Scotiabank
Mainframe Modernization:
Using IMS Connect & IMS Tools
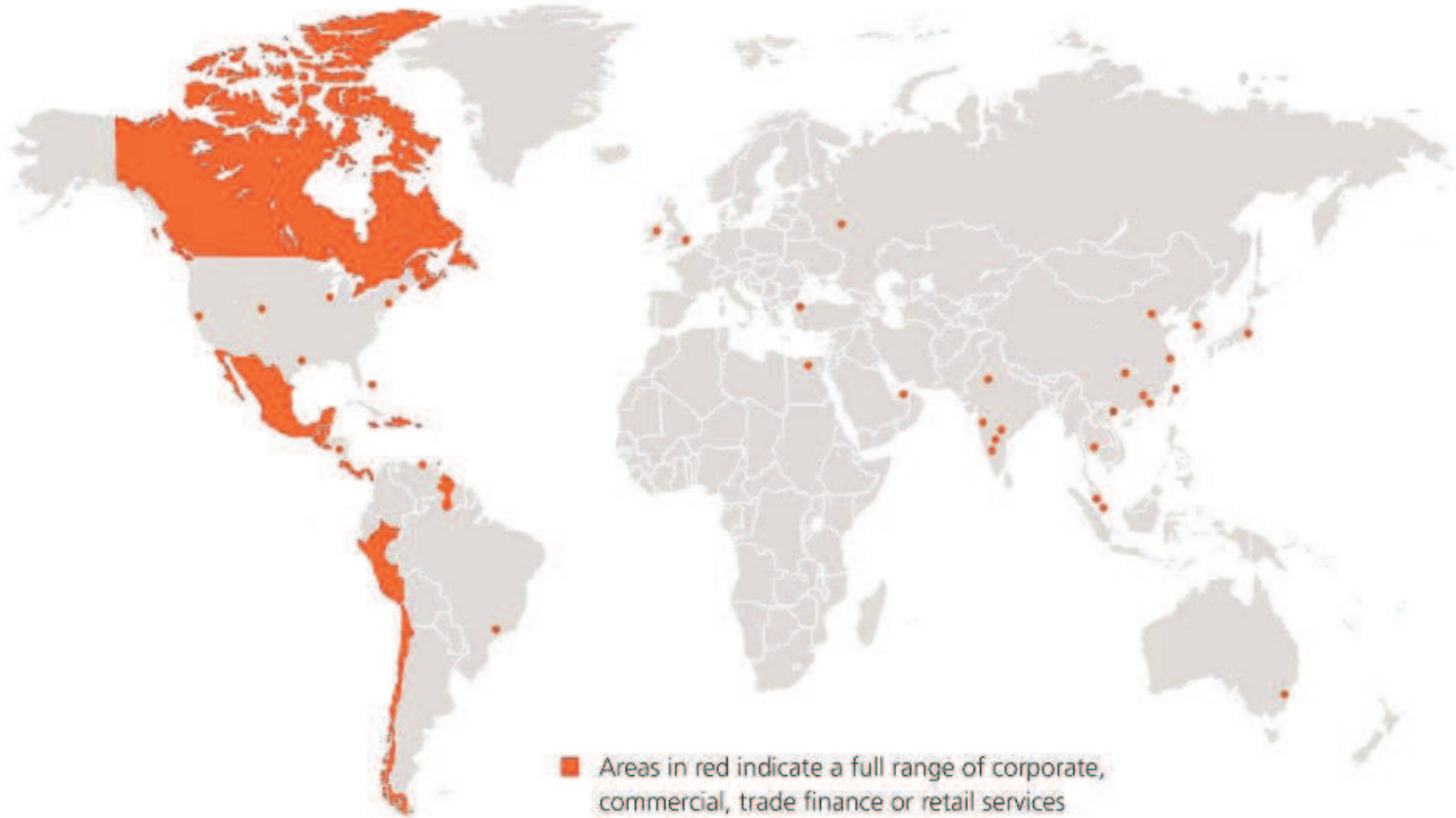# for Improved IMS Applications

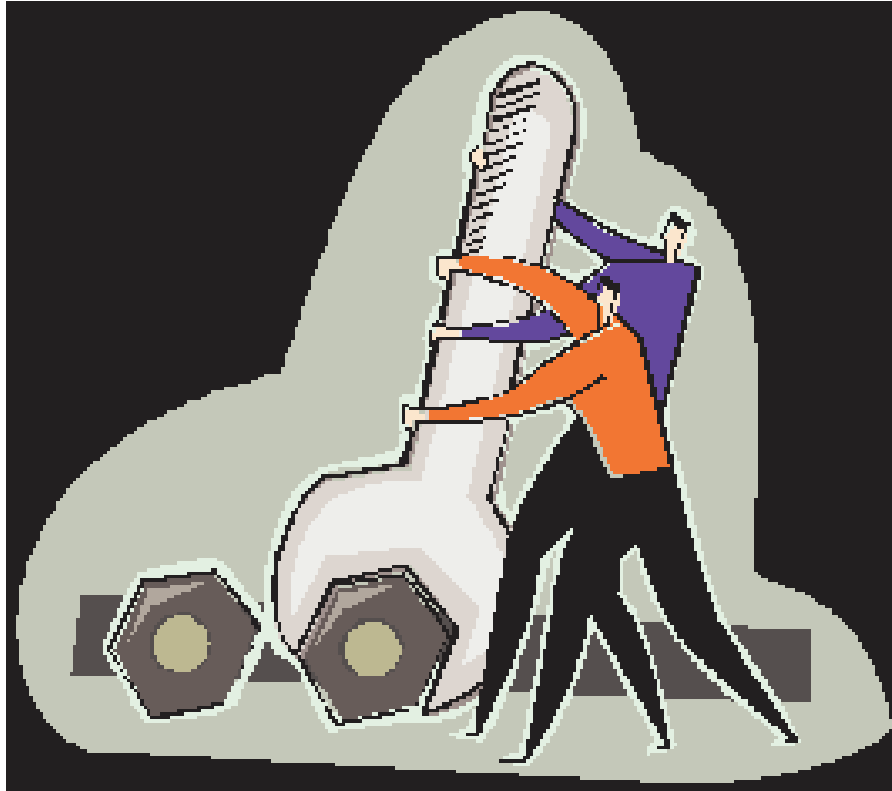Craig Oddy, Senior Enterprise Architect, Scotiabank

About Scotiabank

- Scotiabank is one of North America's premier financial institutions, and Canada's most international bank.

  - Since welcoming our first customers in Halifax, Nova Scotia, in 1832, Scotiabank has continued to expand its global reach.

  - Today, through our team of more than 70,000 employees, Scotiabank Group and its affiliates offer a diverse range of products and services, including personal, commercial, corporate and investment banking, to some 18.6 million customers in more than 50 countries around the world.

- Our corporate goal is to be a leading international financial services provider, based in Canada, by being the best at helping our customers become financially better off.

