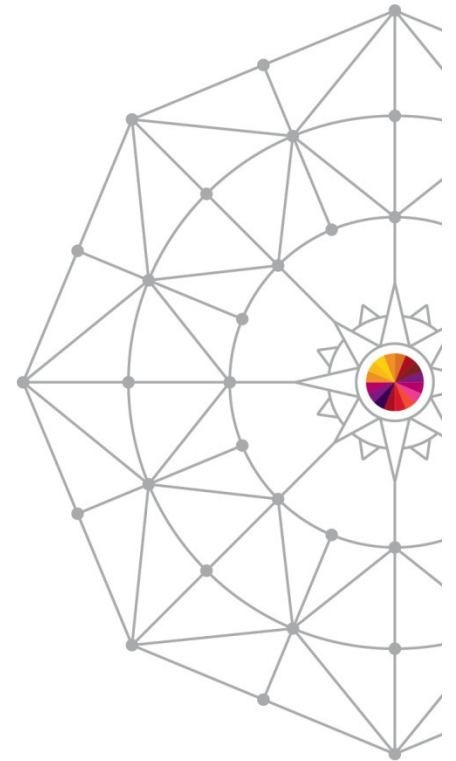


IMS and DataPower – Perfect Together

Share Session 16100
Suzie Wendler (wendler@us.ibm.com)



#SHAROrg



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Topics

- Existing DataPower support
 - Inbound access to IMS
 - Access to IMS databases
 - Outbound support for IMS callout

IBM United States Software Announcement 213-172

New processing for mobile and web traffic, support for IBM API Management V2.0, and pattern-based configuration

<http://tinyurl.com/bs2yh6e>

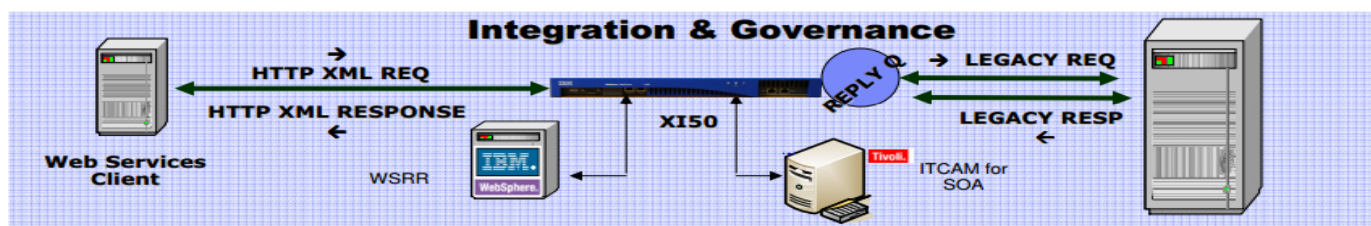
IBM United States Software Announcement 213-171

Simplified ordering of DataPower appliances and options using Passport Advantage

<http://tinyurl.com/ark5fw2>

DataPower

The WebSphere DataPower Integration Appliance is a purpose built hardware platform that delivers rapid data transformations for cloud and mobile applications, supports secured and scalable business integration, and provides an **edge of network security gateway** in a single drop-in appliance.



Integration appliance
Includes all features of
the Security and
Acceleration appliances



DataPower...

- **Why an Appliance for SOA?**

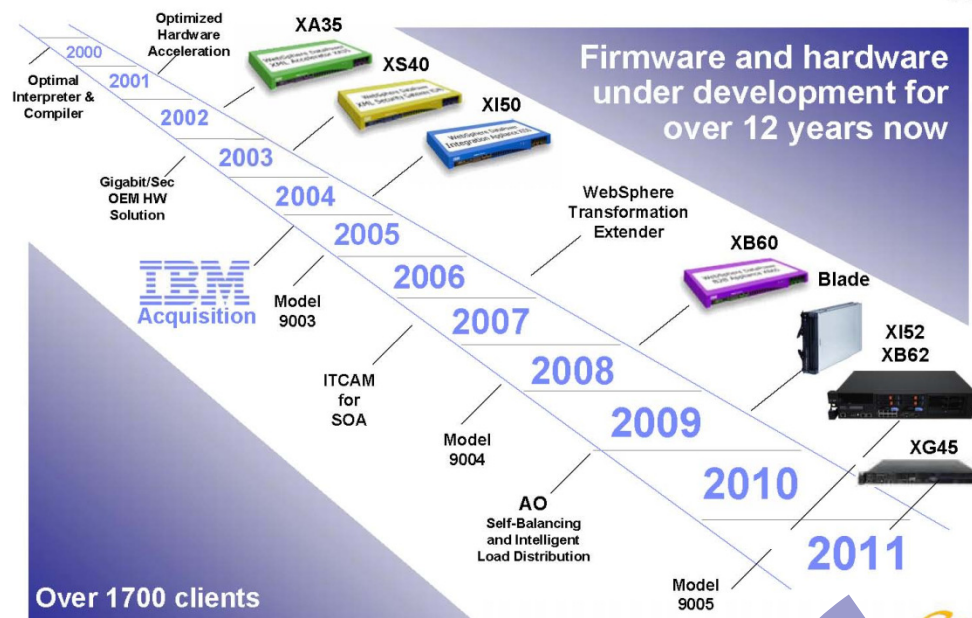
- Hardened, specialized hardware for helping to integrate, secure & accelerate SOA
- Many functions integrated into a single device
- Higher levels of security assurance certifications require hardware
- Enables run-time SOA governance and policy enforcement
- Higher performance with hardware acceleration
- Addresses the divergent needs of different groups:
 - enterprise architects, network operations, security operations, identity management, web services developers
- Simplified deployment and ongoing management
- Proven Green / IT Efficiency Value
 - Appliance performs XML and Web services security processing as much as 72x faster than server-based systems
 - Impact: Same tasks accomplished with reduced system footprint and power consumption

<http://tinyurl.com/cffhmzc>

ftp://ftp.software.ibm.com/software/systemz/pdf/aiseminars/Using_WebSphere_DataPower_SOA_appliances_to_extend_the_value_of_System_z.pdf

Evolution

DataPower boasts over a decade of connectivity innovation 



Many integration standards are XML-based which may result in additional data processing and security requirements

IBM DataPower is positioned to meet the additional security requirement and to move data processing cycles from the mainframe to the mid-tier layer.

