

C09: IMS Connectivity & Integration Solutions: Strategy and Success

Shyh-Mei F. Ho
IBM Distinguished Engineer
IMS Integration SOA Chief Architect
SVL, San Jose, CA. USA



IMS Technical Symposium 2015

Availability. References in this presentation to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates.

The workshops, sessions and materials have been prepared by IBM or the session speakers and reflect their own views. They are provided for informational purposes only, and are neither intended to, nor shall have the effect of being, legal or other guidance or advice to any participant. While efforts were made to verify the completeness and accuracy of the information contained in this presentation, it is provided AS-IS without warranty of any kind, express or implied. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this presentation or any other materials. Nothing contained in this presentation is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics may vary by customer. Nothing contained in these materials is intended to, nor shall have the effect of, stating or implying that any activities undertaken by you will result in any specific sales, revenue growth or other results.

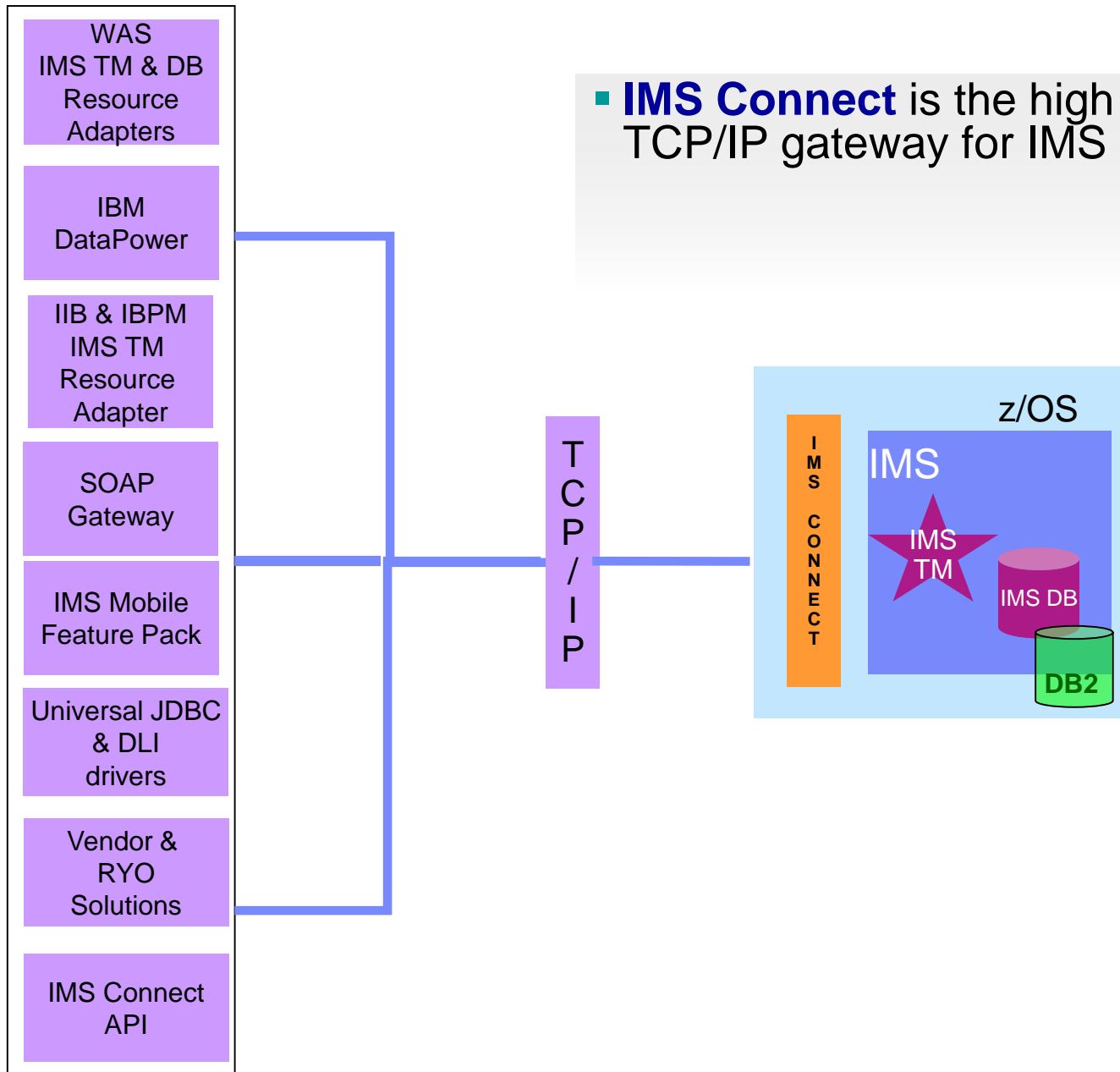
© **Copyright IBM Corporation 2015. All rights reserved.**

- **U.S. Government Users Restricted Rights - Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.**

IBM, the IBM logo, ibm.com, IMS, DB2, CICS and WebSphere MQ are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at “Copyright and trademark information” at www.ibm.com/legal/copytrade.shtml

Other company, product, or service names may be trademarks or service marks of others.

- IMS Enterprise Integration Solutions
- IMS Database Integration & Use cases
- IMS Transaction Integration & Use cases
- IMS Synchronous Callout Observations
- IMS TPIPE Parallelism



- **IMS Connect** is the high speed TCP/IP gateway for IMS



- IMS provides Java and SQL/JDBC access to IMS database since 2000
- All IMS data are captured as standard metadata
 - IMS Catalog (V12)
 - Allow desktop tools to consume and understand IMS data
- IMS Open Database provides distributed access to IMS data via standard interfaces
- IBM WebSphere can access IMS data via IMS DB Resource Adapter
 - WAS to access IMS data
 - DataPower V6 to access IMS data (2Q2013)
- Integration with IBM Watson Explorer (4Q2013)
- Integration with InfoSphere
 - Classic Federation
 - Discovery
 - Guardium
 - BigInsights (1Q2014)
- Cognos V10.2 is fully integrated with IMS to do business reporting against both operational and data warehousing environments (2Q2013)
- SAP &.NET (4Q2013) directly access IMS database
- IMS goes Mobile
- Integration with Bluemix

