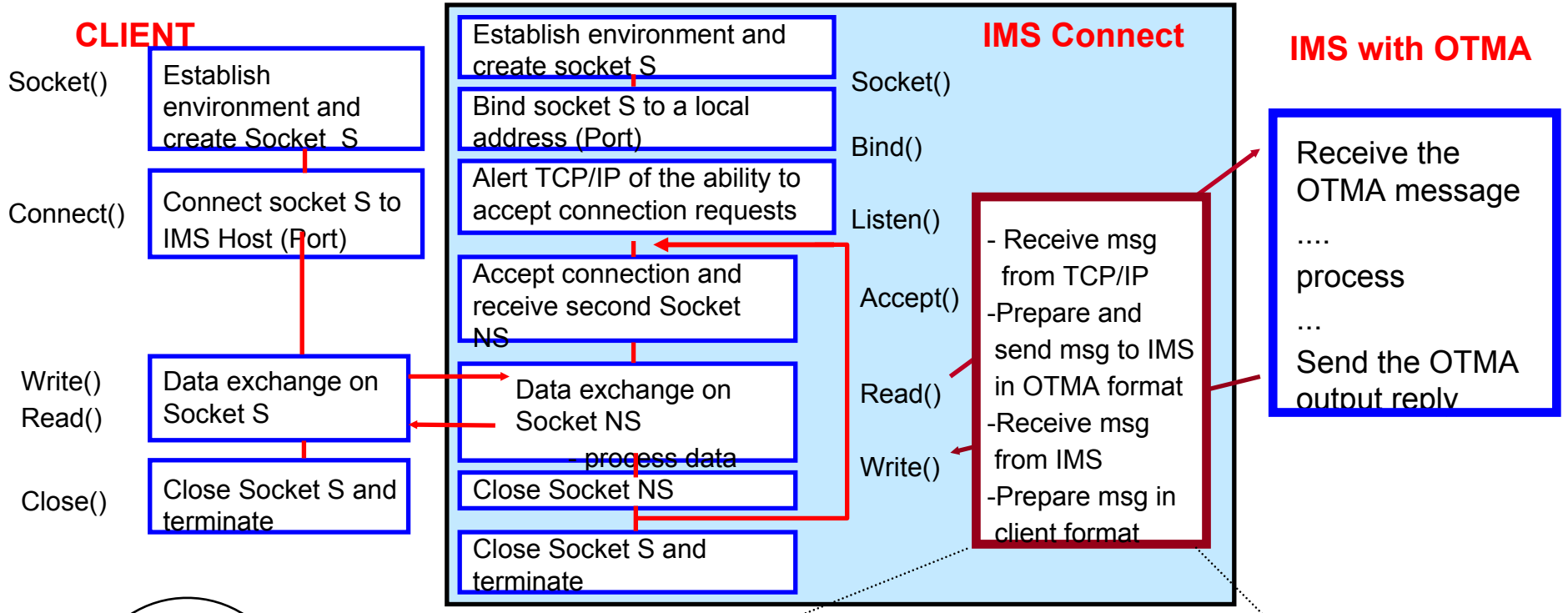
- **IMS Connect V2.1**
  - PING support
    - Determines IMS Connect availability
  - J2EE XA Two-phase Commit Support
    - Distributed environments
    - z/OS environments across TCP/IP
  - SSL support
    - Enhanced security control
  - Commit mode 0 – persistent socket support
    - PQ80468

Configuration



IMS Connect configuration (HWSCFGnn) member resides in IMS.PROCLIB

Socket Application Basic Design



clients use SOCKETS API:

- ***Input message:***
  - Formatted message header to communicate with IMS Connect
  - Client message (can include OTMA headers)
- ***Output message*** can consist of one or more predefined structures