WebSphere DataPower Family

Service Gateway XG45

- Entry-level device, slim footprint (1U)
- Security gateway (AAA, XML threat, etc)
- Service level management and monitoring
- Intelligent load distribution & dynamic routing
- Lightweight ESB functions (optional module)



Integration Appliance XI52

- High density 2U form
- Consumable hardware ESB Optimization
- "Any-to-Any" conversion at wire-speed
- Bridges multiple transport protocols
- Mainframe integration & enablement



Integration Blade XI50B/XI50z

- Functionally equivalent to XI52
- Form factor flexibility
- XI50B: BladeCenter form factor
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B2B Appliance XB62

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- B2B Messaging (AS1/AS2/AS3/ebMS)
- Trading Partner Profile Management
- B2B Transaction Viewer

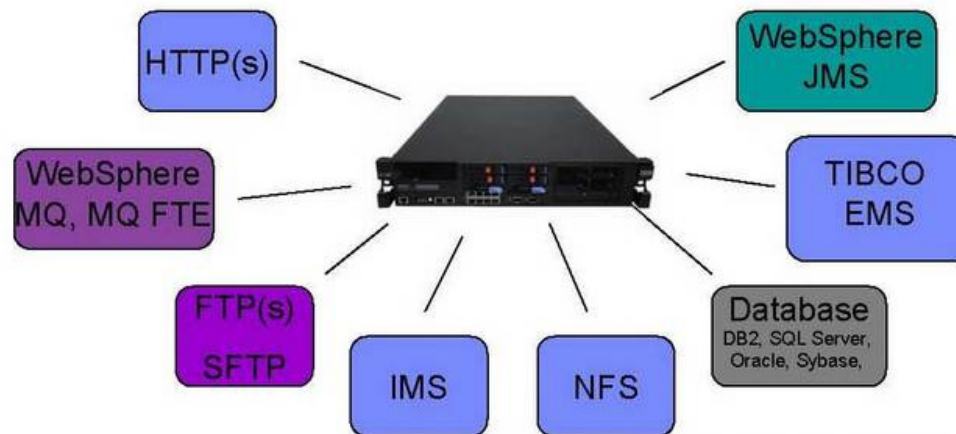


<http://tinyurl.com/b4gdlkz>

Complete your session evaluations online at www.SHARE.org/Pittsburgh-Eval

Enterprise Integration and Enablement

- Enterprise Integration
 - Provides a Multi-Protocol Gateway (MPG)
 - Connects client requests that are transported over one or more protocols to a remote destination that uses the same or a different protocol
 - *Supports the FTP, HTTP, HTTPS, IMS™, MQ, NFS, SFTP, TIBCO EMS, and WebSphere® JMS protocols*



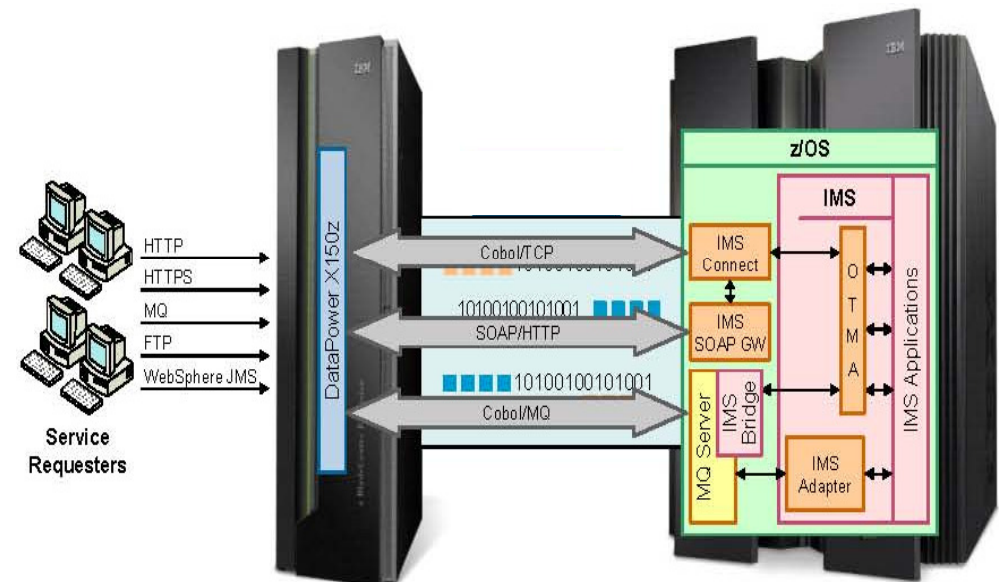
Enterprise Integration and Enablement ...

❖ *IMS Integration (XI50, XI50B, XI50z, XI52, XB60, XB62...)*

– *Three interfaces to get to IMS:*

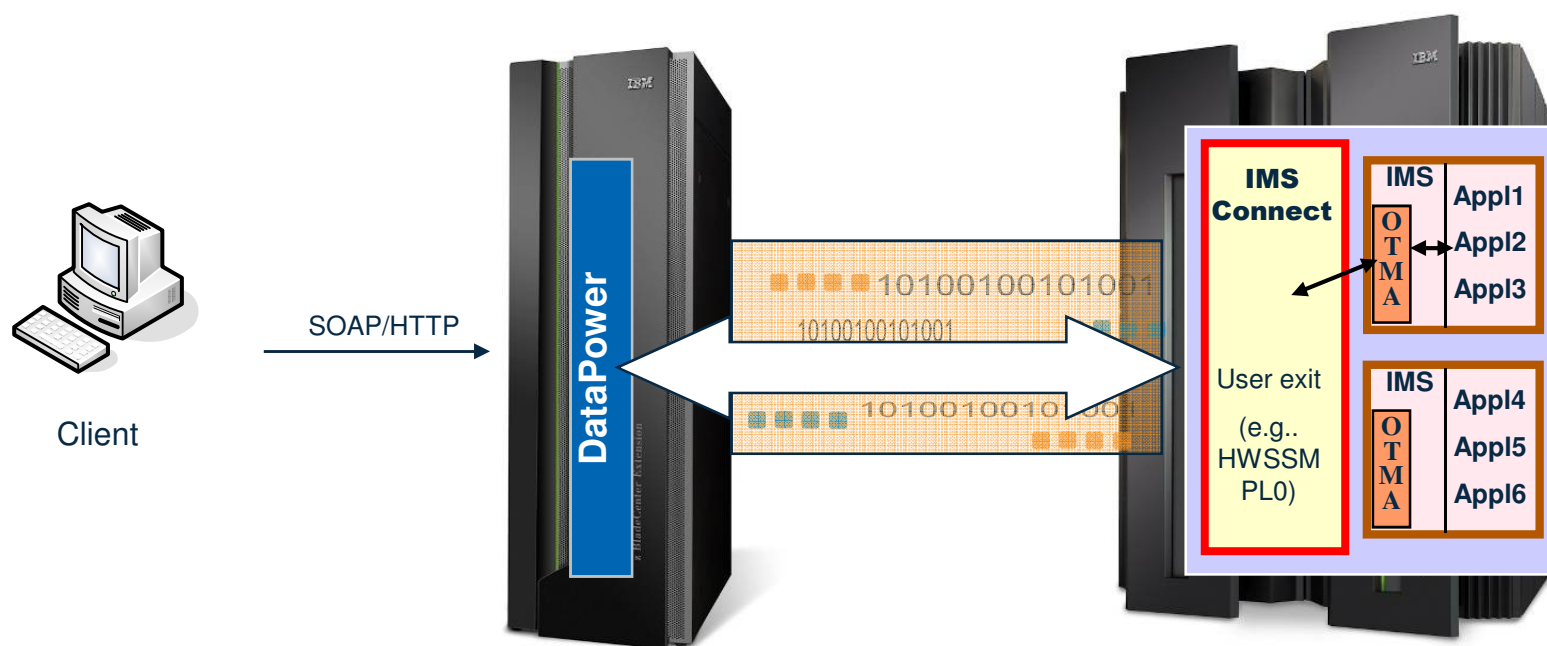
- **IMS Connect Client**
 - Access to IMS applications using a DataPower embedded IMSClientConnect handler to IMS Connect
- **Soap**
 - Access to IMS web services via the IMS SOAP Gateway
- **MQ Client**
 - Access to IMS applications using an MQ server on system z and the MQ Bridge for IMS