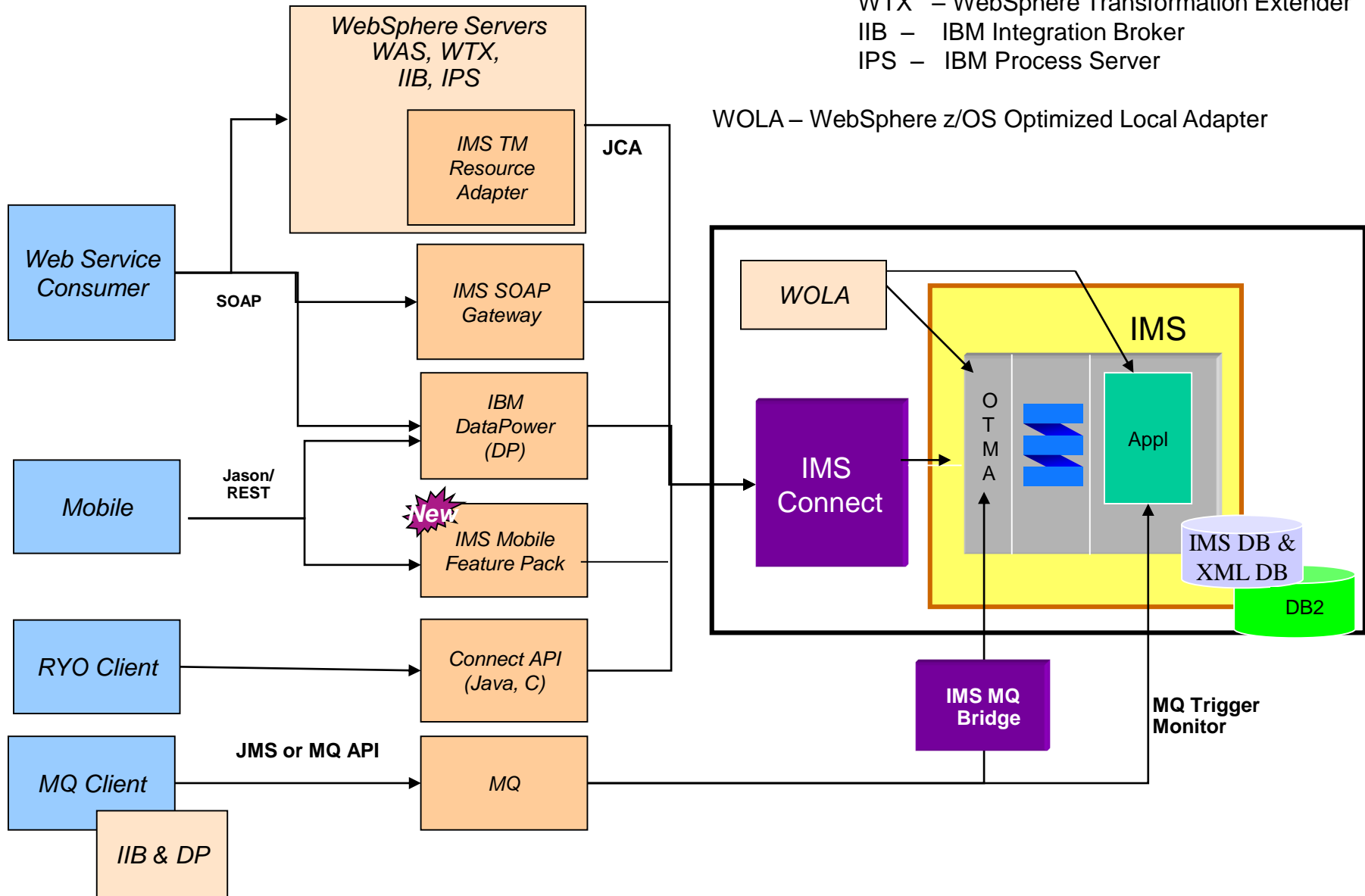
- JDBC access in IMS available since IMS V7
 - Further enhanced in IMS V11 with IMS Open Database capability
 - Both Type 4 and Type 2 access available since IMS V11
- IMS Catalog implemented in IMS V12
- IMS certified with COGNOS 10.2 for business analytics
- Further enhancement in IMS V13
- Enhance IMS analytics with Big Data
- To provide IDAA like capability for IMS

- One of the world's largest public retail corporations by revenue
- Situation
 - Needed to move to a centralized web-based J2EE model in order to manage internal inventory across their 4 regions in the United States
- Solution
 - Leveraged the **IMS DB Resource Adapter** in order to develop Enterprise JavaBeans that access the target IMS databases directly
 - Built service layers on top of the target IMS databases
- Value
 - Leverage the robustness of the J2EE platform to build enterprise applications and have them accessible from anywhere in the corporation



- Provide Java container in IMS regions since 2000
- IMS has evolved from its initial server function with the ability to consume external resources as well as provider access to external applications
 - IMS as an Integration Focal Point in enterprise environments
 - Support both Web services and non-Web services protocols
- Integration with IBM products in supporting XML, Java, JEE, Web Services, SOAP, RESTful, JSON, etc.
 - WebSphere: WAS, WDP, WTX
 - DataPower V6+ supports IMS Callout (2Q2013)
 - PureSystems
 - IIB (IBM Integration Bus), BPM IPS (IBM Process Server)
 - **Plan:** IMS Callout
 - IODM V8.5 (IBM Operational Decision Manager)
 - WebSphere MQ
- IMS SOAP Gateway: Direct SOAP endpoint for IMS transactions
- **New:** IMS Mobile Feature Pack: Direct JSON endpoint for IMS transactions
- Integration with solution packages and databases
 - JEE compliant application servers
 - .NET
 - BizTalk
 - SAP
 - and Oracle, etc.
- Integration with BlueMix, Big Data
- IMS goes Mobile

Connectivity with IMS MQBridge & IMS Connect (Inbound Requests)

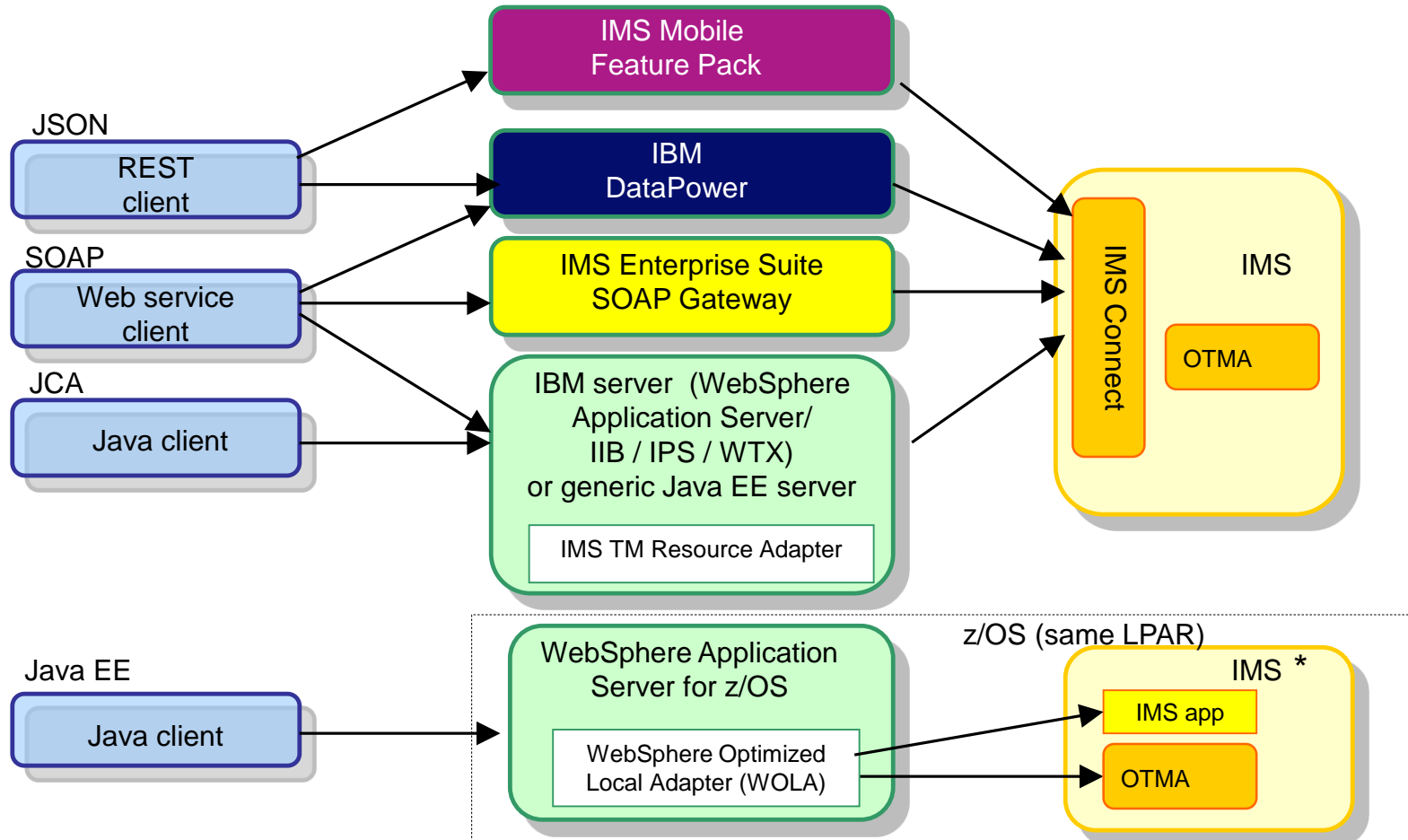


IMS TM Resource Adapter:

- WAS – WebSphere Application Server
- WTX – WebSphere Transformation Extender
- IIB – IBM Integration Broker
- IPS – IBM Process Server