- For more information please visit www.scotiabank.com

- (TSX: BNS) (NYSE: BNS)

Areas in red indicate a full range of corporate, commercial, trade finance or retail services

Areas with a red dot indicate global corporate and investment banking or capital markets businesses, Scotiabank representative offices or retail operations with less than 10 branches.

# Scotiabank Partners with IBM Global Services

- In 2007, Scotiabank renewed a multi-year agreement with IBM to manage Scotiabank's Canadian domestic information technology operations, including data centers, branches, automatic banking machines and help desk support.

- Scotiabank Mexico has a similar agreement with IBM IGS

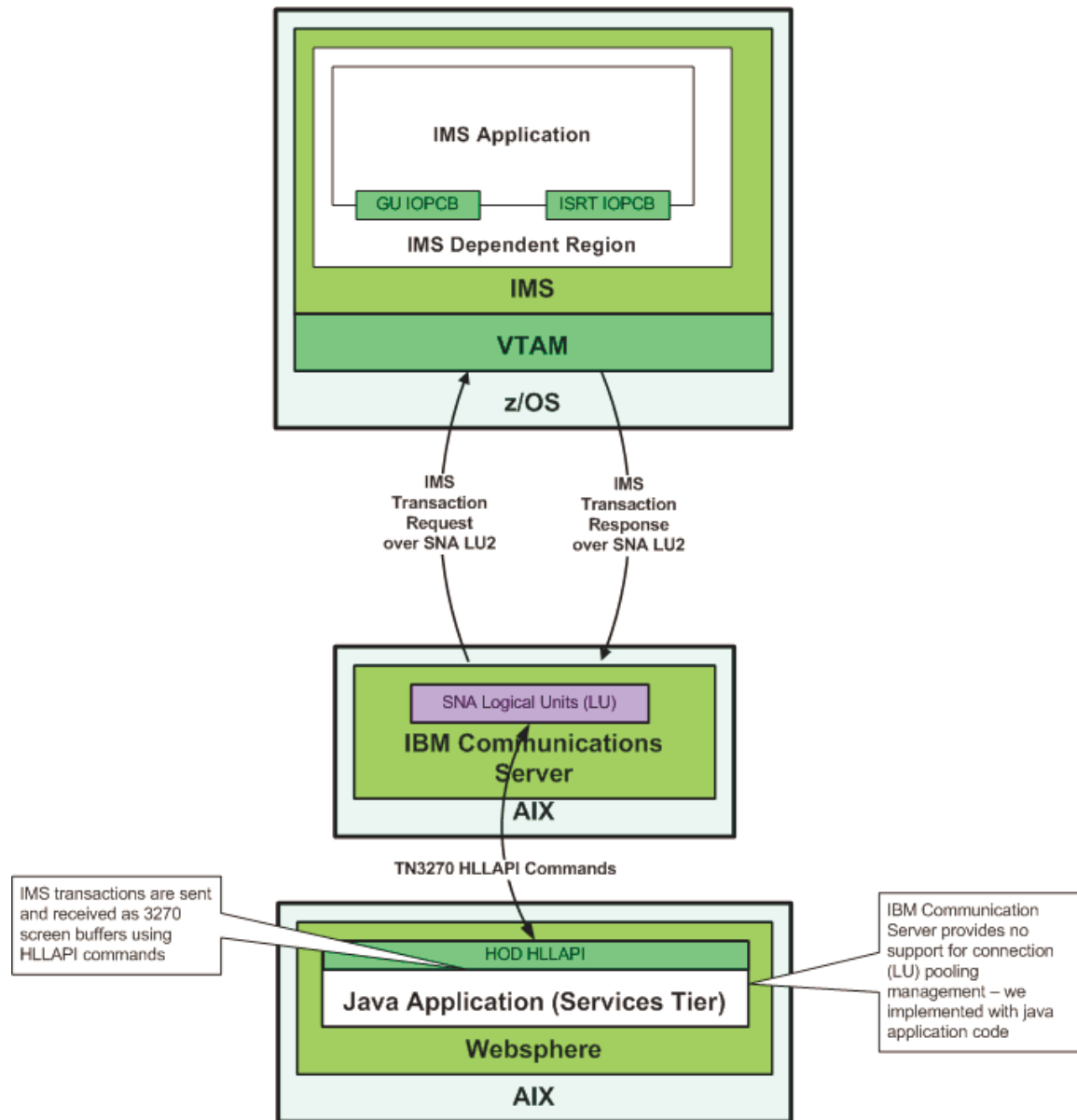# Using IMS Connect to Modernize Connectivity with z/OS® IMS™