<http://www.redbooks.ibm.com/redbooks/pdfs/sg247988.pdf>



IMS Integration

- DataPower provides WS-enablement to IMS applications
- User codes schema-dependent WTX data map to perform request/response mapping
- “IMS Connect Client” (back-side handler) natively connects to IMS Connect using its custom request/response protocol

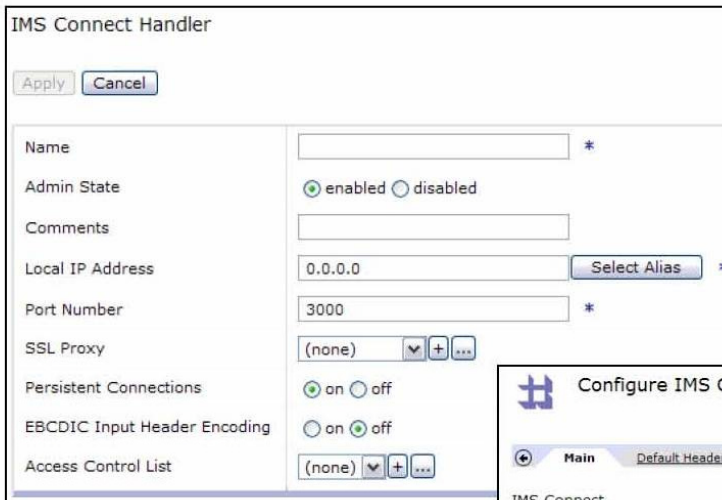


IMS Integration – IMS Connect client

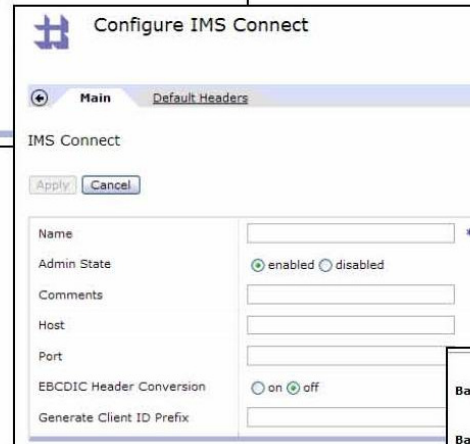
- Accessing IMS as a service provider
 - DataPower Release 3.6.1
 - *First implementation of an IMS Connect client*
 - » *Support for CM1 (synchronous), Sync_level = None*
 - DataPower Release 3.8.0
 - *Automatic chunking and de-chunking*
 - » *Support for client sending and receiving IMS messages larger than 32KB using the Web Service Proxy service or the IMS Connect object*
 - » *Support for automatically processing the LL/ZZ headers for each of the message segments.*
 - » *When using the IMS Connect configuration, support for an extra 4-byte LLLL header field in the response message and supports for receiving this LLLL header, processing it properly, and sending it back to the client in the response message.*
 - DataPower Release 3.81
 - *Support for CM1 (synchronous), Sync_Level=Confirm*

IMS Integration – IMS Connect client...

- Components:



IMS Connect Front Side Protocol Handler for accepting IMS-based client requests passing through a MultiProtocol Gateway



IMS Connect object for basic connection configuration values. Note Default Header tab for critical connection values.

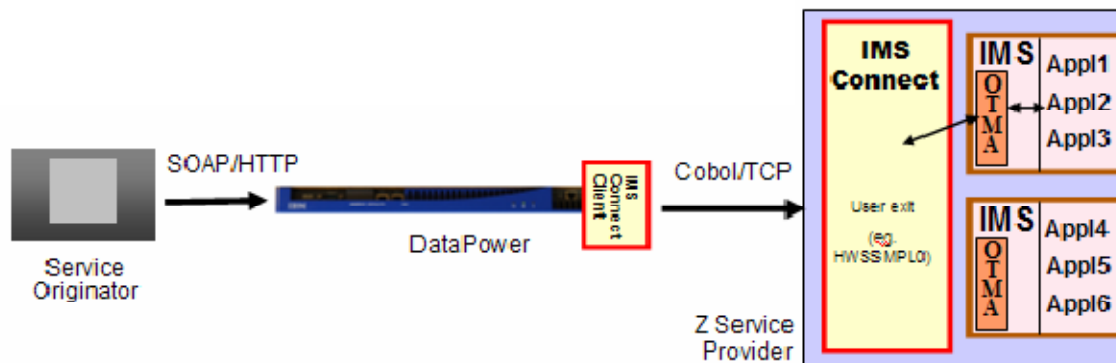
MPGW IMS Destination URL with URL Builder help. Uses IMS Connect object.



IMS Integration – IMS Connect client...

- An IMS Connect Handler object defines a handler service that receives IMS Connect requests and forwards them to the appropriate DataPower service

Command	Purpose
acl	Assigns an Access Control List (ACL). The access control list allows or denies access to this service based on the IP address of the client
admin-state	Sets the administrative state of an object. Enabled (active) or disabled (inactive)
ebcdic-input	Sets the encoding for input headers as EBCDIC or ASCII.
local-address	Specifies the local address for the service. This is the local IP address or host alias on which the service listens. The default value is 0.0.0.0.
persistent-connections	Controls the negotiation of persistent connections. When enabled, the IMS Connect Handler negotiates with the remote IMS Connect target to establish a persistent connection.
port	Specifies the local listening port for the service. The default is 3000.
ssl	Assigns an SSL Proxy Profile.
summary	Specifies a brief, object-specific comment.