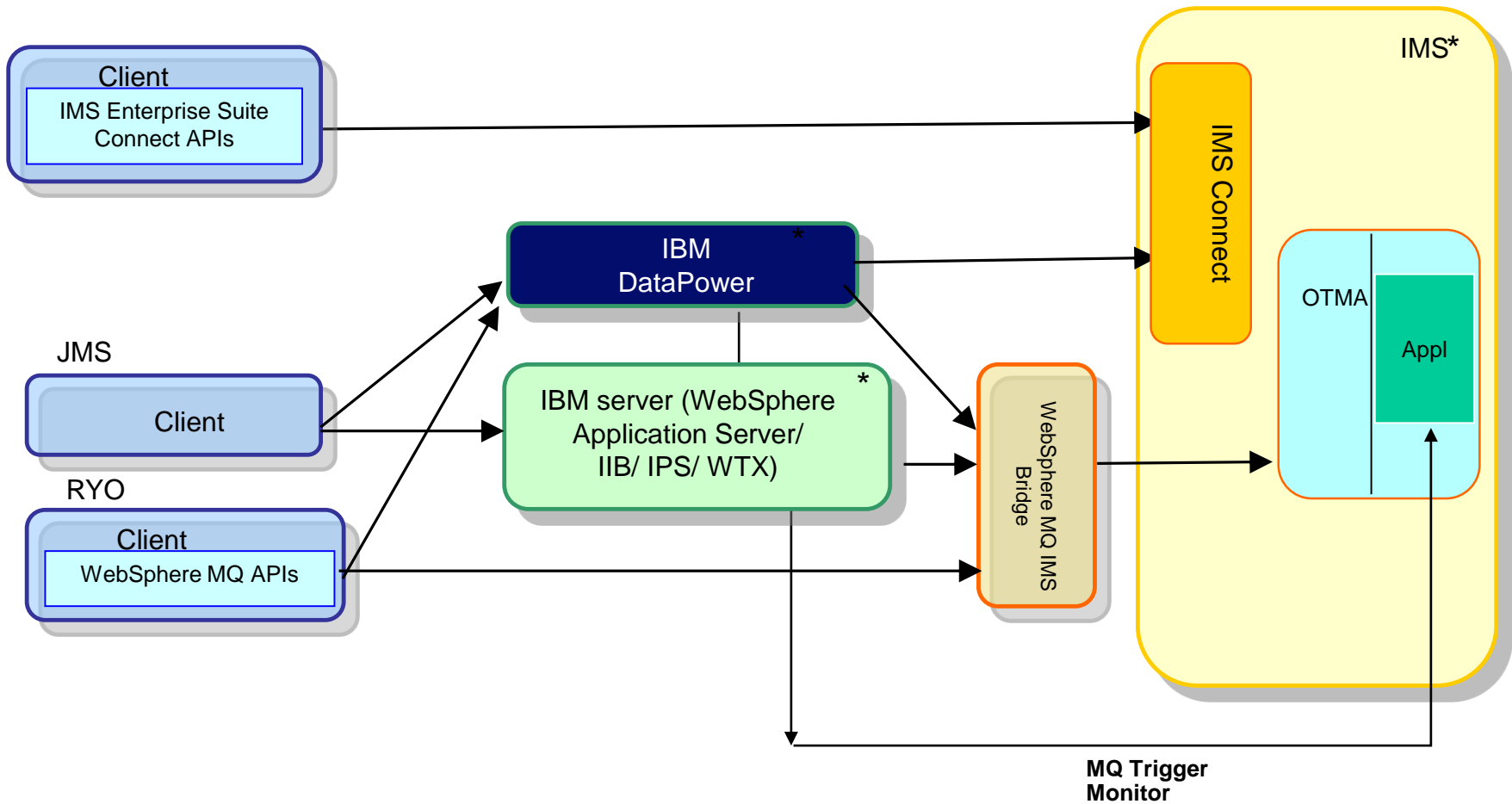
WOLA – WebSphere z/OS Optimized Local Adapter

Connectivity with IMS MQBridge & IMS Connect (Inbound Requests)



* IMS, IBM servers, and WebSphere DataPower boxes are duplicated for diagram simplicity

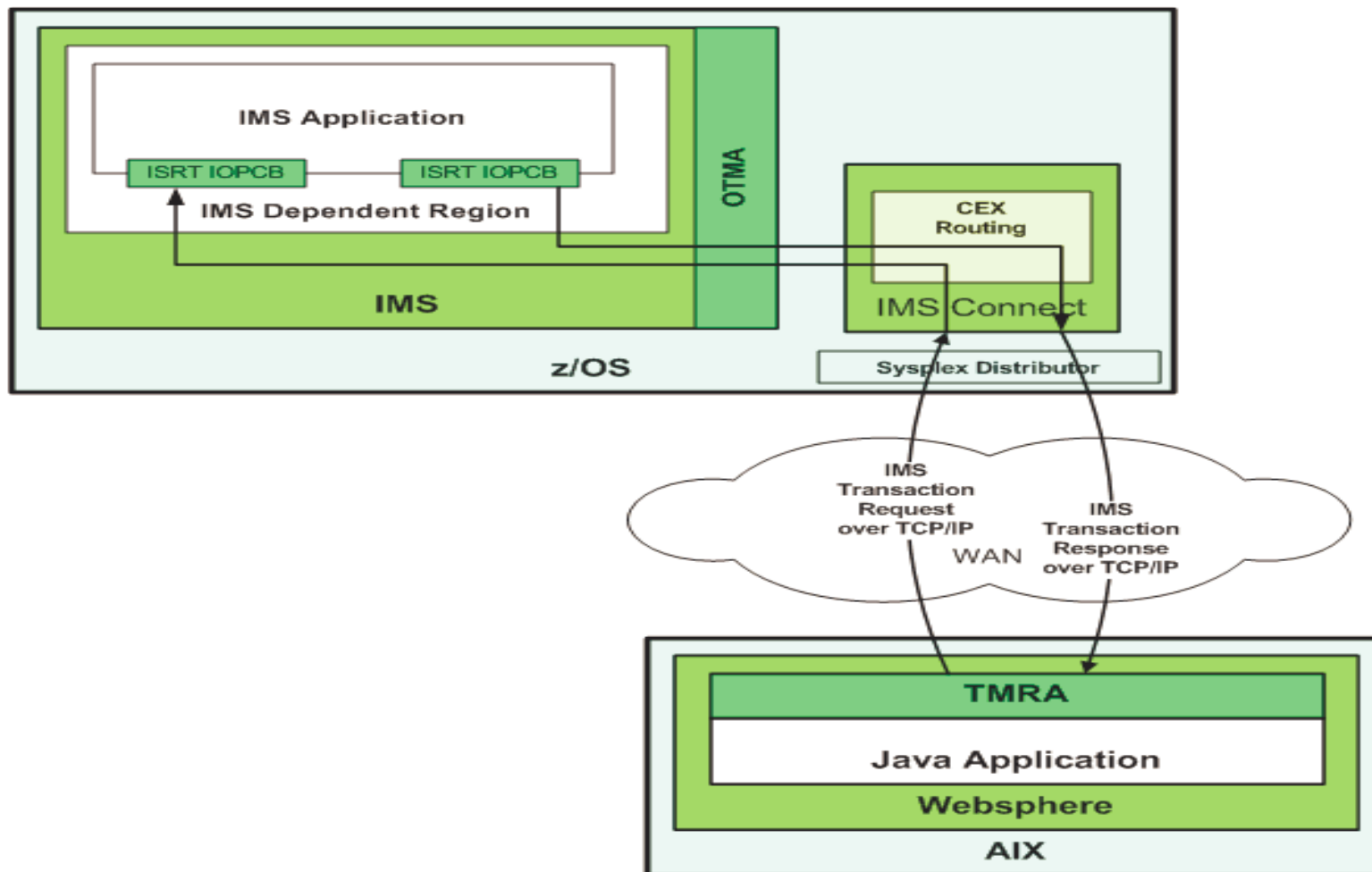
Connectivity with IMS MQBridge & IMS Connect (Inbound Requests)



* IMS, IBM servers, and WebSphere DataPower boxes are duplicated for diagram simplicity