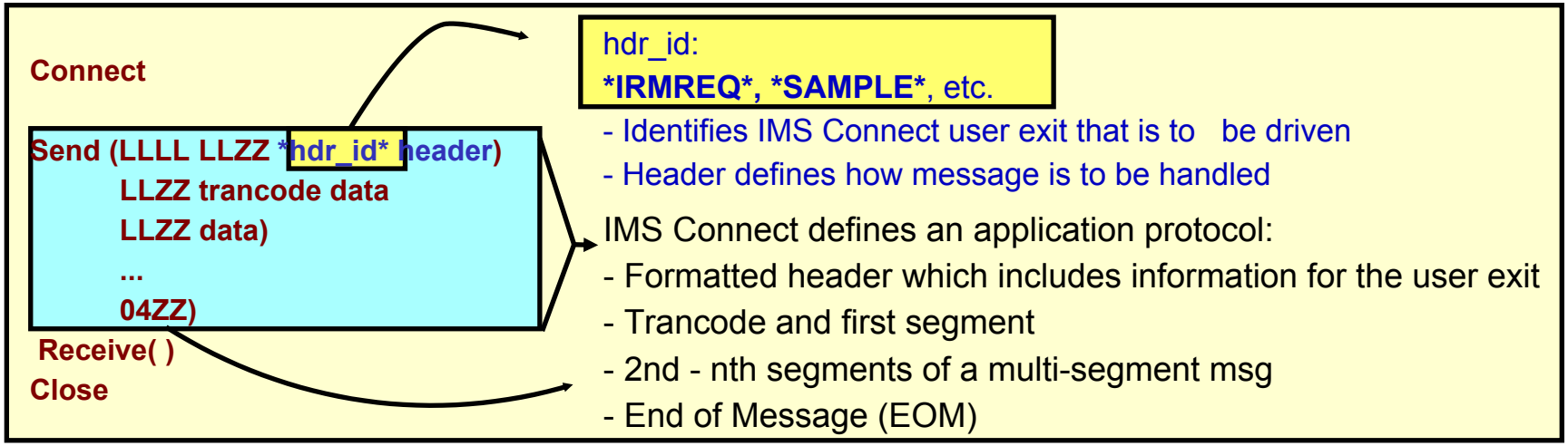
User Exits: HWSIMSO0, HWSSMPL0, HWSJAVA0, ...

Optionally perform:

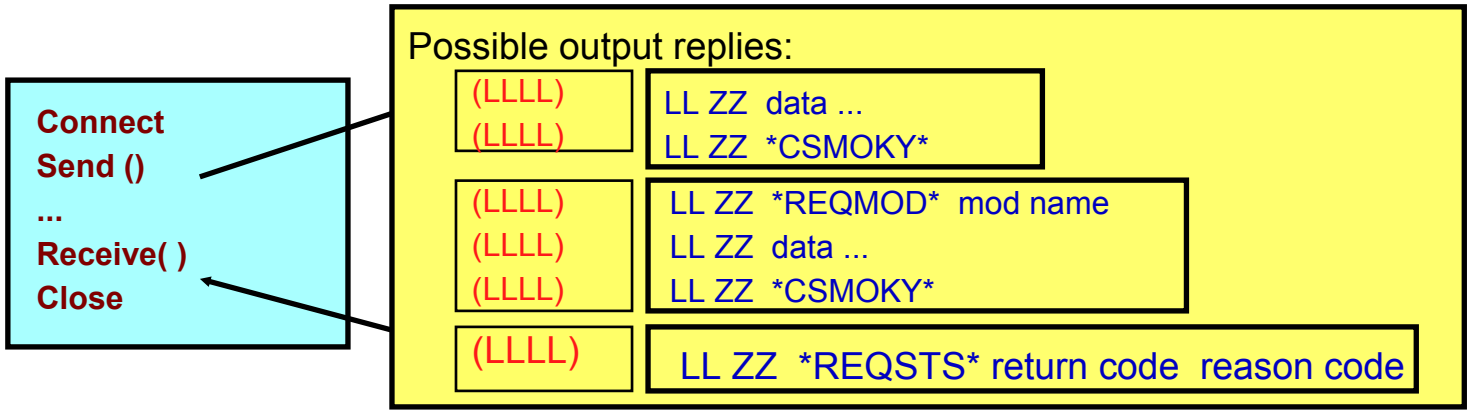
- Translation ASCII / EBCDIC
- Conversion between client msg format and OTMA msg format
- Prepare output message format

IMS Connect Application Protocol

- **Input Messages:**
  - LLLL = Length of entire msg including all data segments and the EOM



- **Output Messages:**
  - Optional LLLL included when using message exits HWSIMS01/HWSSMPL1



Application Protocols

- **Synchronization level (Sync_level)**
  - NONE
  - CONFIRM
  - SYNCPOINT - two phase commit
    - Websphere/zOS and Websphere Distributed
- **Commit modes**
  - Commit_then_send (Commit mode 0)
    - Output is sent as a result of syncpoint
    - Always uses sync_level of CONFIRM
    - Output is queued until client sends an ACK
  - Send_then_commit (Commit mode 1)
    - IOPCB output is sent before syncpoint
    - Sync_level can be either NONE or CONFIRM