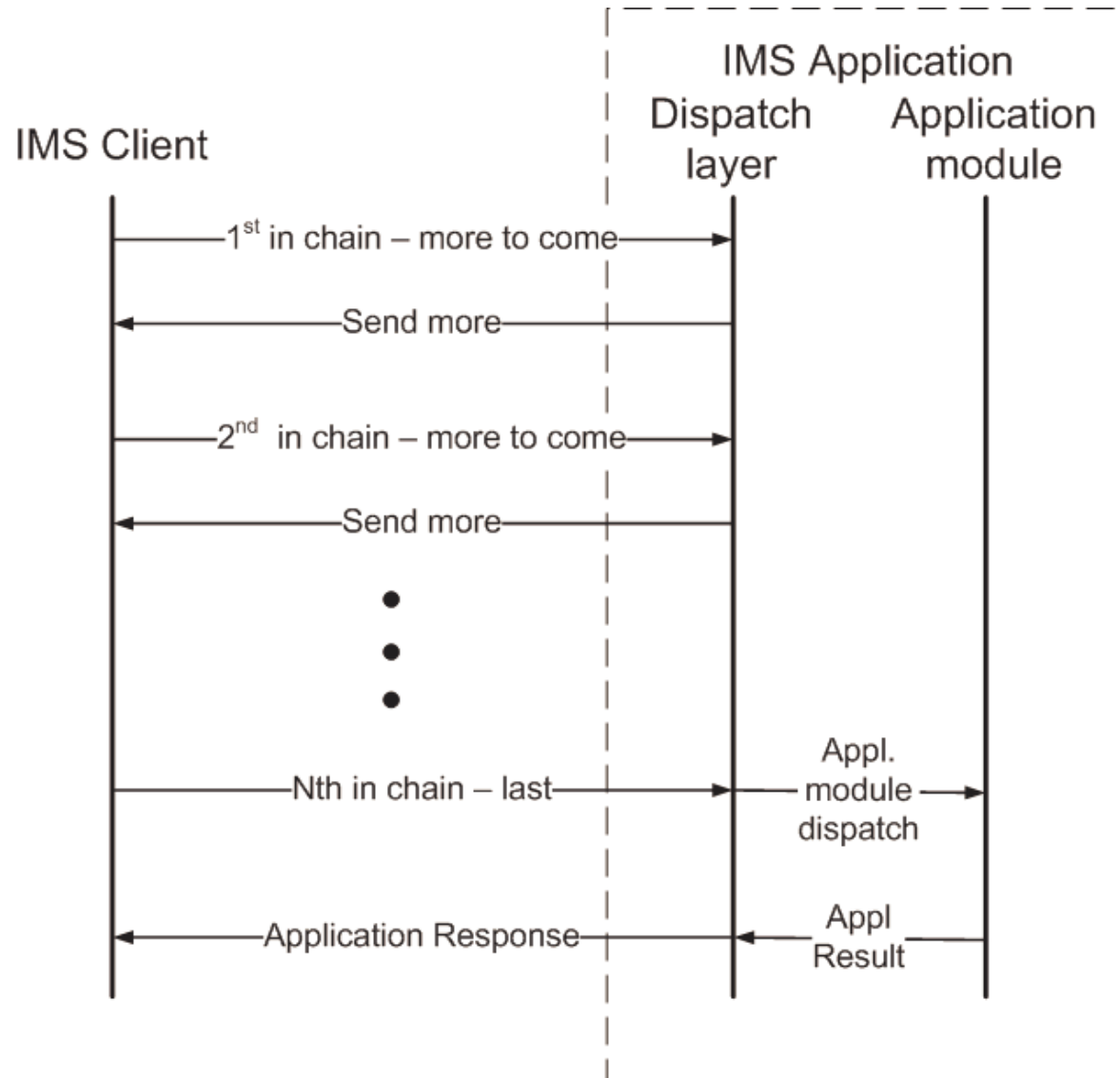# Architectural Tiers and Focus of Interest for this Work
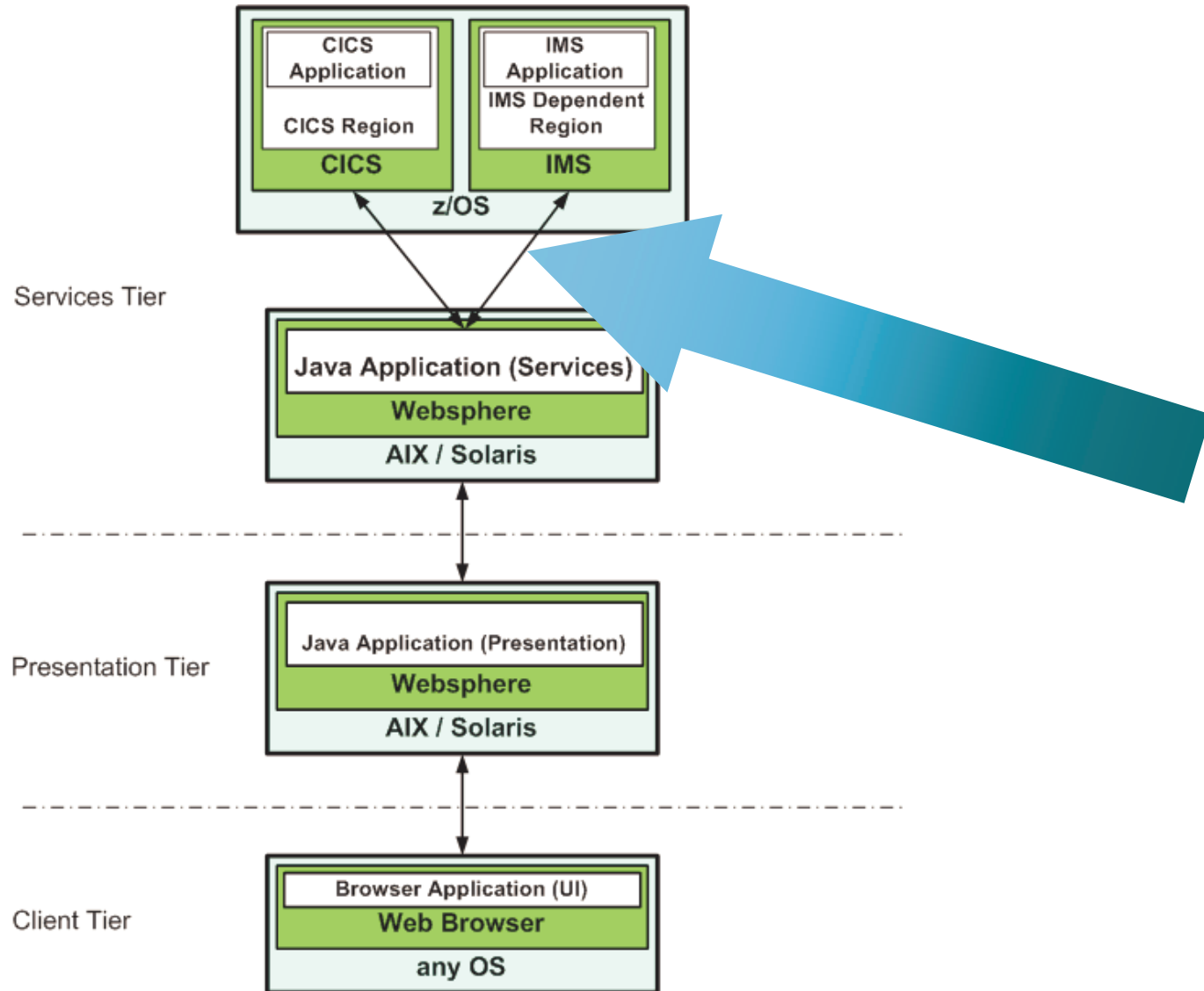
Challenges and Opportunities
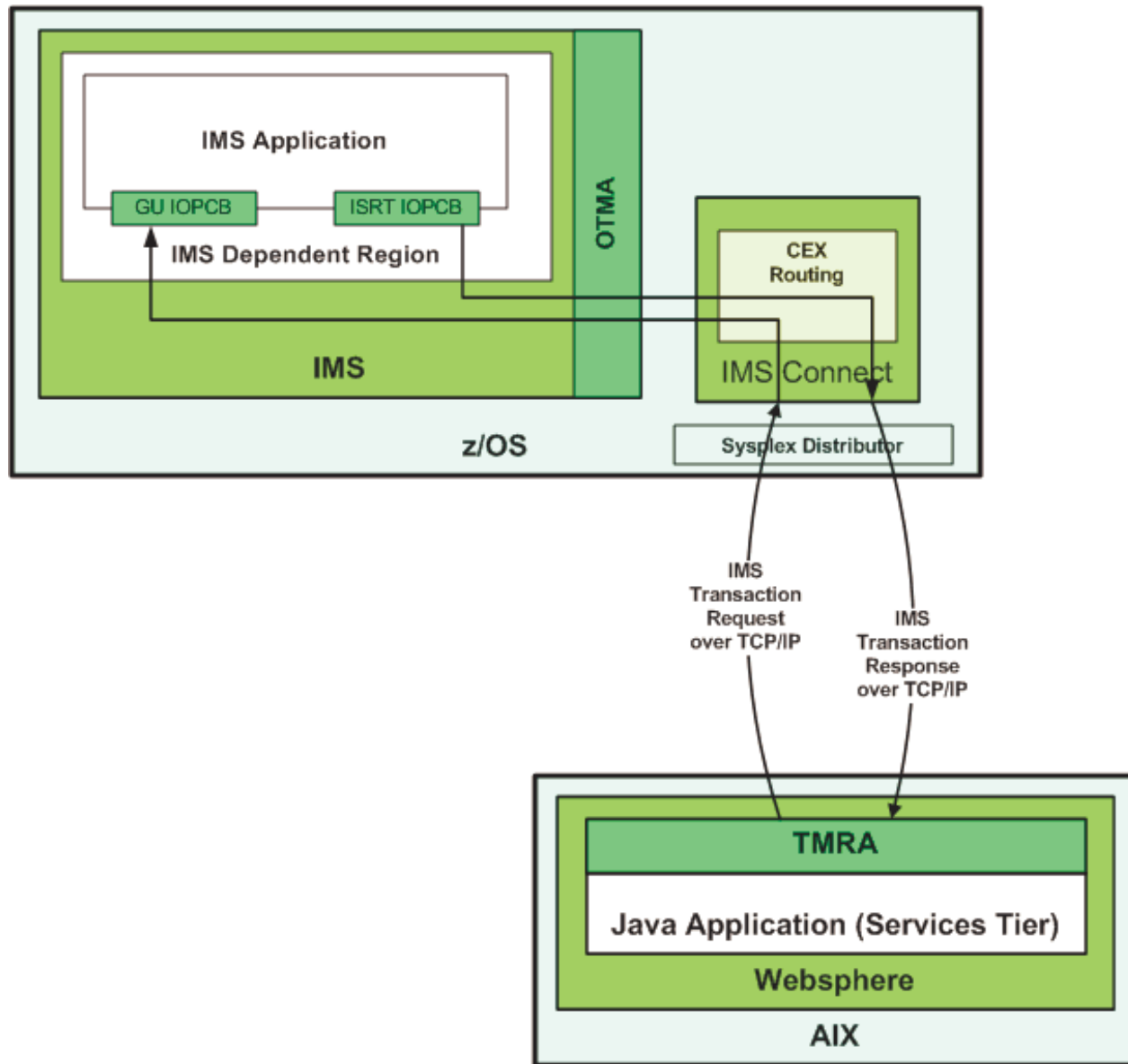## - SNA based Connectivity with IMS™