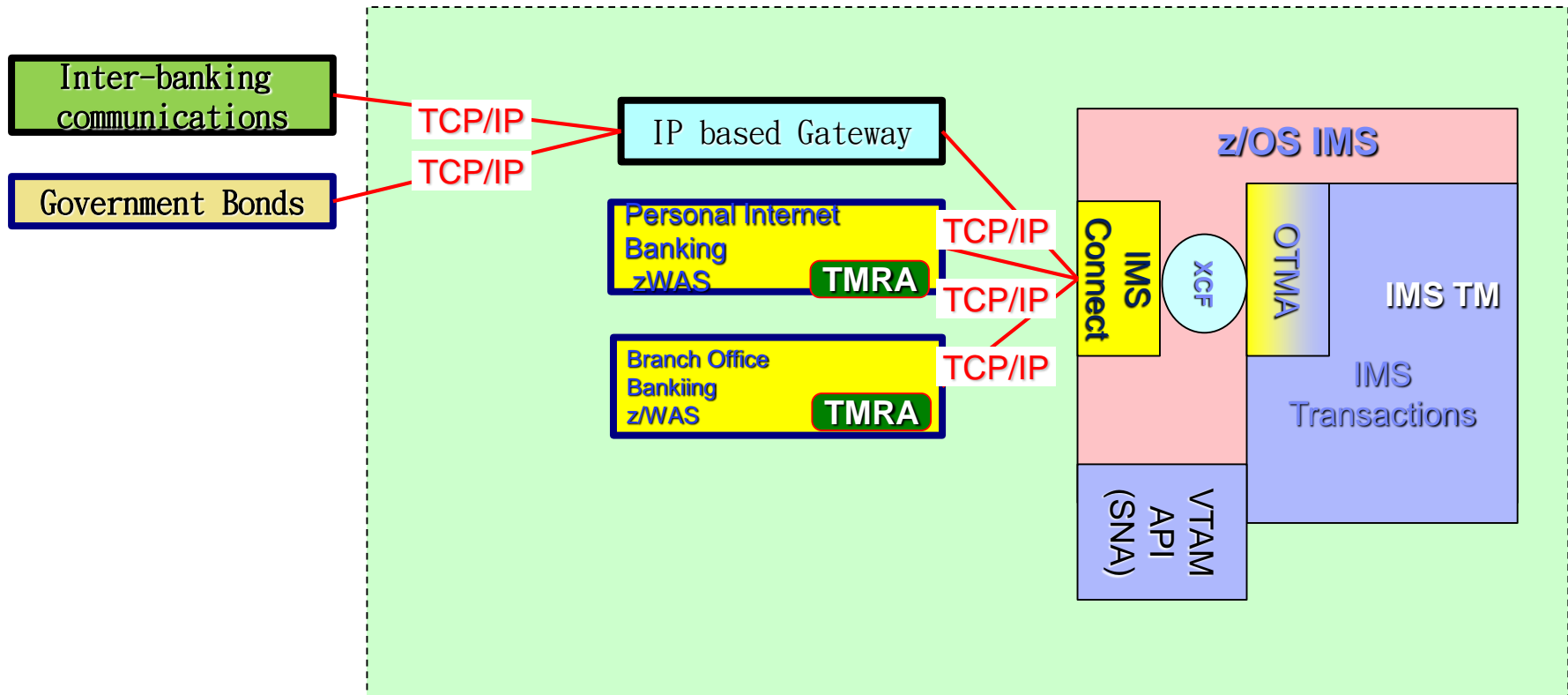
- **Large Canadian Bank** - New financial services through reuse of IMS assets
 - 3 IMS sysplexes in production, processing 50 million transactions a day
 - Situation
 - Needed to reuse the bank's extensive IMS assets as components to deliver new financial services and extend client reach
 - Needed to maintain high availability and throughput in the new IMS profile
 - Solution
 - Evolving IMS in a growing portfolio of new applications for the branch platform and mission-critical "e" channels **since 2002**
 - 18 **IMS Connect** instances, and growing **IMS TM Resource Adapter** applications in 3 WebSphere Application server for z/OS sysplexes in production now
 - Rational Application Developer for Java development

- ❖ A Banking system wanted to modernize z/OS and eliminate SNA LUs, and reduced proprietary transaction chaining
- ❖ Position IMS applications as first-class players in enterprise SOA solutions



Personal Internet Banking with zWAS and IMS TMRA

- ❑ A Banking system in Asia has modernized their Personal Internet & Branch Office banking systems with zWAS and IMS TM Resource Adapter
- ❑ In production in 2013





Business Challenge

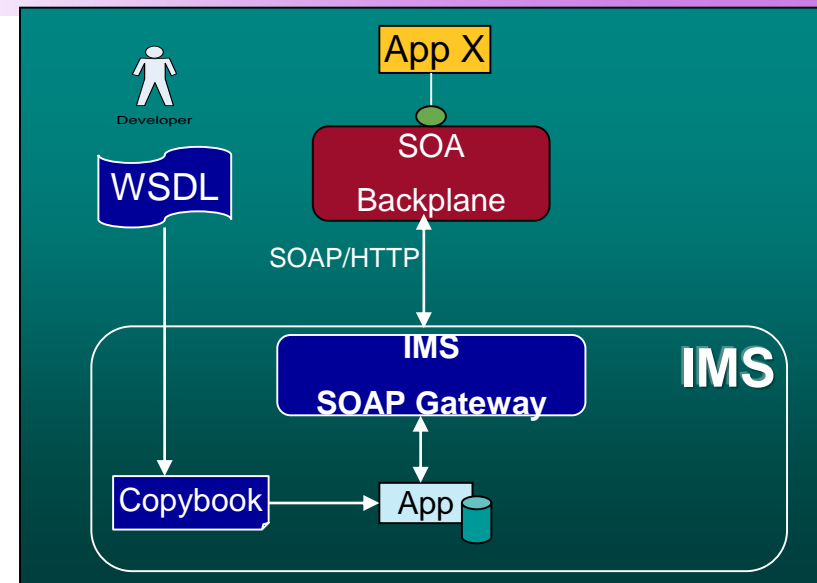
❖ *Credit Suisse needs to flexibly and cost efficiently implement new and changed business requirements to isolate the effects of changes and prevent ripple effects of changes. They need services with a business semantic that is unrelated to the current implementation or database schema.*

Solutions

- ❖ *Credit Suisse's Strategic core banking applications are built and evolved with PL/I as the preferred language on IMS*
- ❖ *Start with Web services description files (WSDL) that represent the interface contract to develop new and evolve existing IMS applications*
- ❖ *A top-down approach is required to map complex XML data structures, including unbounded arrays and strings to PL/I*
- ❖ *Using IMS SOAP Gateway for inbound requests, with RDz as the development tooling.*