Sockets

- **TCP/IP application programming interface (API)**
  - Connection between two TCP/IP programs
- **Socket type is controlled by the client application**
  - Set socket flag in the IRM header:
    - Non-Persistent socket - connection is terminated after each reply
    - Transaction socket - connection is terminated after each transaction
      - Supports Commit Mode 0 and Commit Mode 1
    - Persistent socket - connection is maintained across transactions
      - Supports Commit Mode 1
      - PQ80468 – provides support for Commit Mode 0

Asynchronous Output

- **Asynchronous output support**
  - Alternate TP PCBs (ALTPCB) messages
  - Queued commit-then-send reply messages (IOPCB) that could not be sent back on the original connection
- **IMS environment - IMS V7/V8**
  - IMS application ALTPCB destinations
    - Specify a destination = tpipe name = client id
  - IMS OTMA Exits needed for ALTPCB output
    - Prerouting Exit Routine (DFSYPRX0)
    - Destination Resolution Exit Routine (HWSYDRU0)
- **Remote client environment**
  - Retrieve messages

RESUME TPIPE - specify client id
- specify request type (single, noauto, auto)
RECEIVE - receive first output msg
ACK - acknowledge receipt of first msg
RECEIVE - receive second output message
ACK ...

Enhanced Timer Granularity

- **Provides a greater level of granularity for timeout settings**
  - IRM_TIMER value in IRM header
  - Time values:
    - no wait, wait indefinitely, .01-95 sec, 1-60 sec, 1-60 min
  - Specified by the client program and affects
    - RESUME TPIPE
    - SEND ACK/NAK
    - SEND of data
  - Also affects:
    - HWSIMSO0, HWSIMSO1, HWSJAVA0,
    - HWSSMPL0, HWSSMPL1

Local Option

- **Non-TCP/IP connectivity**
  - MVS Program Call (PC) interface to IMS Connect
    - Avoids TCP/IP Firewall issues
    - Provides compatible performance to TCP/IP connectivity
  - Defined in the CONFIG file as PORT=(9999,LOCAL,...)
    - Only 1 local PORT per IMS Connect
  - Supports commit mode 1 (send-then-commit)
    - 10 TPIPEs per IMS
- **Only supports IMS Connector for Java on S/390, z/OS**
  - IMS Connect and Websphere must be in the same LPAR

UNICODE

- **A standardized character coding system that provides a unique number for every character regardless of platform, program or language. (Used by XML and Java)**
- **IMS Connect supports**
  - Language groups 1,2,3
  - UTF-8, UTF-16, UTF-32 and UCS-2 encoding schema
- **Note:**
  - Input messages can supply trancode as ASCII, EBCDIC, UNICODE
  - Data portion sent in as UNICODE is NOT translated
    - IMS application must be able to deal with UNICODE

New fields/flags in the IRM for UNICODE support:
IRM_ES - Encoding schema (UTF-8, UTF-16,...)
IRM_F1 (new flags)
IRM_F1_UC - Unicode message text
IRM_F1_UCTC - Unicode transaction code

Automatic Reconnect to IMS

- **Support to automatically reconnect to an IMS that rejoins the XCF group**
  - Relieves the existing manual method of issuing "OPENDS"
- **New "DISCONNECT" status**
  - VIEWHWS
  - VIEW DS

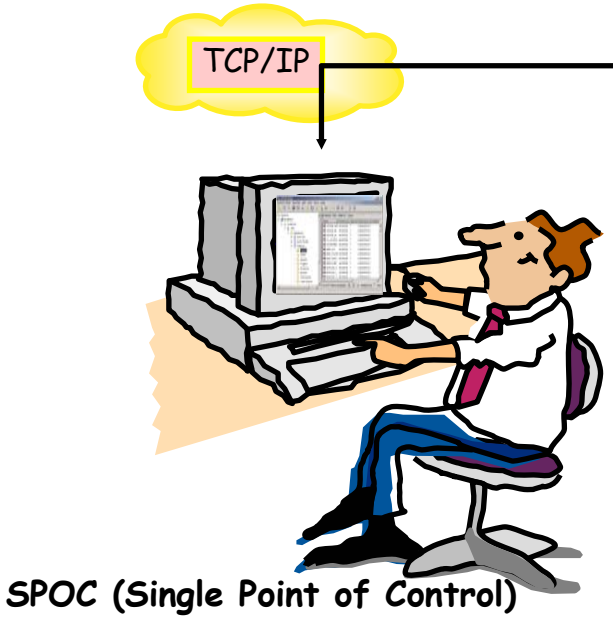
IP V6 Support

- **Support for IPV6 - larger addressing scheme**
  - Requires z/OS V1R4
  - IMS Connect
    - Configuration: TCPIP statement IPV6 = N | Y
    - User message exits - READ subroutine is affected
  - UNIX Systems Services Parameters
    - Customize BPXPRMxx member in parmlib and recycle TCP/IP