IMS Integration – IMS Connect client...

- The IMS Connect configuration handles the IMS protocol communications from a DataPower service to IMS applications
 - The configuration contains settings that affect the behavior of the connection

admin-state	Sets the administrative state of an object.	→
client-id-prefix	Sets the two-letter prefix for the generated client ID. (default is DP)	→
clientid	Specifies the name of the IMS client identifier.	→
datastore	Sets the name of the data store.	→
ebcdic-conversion	Controls EBCDIC header conversion.	→
encoding-scheme	Sets the Unicode encoding scheme.	→
exit-program	Sets the exit program.	→
expect-llll	Indicates whether the response message includes an extra 4-byte (LLLL) response message header specifying the total response message size back from IMS Connect.	→
group	Sets the RACF® security group.	→
hostname	Specifies the host of the target IMS Connect.	→
irm-timer	Sets the wait time to return data.	→
lterm-name	Sets the logical terminal name.	→
password	Sets the connection password.	→
port	Sets the port on the target IMS Connect.	→
segment-size	Sets the maximum segment size when a message is split when sending to an IMS Connect server.	→
summary	Specifies a brief, object-specific comment.	→
sync-level	Controls the acknowledgement (ACK) to the IMS Connect server after receiving the response. 0x00 =none, 0x01= confirm	→
tran-code	Sets the transaction code to invoke.	→
username	Sets the RACF identifier.	→

IMS Integration – IMS Connect client...

- The IMS Connect URL
 - `dpims://Connect-object/?parameters`
 - `dpimsssl://Connect-object/?parameters`
 - An example of an IMS Connect URL is:
 - `dpims://xxx.xxx.xxx.xxx:nnnn/?TranCode=IVTNO;DataStoreID=IMS1;PersistentSocket=0`
- Or it can define *host*, *port*, *DataStoreID*, and *PersistentSocket* in an *IMS-object*:
- `dpims://IMSConnectObject/?TranCode=IVTNO`

New Capabilities

- Enhanced integration capabilities between DataPower and IMS
 - Allow remote applications to easily consume IMS data as a service
 - Leverages the IMS universal drivers
 - Allow IMS transactions to easily consume external web services
 - Leverages IMS callout support
- Availability:
 - June 28, 2013: Electronic availability
 - July 22, 2013: Factory shipments on new appliances

DataPower – New IMS DB feature

- IMS DB feature easily exposes IMS data as a service to remote applications
 - Requires one of the following DataPower models and Firmware 6.0:

- XG45 or XG45 Virtual Edition (with Database Integration Module feature)
- XI52, XI52 Virtual Edition or XI50B (with Database Connectivity feature)
- WebSphere DataPower B2B Appliance XB62

WebSphere DataPower Family

Service Gateway XG45

- Entry-level device, slim footprint (1U)
- Security gateway (AAA, XML threat, etc)
- Service level management and monitoring
- Intelligent load distribution & dynamic routing
- Lightweight ESB functions (optional module)



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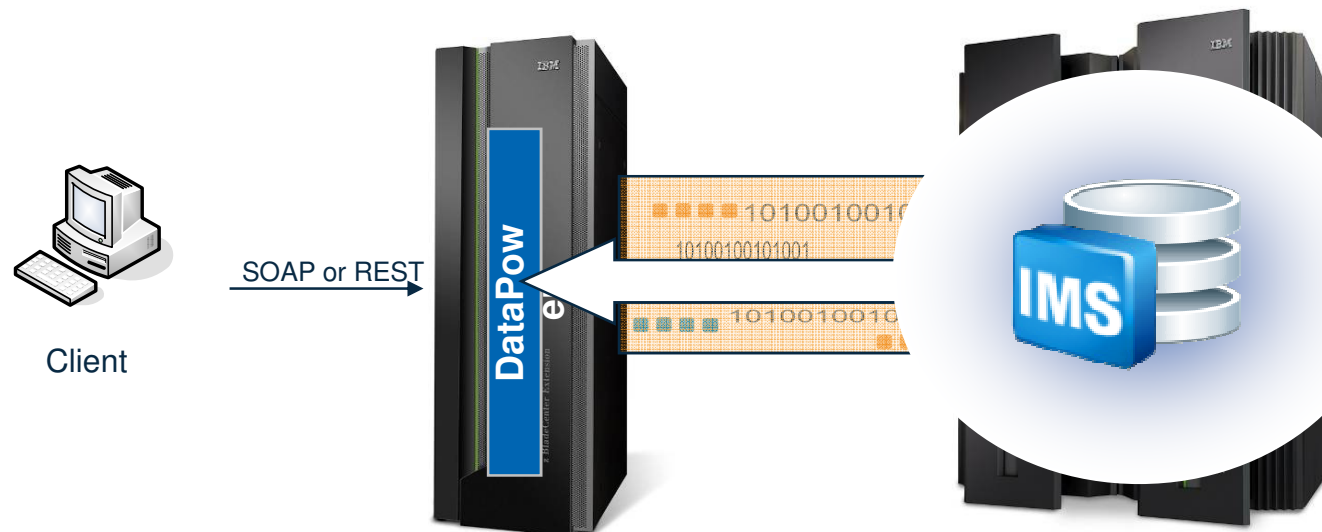
B2B Appliance XB62

- High density 2U form
- B2B Messaging (AS1/AS2/AS3/ebMS)
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- B2B Transaction Viewer