Benefits

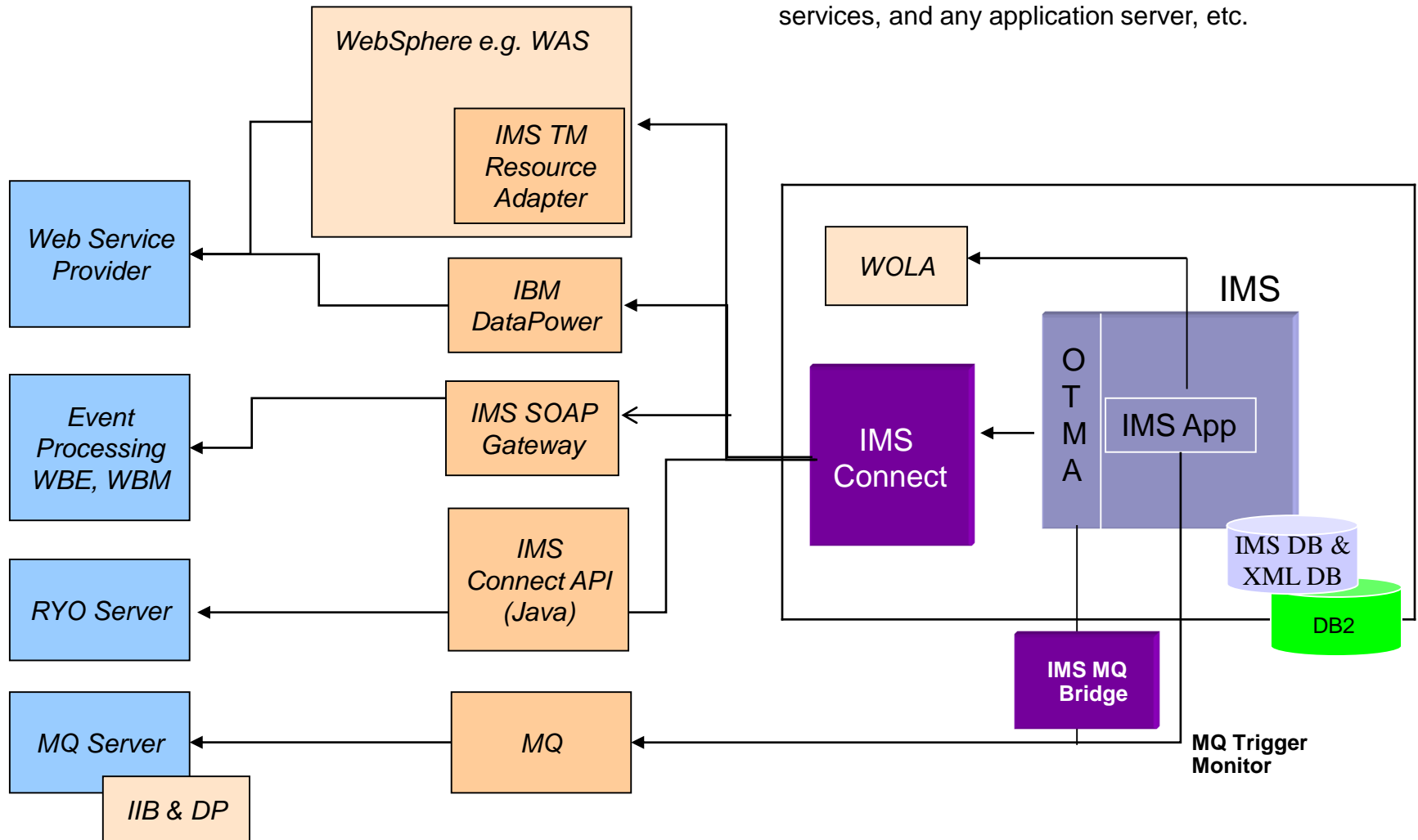
- ❖ *Integrate IMS systems into overall enterprise SOA infrastructure and maintain high availability and throughput in the new IMS profile*



Connectivity with IMS Connect & MQSeries (Outbound Requests)

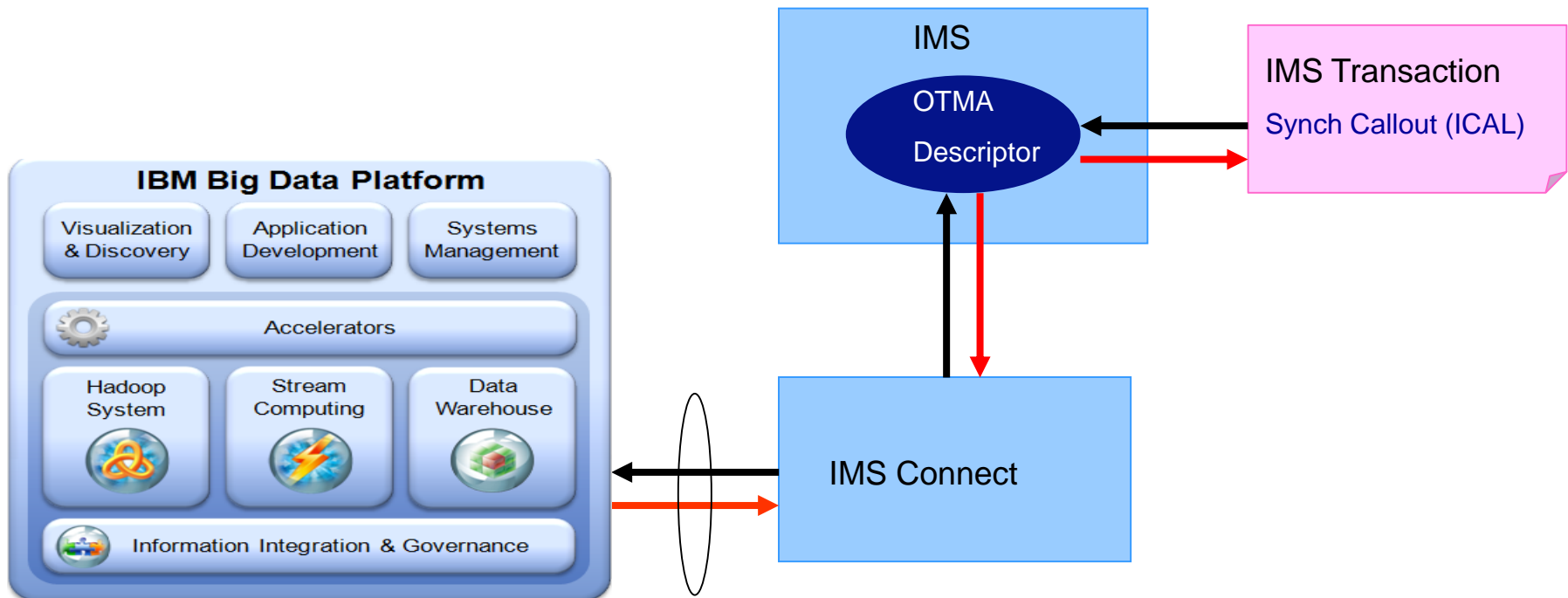


RYO Server - .Net, BizTalk, Oracle SP, SAP, PayPal services, and any application server, etc.