Chaining issue – before IMS Connect

IMS Connect – High Level Solution Architecture
- IMS™ as Enterprise Services Server

Building the Business Case
A Win-Win solution – functional and operational improvements, and as well a positive $ case!

- Eliminate costs related to IBM® Communication Servers

- Eliminate costs related to SNA LUs

- Drastic reduction of "more-to-come" transaction chaining

  - Mainframe MIPS reduction thru transaction overhead reduction

  - Improved business function response times

- Improved stability

- Improved availability

- Improved transaction performance

- Address some software currency issues in client

- Improved "consumability"

  - Better positioning of IMS applications to be first class players in enterprise SOA solutions

IMS Connect and IMS Commit Processing

- We chose:
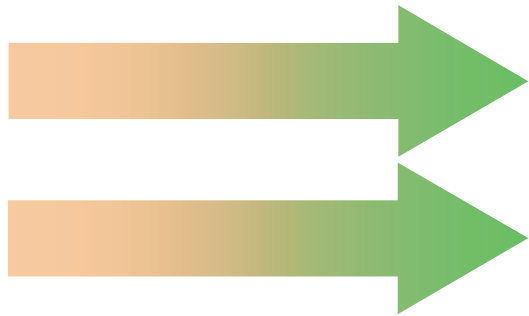
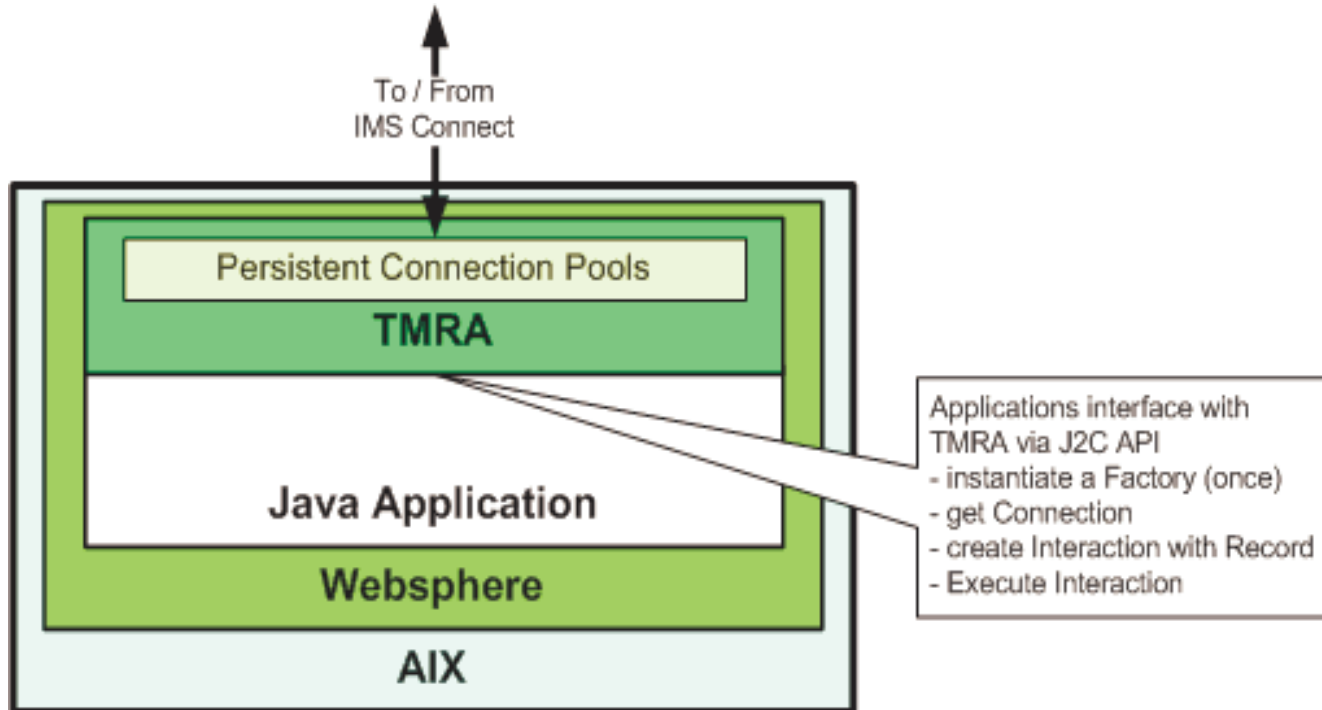**Commit mode = 1**