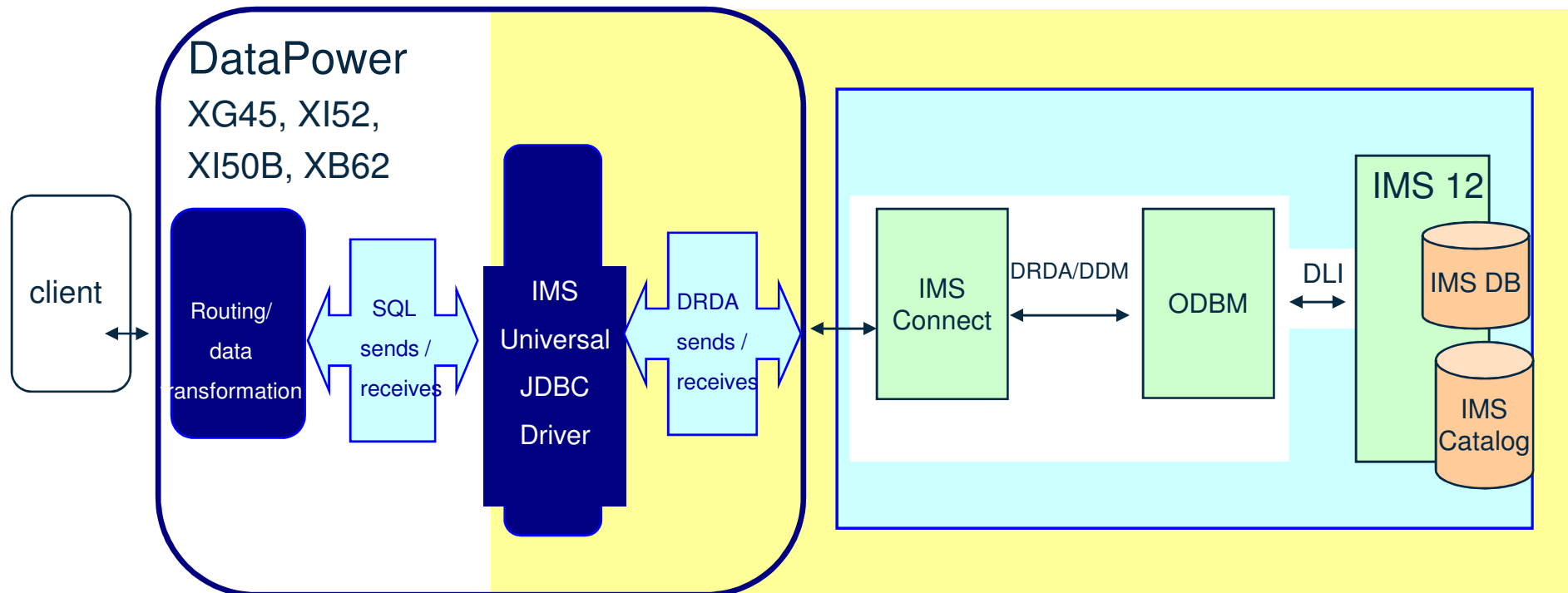
DataPower to IMS DB – “Information as a Service”

- DataPower provides a standard WS façade to IMS
 - SOAP or REST call is mapped to a JDBC (DRDA) invocation
- Exposes database content (information) *as a service*
- Leverages extensive Web Services security and management capabilities of DataPower to more securely expose critical data to the enterprise



DataPower to IMS DB

- Access to IMS DB leverages existing and proven technology
 - IMS Universal JDBC driver
 - IMS DRDA server: IMS Connect/ODBM
 - IMS Catalog



DataPower Operational Considerations...

- IMS DB
 1. Create a Multi-Protocol Gateway (MPG) Configuration
 2. Configure an “SQL Data Source” object (DB connection)
 3. Configure the back-end URL
 4. Define an MPG “Policy”
 - Create one or more “Rule”(s) for the policy
 5. Apply the changes, and save the configuration

DataPower – IMS Callout support

- IMS Callout feature allows IMS transactions to easily consume external web services via DataPower , with minimal application updates required
- IMS Callout functionality requires one of the following DataPower models and Firmware 6.0:
 - WebSphere DataPower Integration Appliance XI52, XI52 Virtual Edition
 - WebSphere DataPower Integration Blade XI50B
 - WebSphere DataPower B2B Appliance XB62

WebSphere DataPower Family

Service Gateway XG45

- Entry-level device, slim footprint (1U)
- Security gateway (AAA, XML threat, etc)
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B2B Appliance XB62

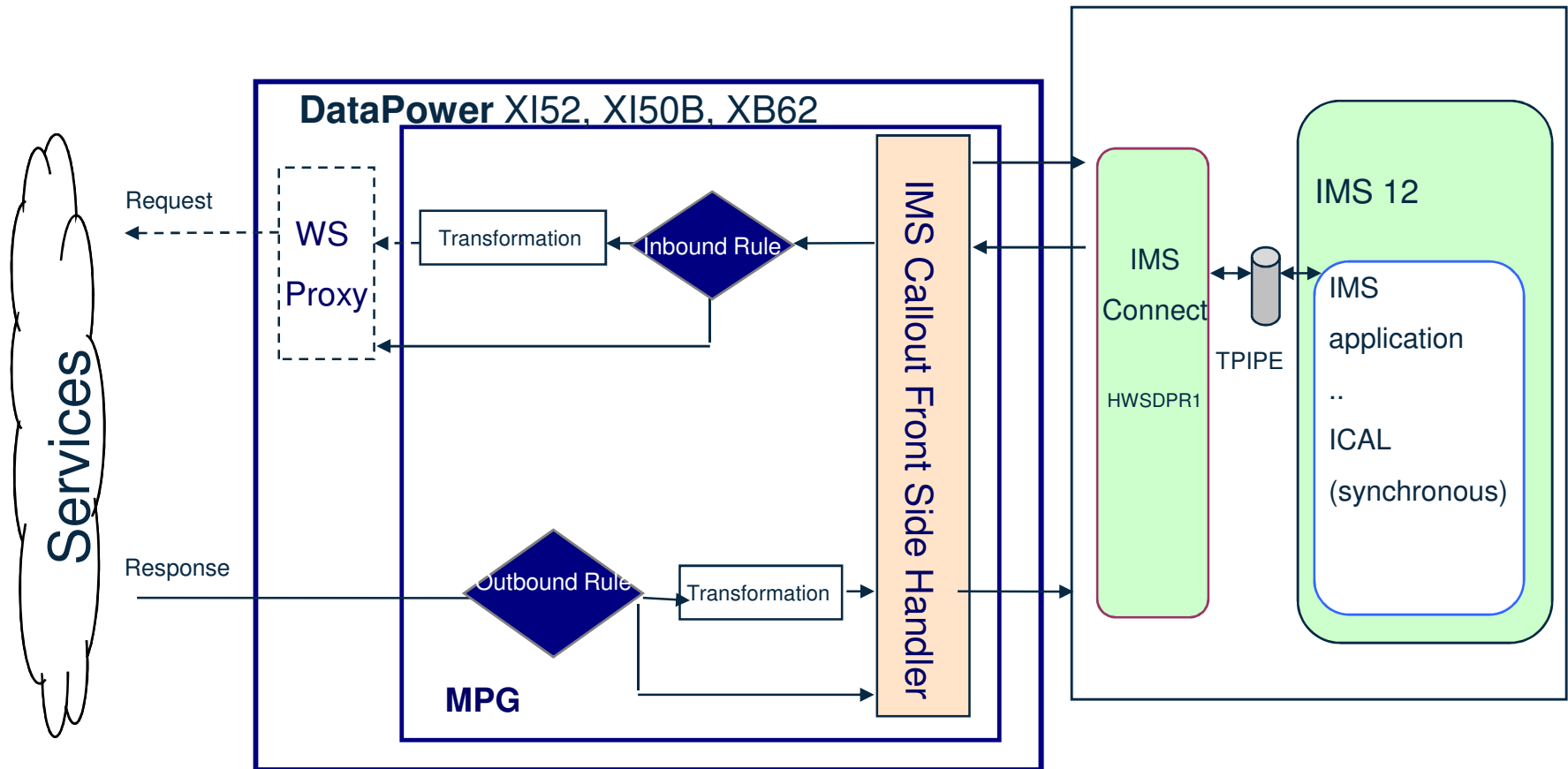
- High density 2U form
- B2B Messaging (AS1/AS2/AS3/ebMS)
- Trading Partner Profile Management
- B2B Transaction Viewer