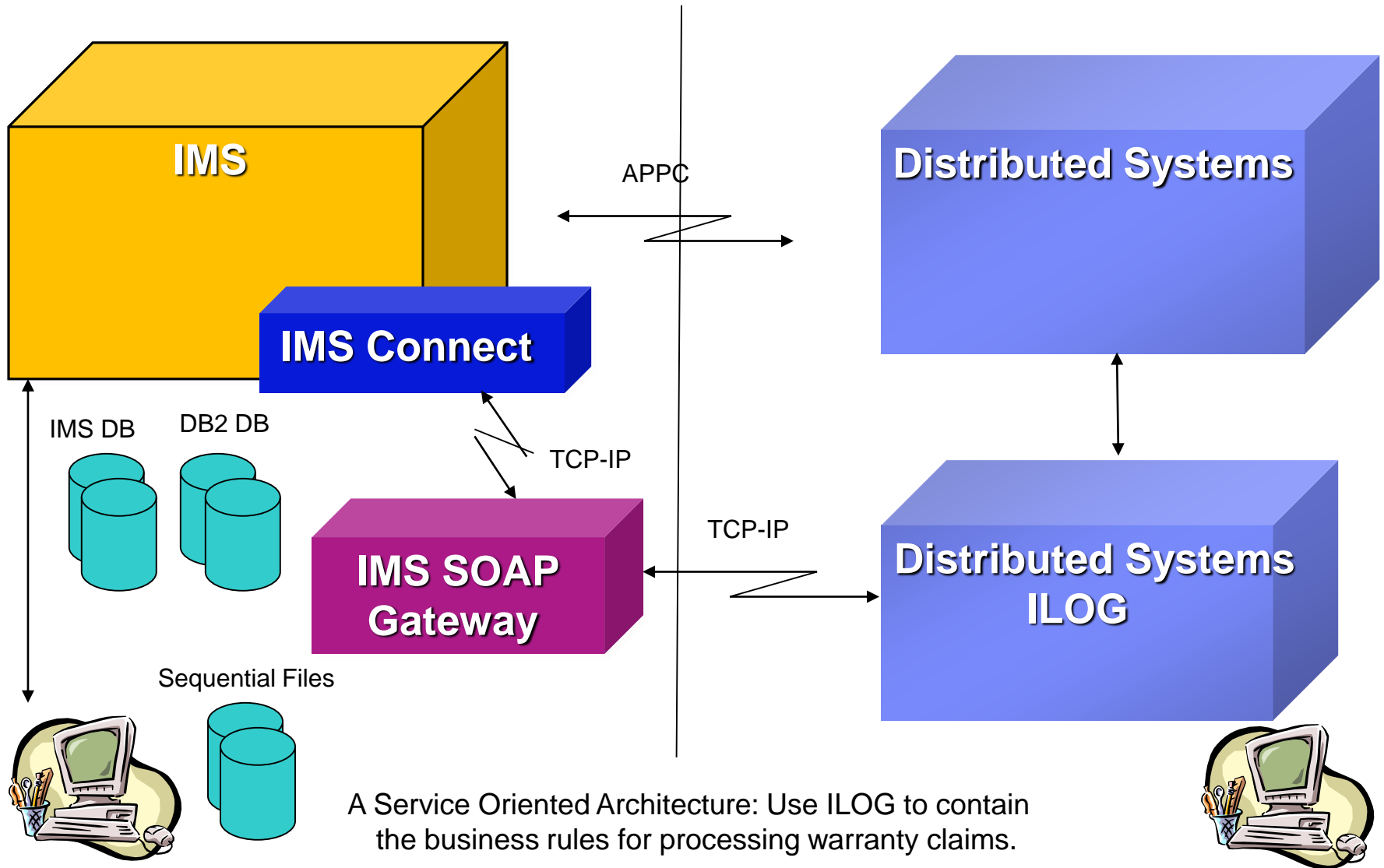


- Asynchronous callout: Notification
- Synchronous callout: To integrate IMS transactions with external solutions
 - Fraud Detection
 - To consolidate solutions, e.g. Proactive Risk Manager (PRM), across enterprise platforms with IMS transactions, for multi-channel integration, e.g. mobile, internet, B2B, and etc.
 - Account Summary
 - Transfer Funds
 - Access “Rules Engine” on distributed platforms
 - Access “Credit Score” engine on other platforms
 - To extend IMS transactional capabilities without adding extra logics inside IMS
 - Others

- **IMS transaction goes outbound synchronously to Hadoop or BigInsights to fetch data (e.g. “score”), and then returns**

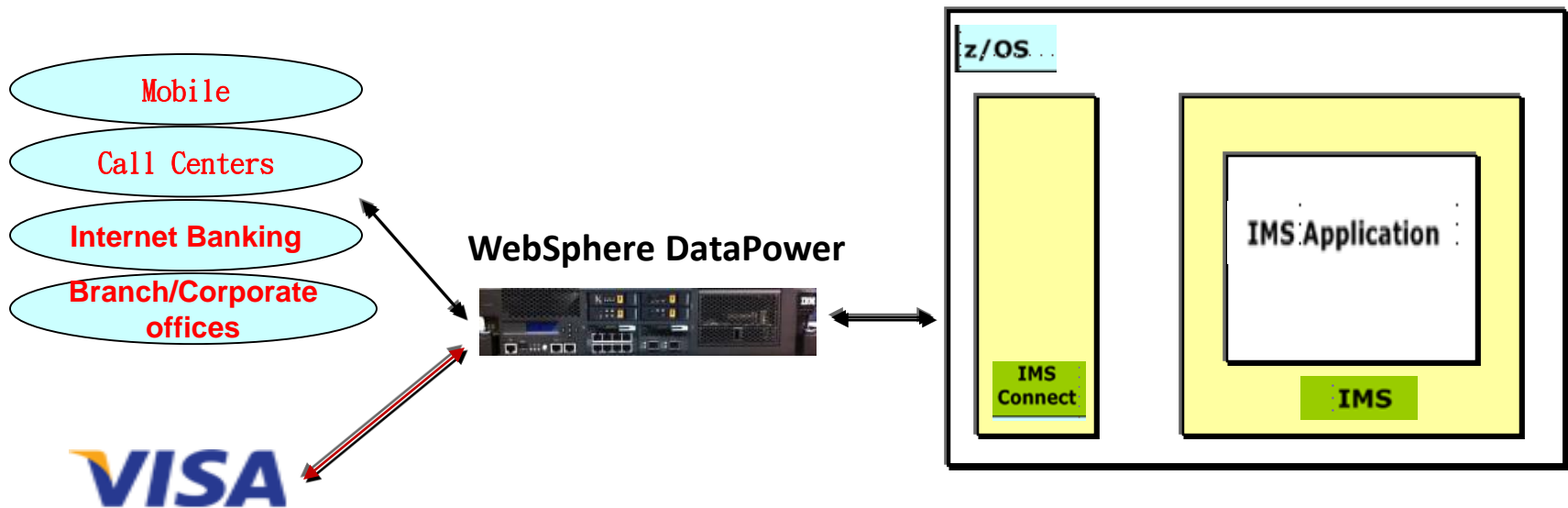


- SOAP Gateway is used to send IMS Synchronous Callout messages to their enterprise-level **Anti-Money Laundering and Fraud Detection** applications
 - SOAP Gateway is preferred for **real-time fraud analysis** and returns immediate responses
 - 70ms response times for Callout
- Bank's IMS Environment
 - An IMS Shared Queue customer
 - Use IMS COBOL transactions to drive the Synchronous Callout requests.
 - Have 4 LPARs with 3 IMSes, 4 IMS Connects and 4 SOAP Gateways (one for each IMS Connect on each LPAR)
 - Also implemented Failover with SOAP Gateway



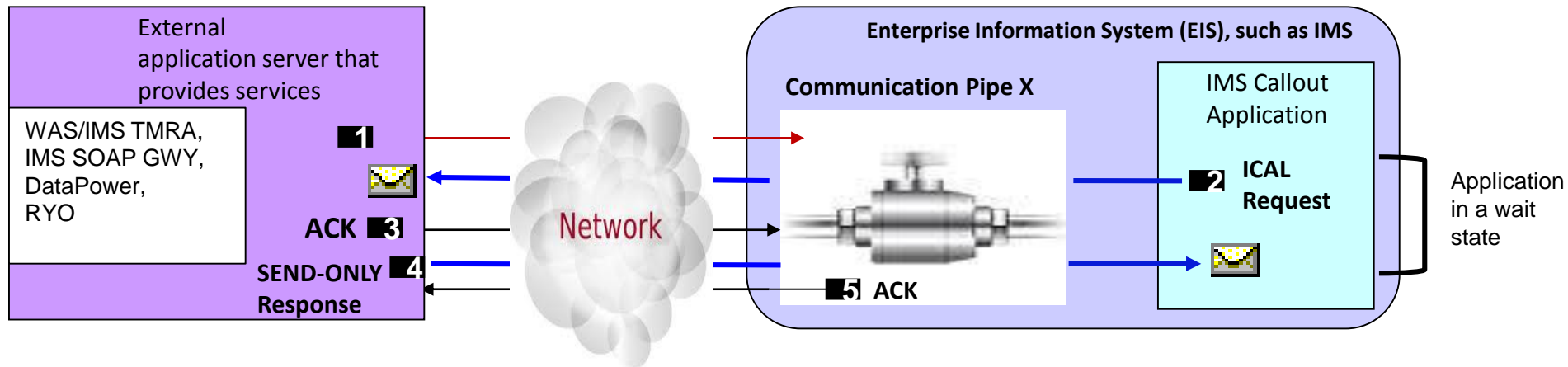
- Use **IMS Synchronous Callout** through the IMS SOAP Gateway to access the ILOG processes from the existing IMS application.
- Presented at 2012 IBM IOD Conference

- A Banking system supports **multiple solution delivery channels**, e.g. Internet Banking, Mobile, Call Centers, Branch & Corporate offices, etc. for account balance, and fund transfer with Visa International
- In production in 2014



- IMS environments that use IMS synchronous callout (DL/I ICAL) or asynchronous retrieval (CM0 with ACK)
 - Require the message to be pulled by the external server/application using a Resume TPIPE request through IMS Connect

Example showing an IMS synchronous callout interaction:

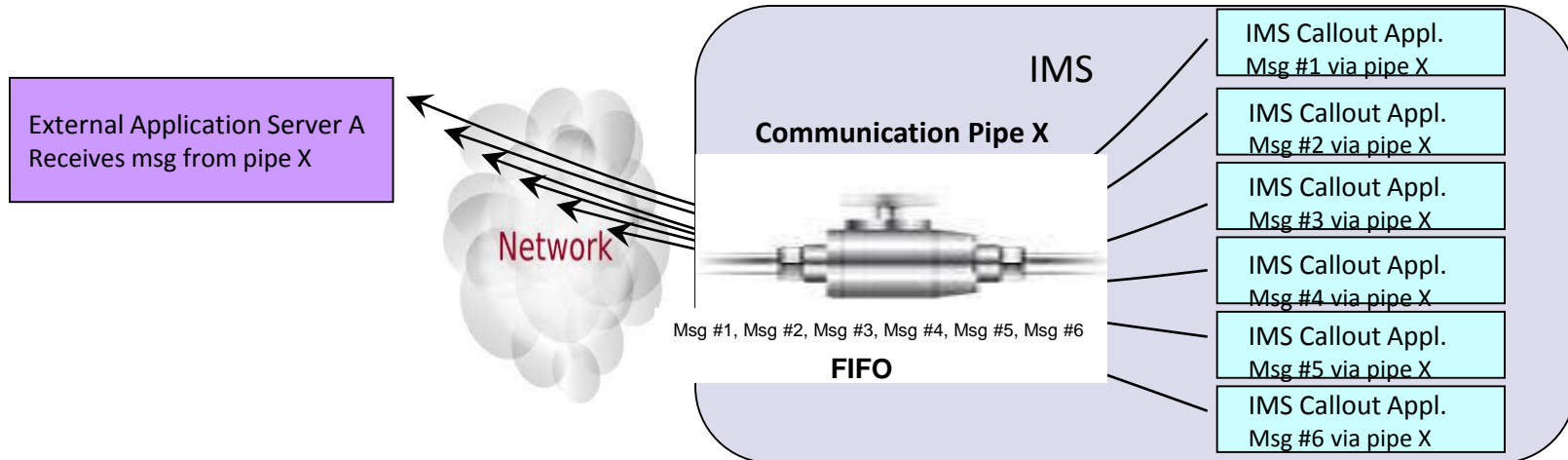


Resume TPIPE is a protocol that is used to retrieve messages from the named **TPIPE** in IMS

A **TPIPE** is a control block structure in IMS

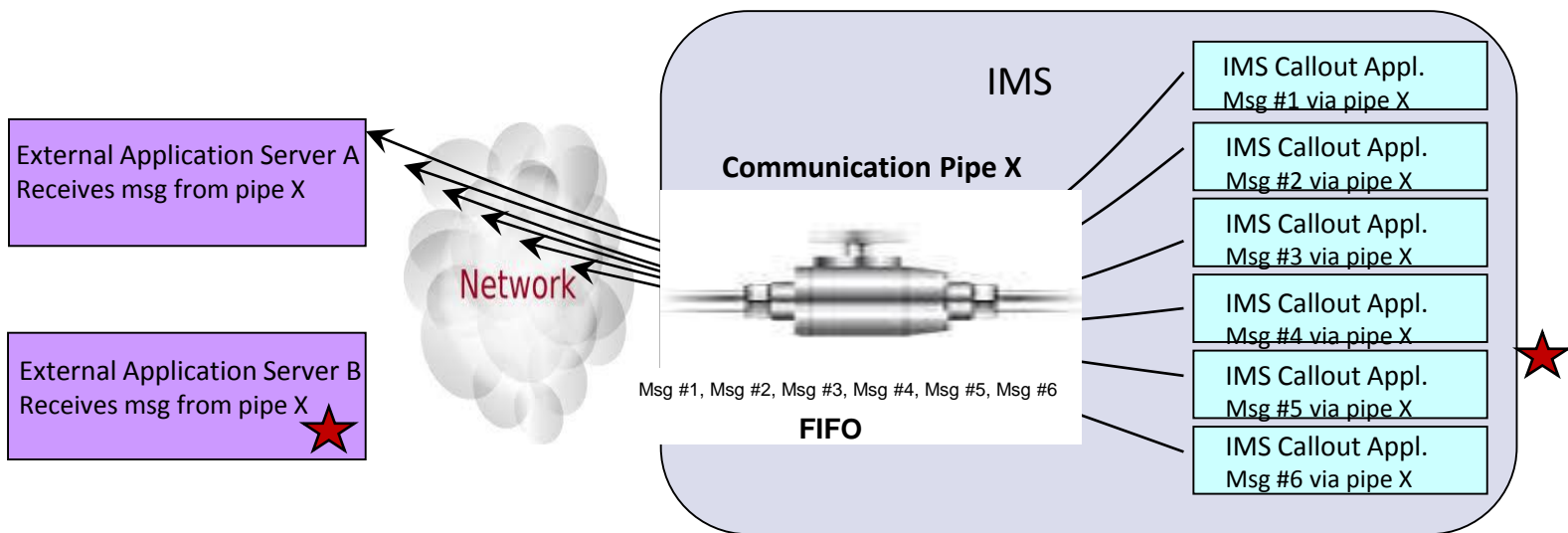
IMS messages are anchored on the TPIPE

- **Problem #1:**
 - Potential bottleneck for high rates of messages
 - Restriction: For each TPIPE, only a single active Resume TPIPE can be active
 - All of the six callout messages from IMS callout applications are sent to External Application server A
 - One message at a time in FIFO order
 - If one is blocked, the others cannot be delivered
 - TPIPEs sending CMO output require ACK before the next message can be sent
 - Ensures message integrity but serializes the message



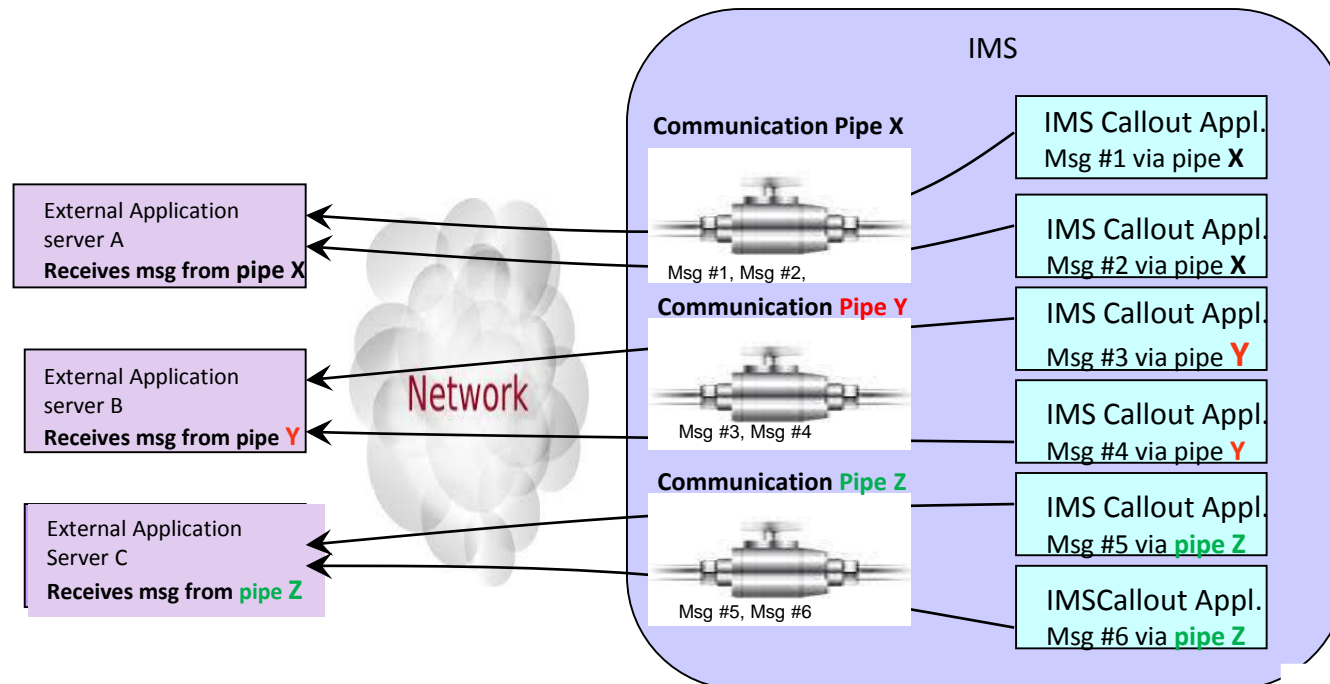
■ Potential problem #2

- No parallelism for callout messages
 - Only one Resume TPIPE (RT) can be active for any given TPIPE
 - Other Resume TPIPEs will be **queued** and have to wait for the **active** RT to terminate
 - This provides for failover but not throughput or workload balancing