Synch level = NONE

Transaction Manager Resource Adapter (TMRA)

WebSphere JAVA Applications access IMS using TMRA

- TMRA is a J2EE Connector Architecture (J2C) compliant adapter

To / From
IMS Connect

Persistent Connection Pools

TMRA

Java Application

Websphere

AIX

Applications interface with
TMRA via J2C API
- instantiate a Factory (once)
- get Connection
- create Interaction with Record
- Execute Interaction

- TMRA implements sophisticated connection pooling for support of persistent socket connections

Being J2C, TMRA is installed and configured via WebSphere Console

Secure Sockets Layer (SSL)

- Both IMS Connect and TMRA support SSL allowing for Client and Server side certificate based SSL connections

- Secure encryption of confidential information between WebSphere client and IMS

- Another option is to use AT-TLS support on z/OS

  - AT-TLS is our longer term strategy

Non-Functional Testing Environment
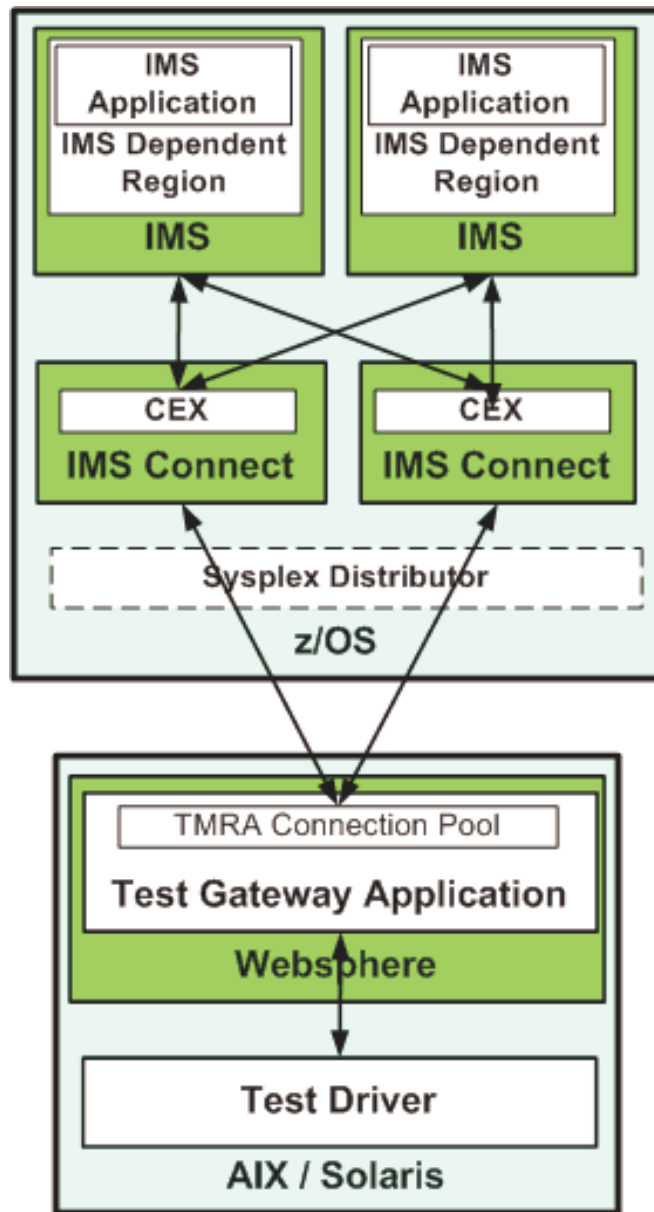
- We established a NFT test environment and executed test scenarios to model production:

  - Matched transaction profiles with production, and matched dependent region types

  - Drove transactions at production peak rates, and captured metrics at: z/OS, the mid-tier, and client driver

  - Executed various operational scenarios including planned and unplanned "downs" for: the network, IMS Connect, IMS and IMS dependent regions

Non-Functional Testing -> Findings

- MIPS Utilization

  - Eventually, all within expectations:

    - Normalized to MIPS per 100 TPS: 30 total

      - 8.5 MIPS per 100 TPS for IMSCONNECT base functions:

      - 7.5 MIPS per 100 TPS for CEX functions:

      - 8 MIPS per 100 TPS for SSL

      - 6 MIPS per 100 TPS for Miscellaneous (mostly TCP/IP)

- Response Times

  - Measured in gateway application at TMRA API boundary

    - Round trip in "no IMS application delay" case: approx. 20 ms.

Non-Functional Testing -> Findings

- Switchover / Failover and Recovery:
  - New system with Sysplex Distributor and IMS Connect is much more robust; will support greater availability; and will be faster to recover than SNA based connectivity:
    - Robustness:
      - Use of 3 IMS Connect instances provides horizontal redundancy
      - This means almost no transaction failures during a switchover / failover of IMS Control programs
    - Connection Recovery:
      - Old: 30+ minutes for all connections
      - New: prediction under 3 minutes possible less than 30 seconds
- Mid-tier Metrics
  - TMRA
    - Excellent throughput and response times
    - Very satisfactory CPU utilization
    - Good JVM heap behavior, with no apparent leaks
    - Connection pools were well behaved and stable