IMS Callout Support

- Supports the IMS synchronous callout capability – DL/I ICAL
 - Allows IMS applications to synchronously invoke external web services
- The IMS callout connection is a DataPower “Front Side Handler”
 - Retrieved IMS callout messages, interfaces with DataPower services and send response data back to IMS
- The handler internally creates one or more IMS Connect dedicated persistent socket connections to the host system, using Enterprise Suite V2.2 IMS Connect API for Java
- The handler communicates with IMS Connect via a new DataPower dedicated user message exit HWSDPWR1
 - For a shared queues environment, multiple IMS Callout connections can be created, one for each IMS datastore

IMS Callout Support ...



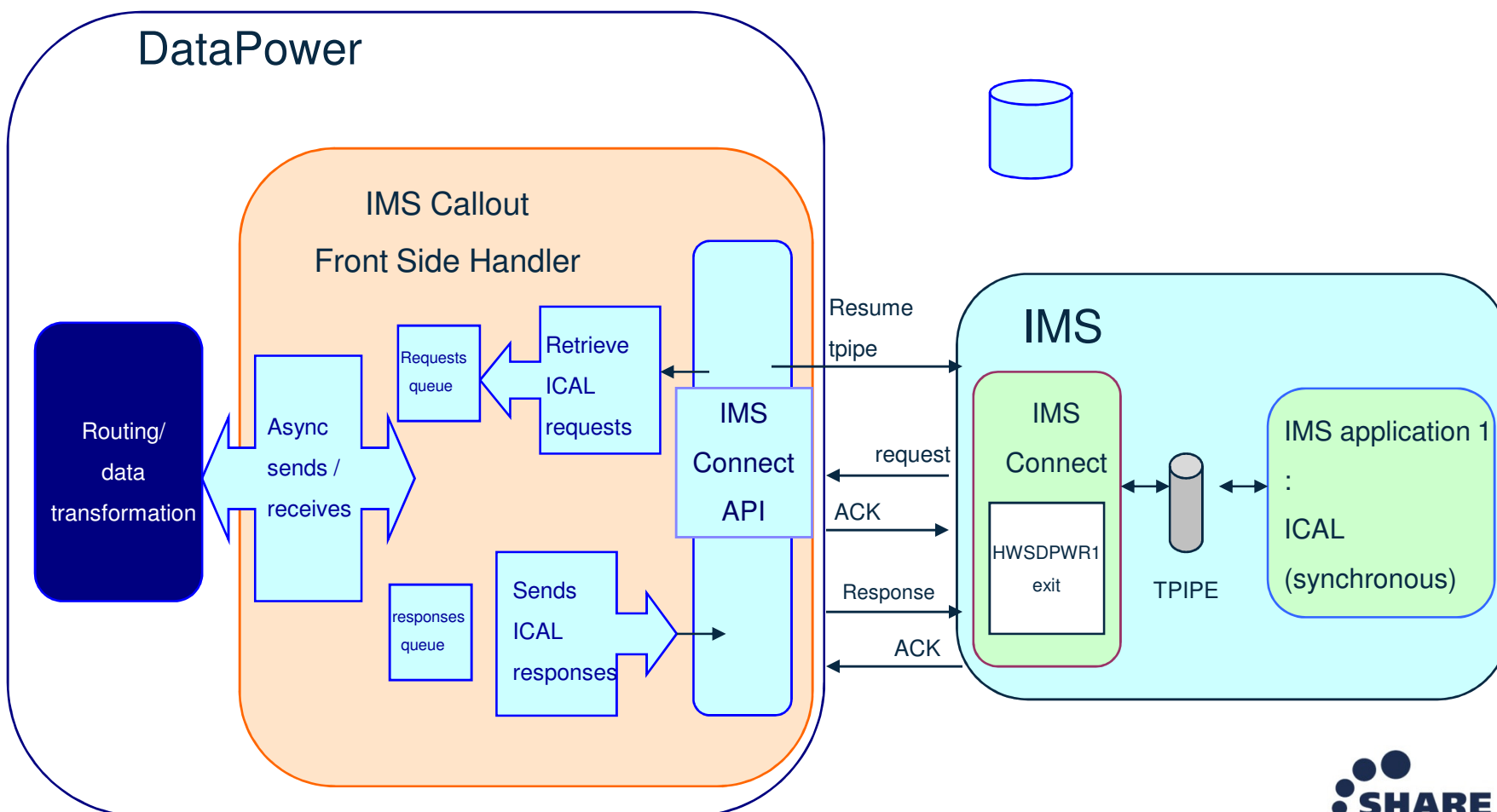
IMS Callout DataPower Dependencies

- IMS Connect
 - **PTF UK91544** (**APAR PM76086**) DataPower User Exit Installation - Object Code Only user exit HWSDPWR1 (new)
 - Specified in the EXIT= parameter of the TCP/IP statement in the IMS Connect configuration file (HWSCFGxx)
- IMS 12
 - **PTF UK82636** (**APAR PM73135**) AIB MAP name field AIBMAPNM (new)
 - DL/I ICAL user can specify a 1-to-8 byte mapname in the AIB so that this ID can be included in the OTMA state data in the callout message.
 - The ID can be used as a unique service identifier for data transformation mapping and service routing

```

01 AIB.
  02 AIBRID PIC x(8) VALUE 'DFS AIB '.
  02 AIBRLN PIC 9(9) USAGE BINARY.
  02 AIBSFUNC PIC x(8).
  02 AIBRSNM1 PIC x(8).
  02 AIBRSNM2 PIC x(8).
  02 AIBRESV1 PIC x(8).
  02 AIBOALEN PIC 9(9) USAGE BINARY.
  02 AIBOAUSE PIC 9(9) USAGE BINARY.
  02 AIBRSFLD PIC 9(9) USAGE BINARY.
  02 AIBRESV2 PIC x(8).
  02 AIBRETRN PIC 9(9) USAGE BINARY.
  02 AIBREASN PIC 9(9) USAGE BINARY.
  02 AIBERRXT PIC 9(9) USAGE BINARY.
  02 AIBRESA1 USAGE POINTER.
  02 AIBRESA2 USAGE POINTER.
  02 AIBRESA3 USAGE POINTER.
  02 AIBMAPNM PIC x(8).
  02 AIBRESV4 PIC x(32).
  02 AIBRSVAVE OCCURS 18 TIMES USAGE
  POINTER.
  02 AIBRTOKN OCCURS 6 TIMES USAGE
  POINTER.
  02 AIBRTOKC PIC x(16).
  02 AIBRTOKV PIC x(16).
  02 AIBRTOKA OCCURS 2 TIMES PIC 9(9)
  USAGE BINARY.
  
```


IMS Callout Support ...



IMS Callout Support ...

- DataPower IMS Callout Front Side Handler retrieves and sends IMS ICAL request to other DataPower services
 - In addition to the message payload, it sets the two headers:
 - *ims-callout-service-id: IMS ICAL AIBMAPNM field*
 - *ims-callout-correlation-token: Hex representation of ICAL correlation token*
 - > *Allows IMS to correlate a response to the associated request*
 - The DataPower administrator can access the header fields in the MPG policy
 - Examples of use:
 - *service ID as the request identifier to select input/output transformation map*
 - *correlation token as the message ID in the outbound HTTP/SOAP request.*

DataPower Operational Considerations

- IMS Callout
 1. Create a Multi-Protocol Gateway (MPG) Configuration
 2. Configure IMS Callout Front Side Handler
 3. Configure the back-end URL