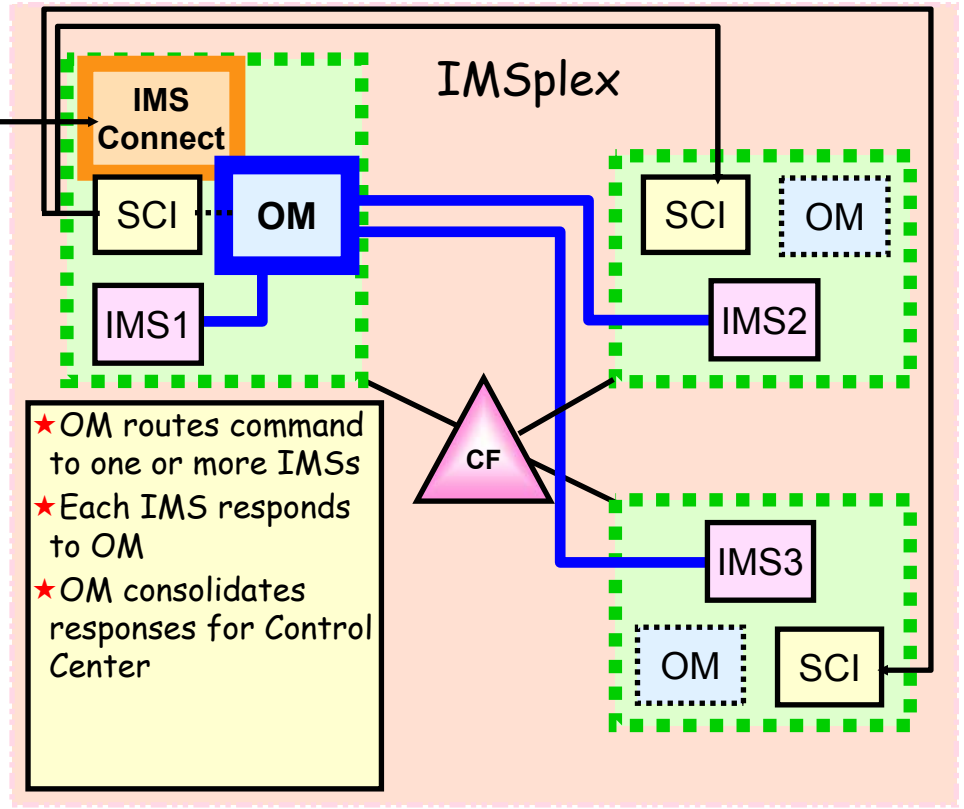
```
FILESYSTYPE Type(INET) Entrypoint(EZBPFINI)
         NETWORK DOMAINNAME(AF_INET)
         DOMAINNUMBER(2)
           MAXSOCKETS(2000)
          TYPE(INET)

        NETWORK DOMAINNAME(AF_INET6)
        DOMAINNUMBER(19)
         MAXSOCKETS(3000)
         TYPE(INET)
```

IMSplex Support

- Allows IMS Control Center (TCP/IP SPOC) to issue IMS V8 commands



SPOC (Single Point of Control)



IMS Control Center
- **Requires IMS Connect**
- **Requires DB2 UDB Administration Client V8.1**
  - **Does not require DB2 UDB**

For more information:
www-3.ibm.com/software/data/ims/imscc/index.html

IMS1,2,3 & 4 could be TM/DB or DBCTL Configurations

Ping Support

- **Mechanism to determine availability of IMS Connect**
  - Client Application:
    - Connect
    - Send PING IMS_CONNECT (must be uppercase0
    - Receive PING RESPONSE
    - Disconnect
  - User message exit support for PING
    - HWSSMPL0, HWSSMPL1, HWSJAVA, user written exit
    - Not supported by:
      - HWSIMSO0, HWSIMSO1, HWSCSLO0, HWSCSLO1

Two-Phase Commit

- **Capability that allows IMS transactions to participate as a resource in two-phase commit external transactions**
  - Requires
    - A syncpoint coordinator
      - RRS on MVS and/or an external coordinator, e.g.,IBM WAS (Websphere Application Server)
        - Uses an ID generated at the beginning of the transaction/process to monitor and modify the state of the transaction
    - Client code that uses IMS Connector for Java
      - Resource adapter
- **Environments**
  - LOCAL
  - DISTRIBUTED
    - Global XA transaction