Non-Functional Testing -> Conclusion

"We are extremely pleased with the results of our testing regarding installation, configuration, tuning, new processes, operations management, and security management"
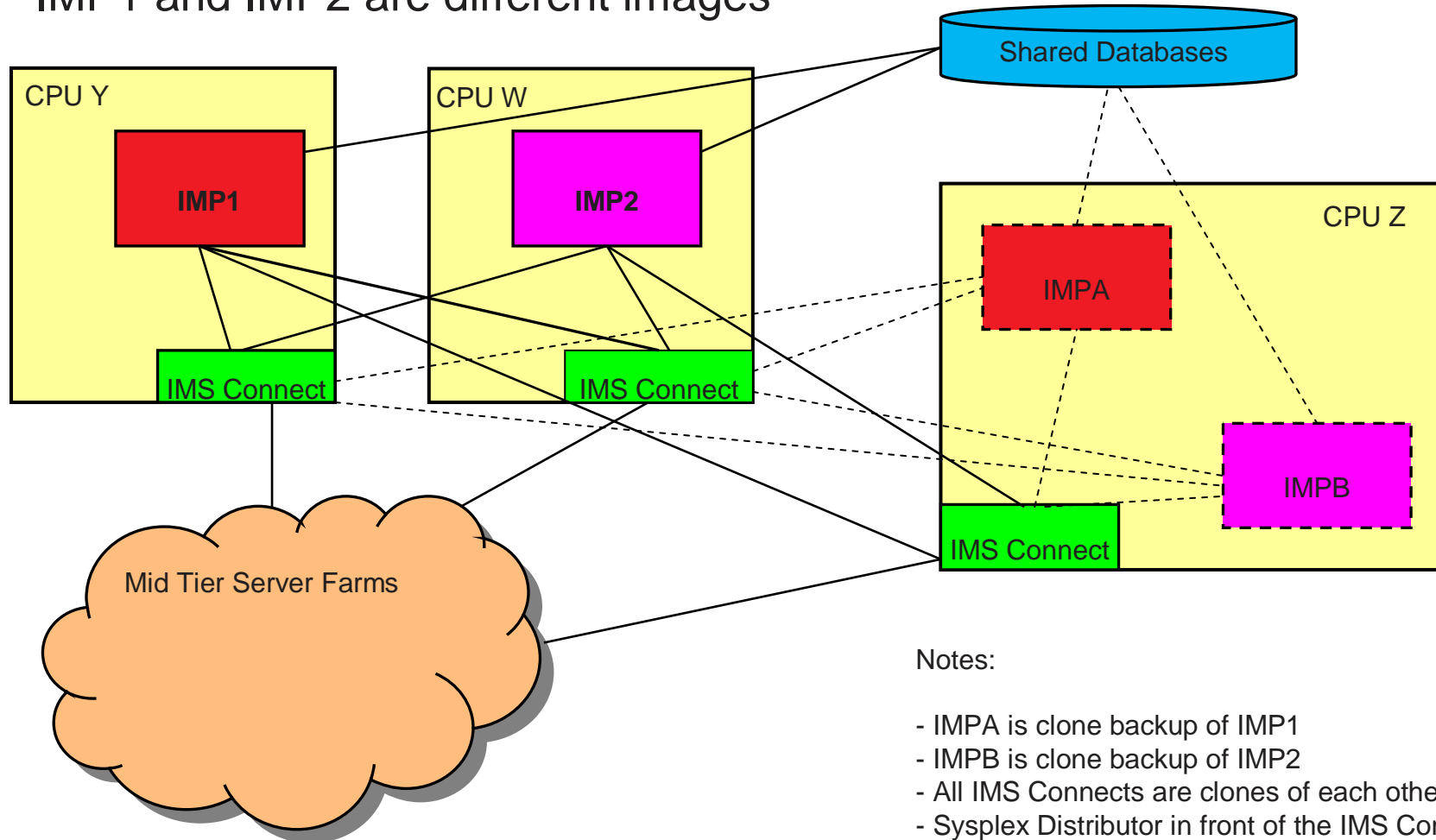
IMS Connect Opens New Opportunities for Evolution of our IMS™ Operational Model

Current Configuration

- IMP1 and IMP2 are different images

Notes:

- IMPA is clone backup of IMP1
- IMPB is clone backup of IMP2
- All IMS Connects are clones of each other
- Sysplex Distributor in front of the IMS Connects

IMS Connect Opens New Opportunities for Evolution of our IMS™ Operational Model

Possible Configuration Example

- All IMS images are full clones

Shared Databases

CPU Y

IMP1

IMS Connect

CPU W

IMP2

IMS Connect

Mid Tier Server Farms
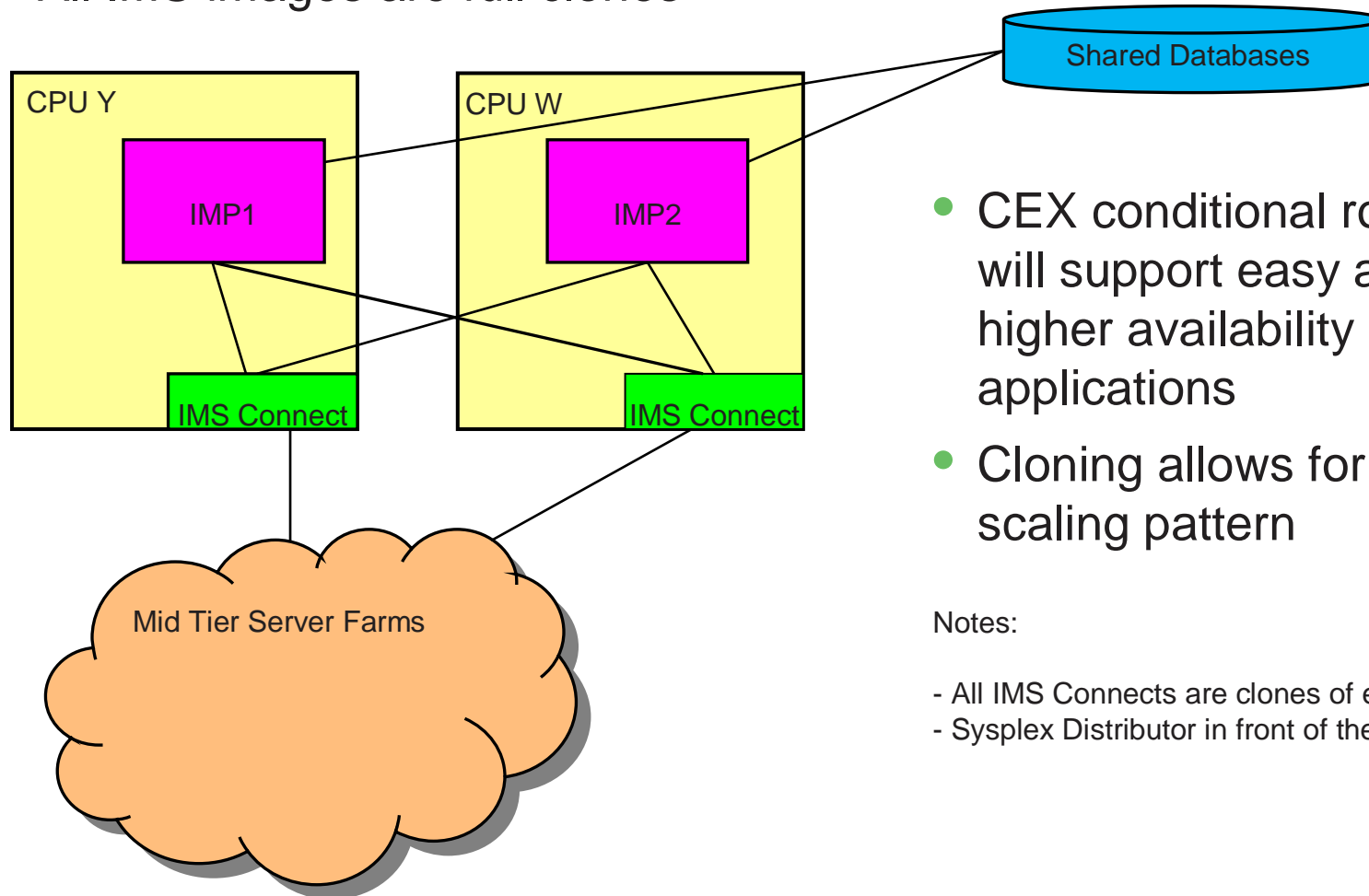
- CEX conditional routing logic will support easy approach to higher availability of IMS applications
- Cloning allows for horizontal scaling pattern