 4. Define an MPG “Policy”
 - Create one or more “Rule”(s) for the policy
 5. Apply the changes, and save the configuration

DataPower Operational Considerations ...

- Operational Characteristics
 - Configuration of an IMS Callout front side handler includes the following properties:
 - *IMSHost, IMSPort, DataStoreName, TPipe(s), UserID, Password, Group, RetryErrorLimit, RetryInterval*
 - DataPower administrator can enable/disable an IMS Callout front side handler
- Operational States
 - An IMS Callout front side handler has the following “opstates”:
 - Up: resume tpipe processing is in operation
 - Down: no active processing
 - Pending: in recovery mode (detected IMS Connect and/or IMS outage)
- Operational Recommendations
 - When not in use, the administrator should disable the IMS Callout front side handler

IMS Application Considerations

- ICAL is a DL/I call verb
 - Leverages the AIB interface
 - Uses the SENDRECV subfunction
 - REQ_area is the Request data area for sending data
 - RESP_area is the Response data area for returned data
 - *REQ and RESP messages are not recoverable*
 - *req-area and resp-area do not specify LLZZ, data can be > 32K*
 - » *IMS Connect and OTMA handle buffer and segmentation internally*
 - Timeout support
 - Optional user specified timeout value in the DLI call to control the time an IMS application waits for a response
 - Can terminate the request and free the dependent region
 - Late responses are logged and discarded

Call AIBTDLI USING ICAL,aib,REQ_area,RESP_area

IMS Application Considerations ...

- **AIB**

- AIBID = DFSAIBbb
- AIBLEN = AIB length
- AIBSFUNC = SENDRECV
- AIBRSNM1 = 8 byte OTMA Descriptor name
- AIBRSFLD = Timeout value
 - 4 byte field for time value 100th seconds. System default is 10 sec.
- AIBOALEN = **REQ_area** length
 - As an input parameter: 4 byte field contains the length of the request area
 - As an output parameter: Actual length of the response message
- AIBOAUSE = **RESP_area** length
 - As an input parameter: 4 byte field contains the length of the response area
 - As an output parameter: Length of the response message.
- AIBRETRN = AIB Return code
- AIBREASN = AIB Reason code.
- AIBERRXT = 2 byte sense code from external application

- **OTMA Descriptor**

DFSYDTx member of IMS.PROCLIB

- TYPE: Destination type
- TMEMBER: OTMA Target Client
- TPIPE: Destination Name
- SYNTIMER=timeout
Note ICAL overrides this value
- ...

D TESTDPWR TYPE=IMSCON TMEMBER=HWS1
D TESTDPWR TPIPE=DPTEST1 ...

```
01 AIB.
  02 AIBRID PIC x(8)  VALUE 'DFS AIB  '.
  02 AIBRLN PIC 9(9)  USAGE BINARY.
  02 AIBRSFUNC PIC x(8) VALUE 'SENDRCV'.
  02 AIBRSNM1 PIC x(8) VALUE 'TESTDPWR'.
  02 AIBOALEN PIC 9(9) USAGE BINARY VALUE +12.
  02 AIBOAUSE PIC 9(9) USAGE BINARY.

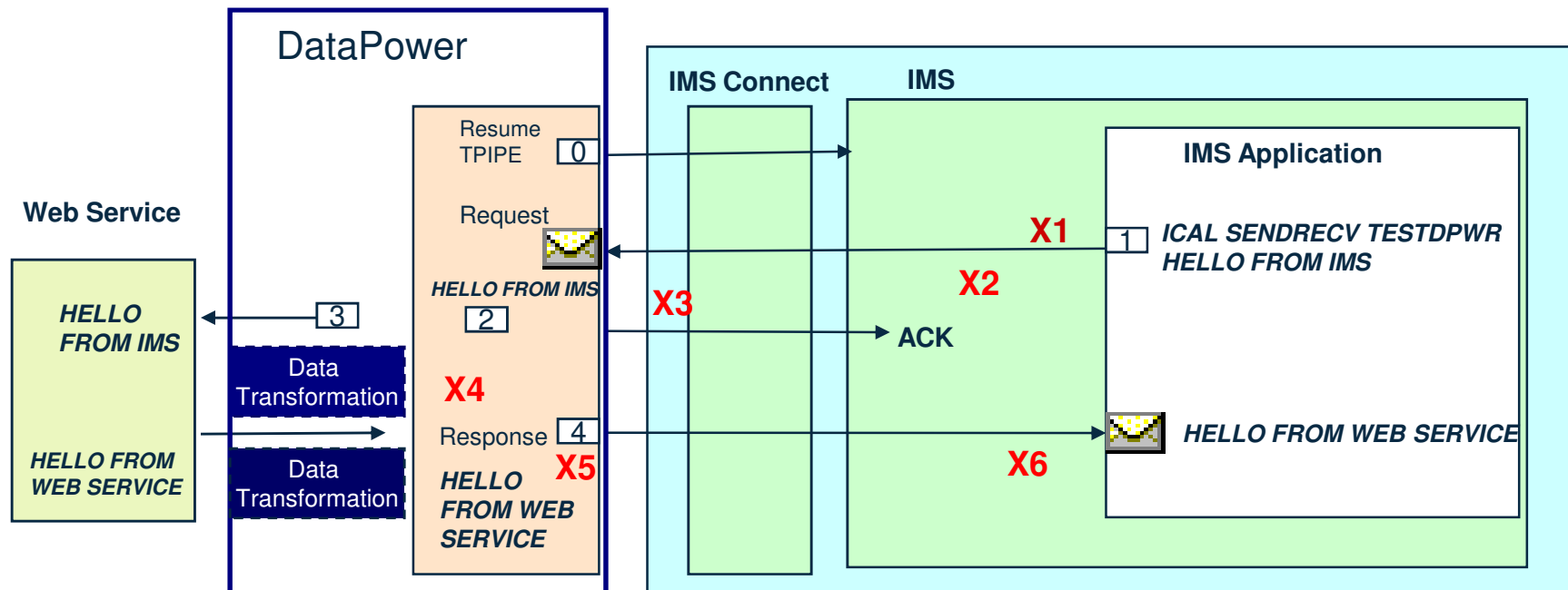
01 CALLOUT-MSG.
  02 CA-DATA          PICTURE X(12) VALUE 'HELLO WORLD '
01 SCA-RESPONSE.
  02 SCA-DATA          PICTURE X(12).

CALL 'AIBTDLI' USING ICAL, AIB, CALLOUT-MSG , SCA-RESPONSE.
```