Two-Phase Commit …

Websphere Application Server platform with the IMS Resource Adapter	Communication Protocol	Global Transaction Two-Phase Commit Support
AIX	TCP/IP	YES *
Linux for z/Series and s/390	TCP/IP	YES *
Solaris	TCP/IP	YES *
Windows	TCP/IP	YES *
z/OS, OS/390	TCP/IP Local option	YES * YES **

* IMS Connect, IMS, and RRS must be in the same MVS image

** WebSphere Application Server, IMS Connect, RRS and IMS must all exist in the same MVS image

- **Software Requirements**
  - Local Two-Phase Commit
    - IMS Connector for Java 1.2.5.2 with WSAD IE 4.1.1
    - WAS 4.0.1 for z/OS (+ APAR PQ65206)
    - IMS Connect 1.2 (+ APAR PQ65982)
  - Global Transaction (XA) support
    - IMS Connector for Java 2.1.0 with WSAD IE 5.0.1
    - WAS 5.0.1 for distributed platforms or WAS V5.0 for z/OS
    - IMS Connect 2.1

Security

- **Accessing IMS transactions from a TCP/IP Client**
  - TCP/IP Client - Provides Userid, Password, Groupid in message header
  - IMS Connect
    - Issues RACROUTE calls to authenticate user
    - Message exits can also call a user-written routine
    - Configuration values for IMS Connect (HWSCFGxx)
      - RACF = Y | N and RACFID = userid (default)
  - IMS Security
    - Validates userid access to transaction or command
    - Userid: from message header or RACFID
    - /SECURE OTMA None | Check | Full | Profile
- **Enhancements**
  - Passticket support
  - Trusted User support
  - SSL support

IMS Connect Tips

- **IMS Connect client TCP/IP environment**
  - SO_Linger=Y,VALUE=10
    - Ensures no loss of data, blocks close() until ACK is received or 10 sec
  - TCPNODELAY=DISABLE
    - Optimizes transmission - Waits until buffer is full (multiple writes)
- **IMS Connect mainframe - PROFILE.TCPIP configuration**
  - PORT - NODELAYACKS
    - Allows any required ACKs to be sent immediately
  - SOMAXCONN
    - Max sockets queued on a listener (default of 10)
    - Should be large enough to support the max concurrent requests

IMS Connect Tips …

- **IMS Connect configuration - TCPIP parameters**
  - ECB=Y, posts an ECB when there is work to do
  - MAXSOC = xxxx (default of 50)
    - Should be large enough to support concurrent throughput requirement
  - IPV6=Y (requires z/OS V1R4)
    - Better performance even if the network itself is not at IPV6 level
- **XCF tuning**
  - MAXMSG
    - XCF signalling buffers
      - XCF buffer shortage can be seen as an IMS Connect hang condition
    - How big should they be?
      - Depends on message traffic, size and frequency of the messages, as well as the performance of the signaling paths
        - z/OS V1R4.0 MVS Setting Up a Sysplex (SA22-7625)
  - IMS Connect Apar PQ82451 – support large number of LPARs using CF

IMS Connect Summary

- **IMS Connect continues opening up IMS to TCP/IP Clients**
  - Standard interface
  - Defined application protocol
  - Comprehensive set of capabilities
- **Accessed by the IMS Connectors**
  - IMS Client for Java, IMS Connector for Java, ...
- **Accessed by user-written programs**
  - Documented and well-defined interfaces

IMS Connect 2.2

- **GA June 25, 2004**
  - Command enhancements for ease of manageability
  - Improved performance and availability reporting
  - Cancel timer support to enhance usability
  - Connector for Java also adds
    - Commit Mode 0/persistent socket for improved performance
    - Socket timeout for enhanced usability
    - Retry for improved availability

IMS Version 9 Integrated Connect Function

Provides easy install/use, high volume/performance, secure transparent access to IMS applications and operations from other environments (incl. LINUX)

- Commands to manage network and balance workload
  - Better resource utilization.
- Reduced design/coding effort for client applications
  - Ease access to IMS applications and operations
  - Improve programmer productivity
- Used with IBM WebSphere Application Server and Studio Tools to
  - Quickly transform static web sites into sources of dynamic Web Content to improve marketing effectiveness and enhance customer service
  - Transform IMS Transactions into Web services for Service-Oriented Architectures (SOAs), enabling quick response to new customer requirements, business opportunities and competitive threats.
- Used with DB2 and the IMS Control Center for Distributed Operations
  - Improve system availability and operator productivity
- Integrates function of separately orderable/installable IMS Connect Tool
  - Simplify administration and reduce costs

EMEA IMS Technical Symposium

- **November 14 – 17, 2005**
- **Koenigswinter, Germany**
- **www.ims-society.org**