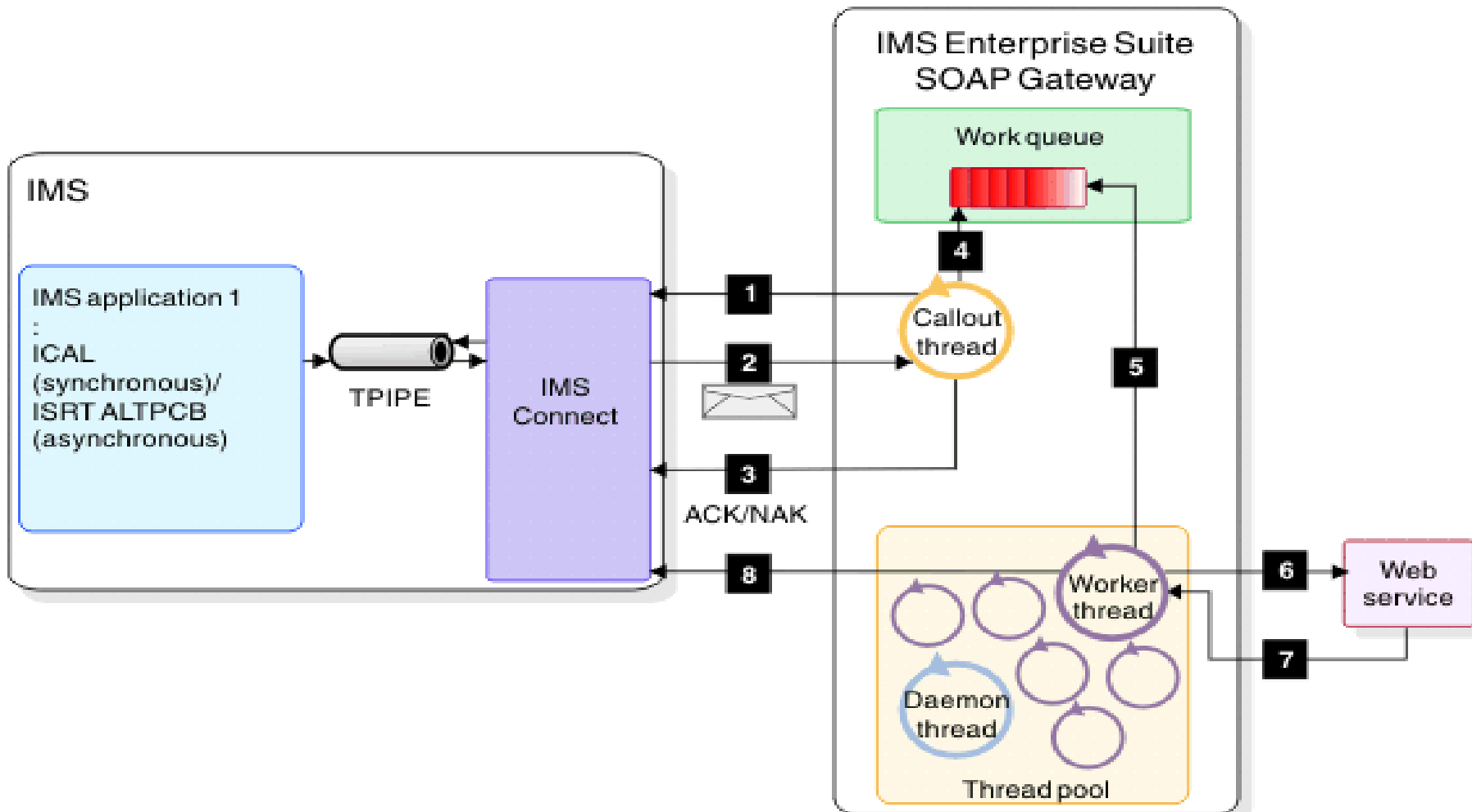
- Multiple IMS Applications issuing ICAL to a single TPIPE ★
 - TPIPE serialization makes them wait longer, holding the dependent regions, increasing region occupancy and transaction response times

- Application-based circumvention: Use multiple Resume TPIPEs with different TPIPE names
 - Change the external applications and IMS callout applications to specify different communication pipes
- BUT: this solution increases application responsibility and complexity
 - Additionally, workload balancing, which would not be easy to do in this environment, would need to be part of the architected design.



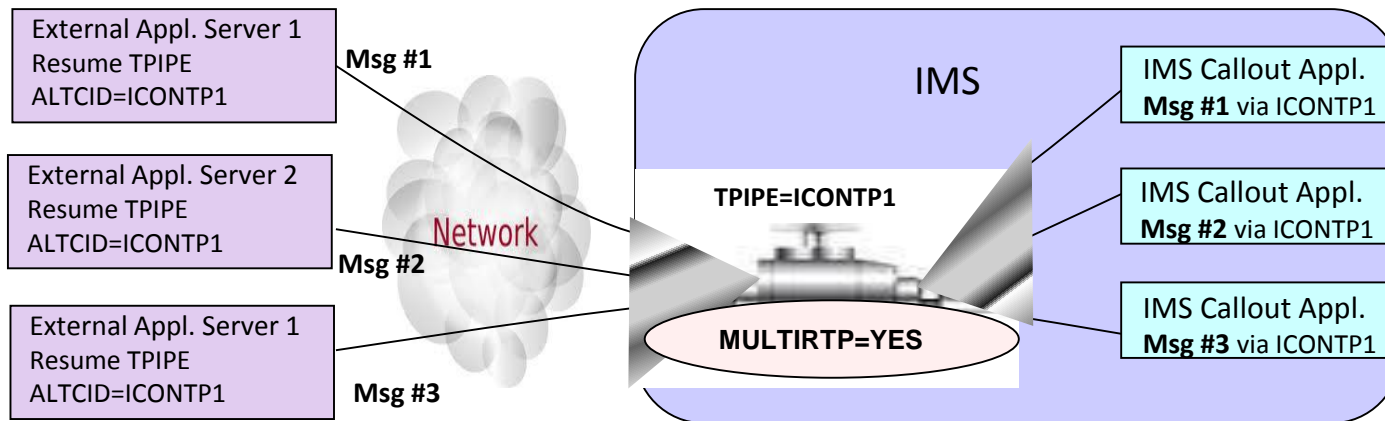
Callout Multi-threading Provided by IMS

- Today, only one Resume TPIPE can be active for any given TPIPE
- IMS provides “multi-threading model” by using different threads to process requests and to dispatch responses to achieve maximum concurrency
 - Callout request messages from a TPIPE can be retrieved by a callout thread (as a “master thread”), and sent to other threads (as “worker threads) for processing
 - Then continue to retrieve the next callout message



- Proposed TPIPE Parallelism
 - **MULTIRTP=Y**: Enables multiple **active** Resume TPIPE requests to pull messages from a single TPIPE
 - Creates additional control blocks up to the LIMITRTP value to support concurrency and to minimize queuing
 - CM0 (commit-then-send) asynchronous output from ALTPCB, SendOnly or NAK'd
 - Synchronous callout requests (ICAL to IMS Connect)
 - **MULTIRTP=N: Default**. Single active Resume TPIPE
 - Messages are queued, as in previous releases, FIFO to a single HOLDQ
 - Controls the order of the messages
 - **LIMITRTP=nnn**: controls or limits the number of active RTs if MULTIRTP=Y

- MULTIRTP=YES can work with multiple callout applications to the same TPIPE for best performance and Parallelism
 - No need to implement circumventions or re-design applications
- Resume TPIPE protocol for client requestors remains unchanged
 - No new architecture or option required on Resume TPIPE
 - Still must wait for ACK from each message sent



Thank You