COBOL example

Error Conditions - IMS

- The IMS ICAL is informed of error conditions using AIB return and reason codes
 - IMS Version 12 *Application Programming APIs* manual
 - <http://tinyurl.com/cgj8tah>



Examples of where some errors might occur:

- X1: ICAL cannot be sent out
- X2: ICAL time out
- X3: late ACK received after time out
- X4: XML converter in error

- X5: external server already committed before time out
- X6: external server already committed, but IMS fails to process the response

Complete your session evaluations online at www.SHARE.org/Pittsburgh-Eval

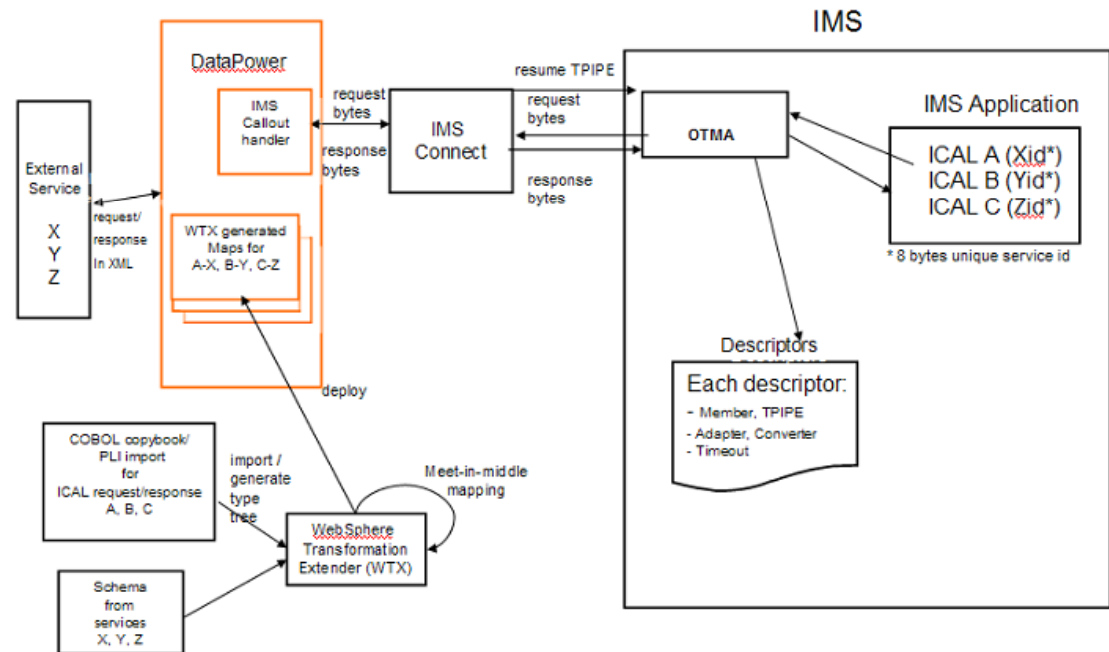
Error Conditions – DataPower

- Errors can occur during different stages of DataPower processing:
 - DataPower MPG inbound/outbound policy (including WTX map transformation)
 - Error response sent to IMS application
 - Return code and Reason code: X'0100'
 - Extended reason code: 2000-3000 (set as 2000+HTTP error code from DataPower)
 - Error message: REQUEST PROCESSING FAILED, CHECK EXTENDED REASON CODE
 - Error retries
 - During resume tpipe processing
 - *RetryErrorLimit: Number of time to attempt to resume a TPIPE (Default 5)*
 - *RetryInterval: Interval to wait before attempting to resume the TPIPE. Default 3 seconds*
 - Self-Recovery support:
 - Once the IMS Callout front side handler goes down after reaching the max retries
 - *Network problem - the front side handler attempts to self-recover*
 - *A /DISPLAY OTMA command is issued every minute to verify network connectivity and IMS availability*
 - » *When successful, DataPower brings up the front side handler to resume operation*
 - Non-operative Auto Detection support
 - DataPower detects when an IMS front side handler becomes non-operative and restarts the processing automatically

Tooling

- WebSphere Transformation Extender (WTX)
 - Provides mapping between different data formats

- WTX maps can be built as deployable artifacts for DataPower
 - ✓ Providing data transformation between IMS callout bytes and XML data for web services
- A WTX map can be set using a DataPower-specified variable, then called within XSL code in a DataPower policy



Summary

- DataPower firmware 6.0
 - Enables connectivity with any IMS environment
 - IMS transactions can be both service consumers and providers of web or HTTP services
 - IMS database content can be exposed as a service
 - Allows IMS to leverage DataPower's flexibility
 - Support for rapid data transformations for cloud and mobile applications, secured and scalable business integration, and edge of network security gateway in a single drop-in appliance.