Notes:

- All IMS Connects are clones of each other
- Sysplex Distributor in front of the IMS Connects

IMS Connect – High Level Solution Architecture
- IMS Callout: IMS Application as Web Service Client
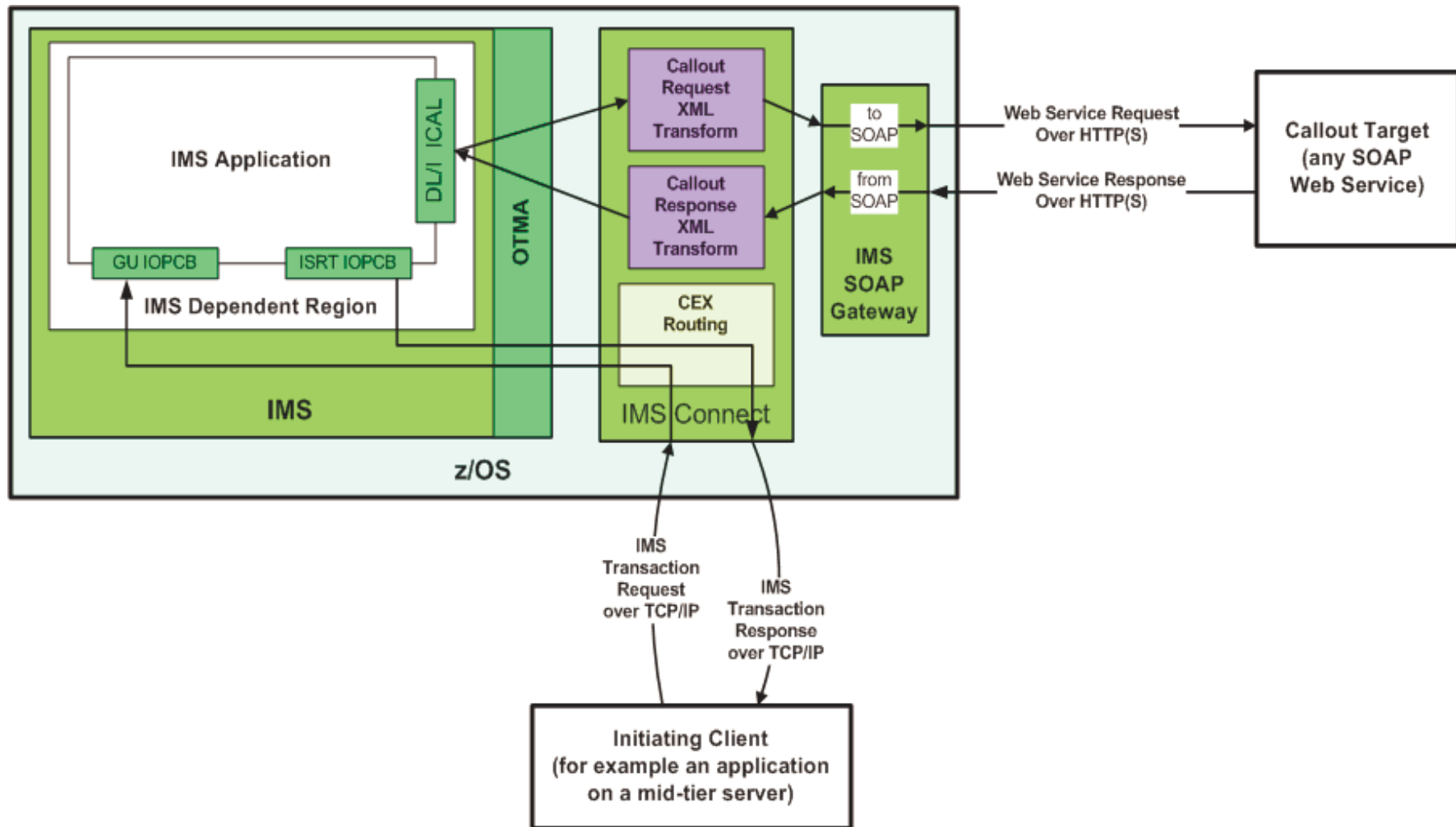
Enhancement Request
- IMS Callout: Via WebSphere DataPower Devices

Operating an IMS Connect Environment

Three tools were introduced at Scotiabank to support IMS Connect implementation:

1. IMS Connect Extensions (CEX)

2. Problem Investigator (PI)

3. Performance Analyzer (PA)

IMS Connect Configuration
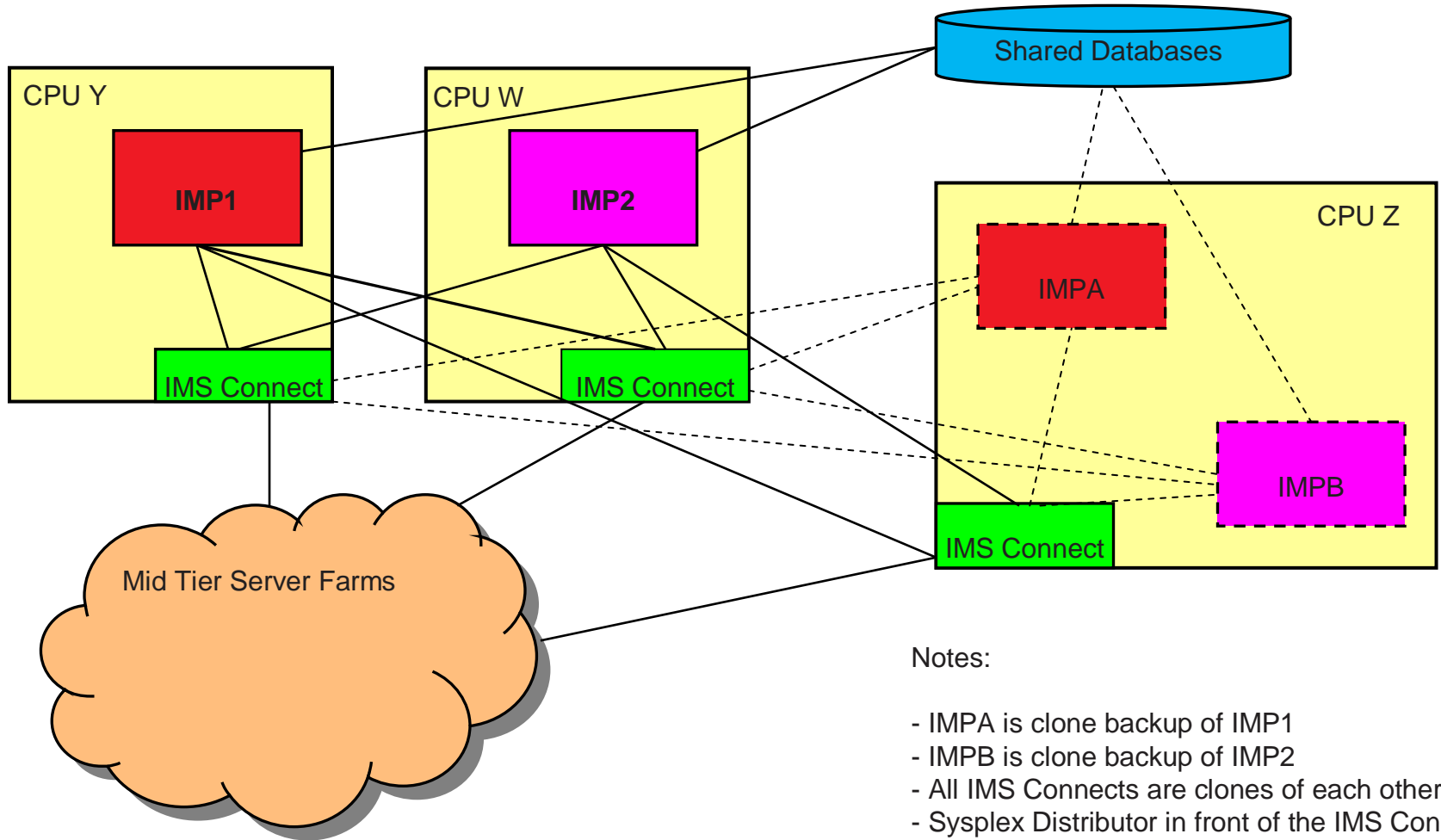
CPU Y

IMP1

IMS Connect

CPU W

IMP2

IMS Connect

Shared Databases

CPU Z

IMPA

IMPB
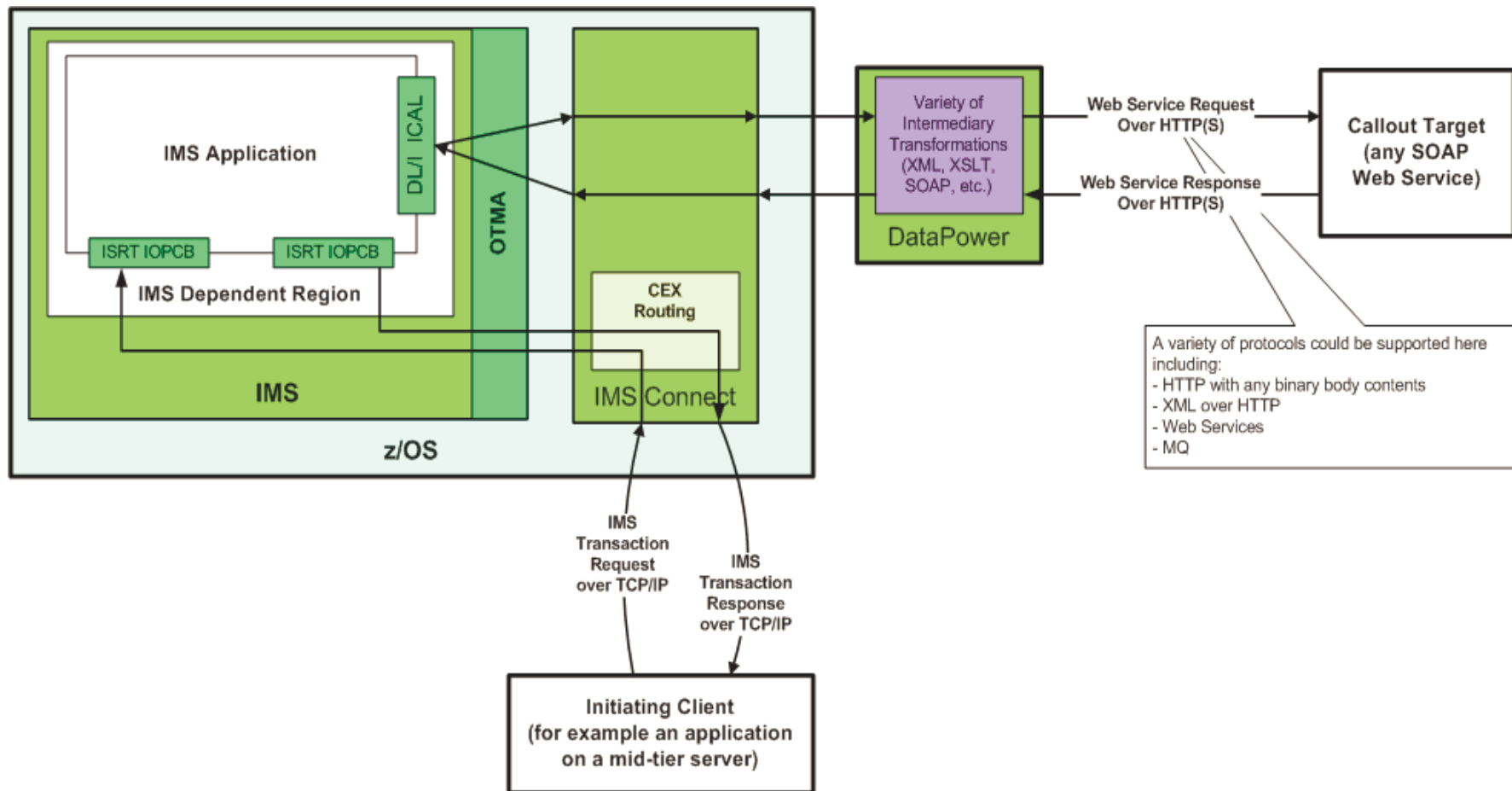
IMS Connect

Mid Tier Server Farms

Notes:

- IMPA is clone backup of IMP1
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Scotiabank

Operating an IMSCONNECT Environment

CEX – IMS Connect Extensions Tool:

- Monitoring
  - IMS Connect is an extra layer….delivered as a black box
    - CEX provides better view into IMS Connect
  - CEX creates a log
  - CEX publishes to Omegamon
  - CEX has ISPF dialogue interface for looking at issues, start/stop, etc..

- Routing Transactions
  - Transaction routing because IMP1 & IMP2 are not clones
  - Automatic routing if failover to IMPA or IMPB
  - With CEX we can dynamically reconfigure things

Operating an IMS Connect Environment

PI – Problem Investigator Tool:

- Requirement to read and format the CEX logs

- Requirement to match CEX logs to IMS logs

- Requirement to match multiple CEX logs with multiple IMS logs

- PI very powerful tool for systems other than IMS Connect …eg it can match DB2 logs to IMS logs

Operating an IMSCONNECT Environment

PA – IMS Performance Analyzer Tool:

- Supports CEX logs to analyze IMSCONNECT performance

- Can combine information from CEX logs with IMS and DB2 logs to provide integrated performance data…for problem resolution or performance trending

- Important when IMSCONNECT transaction volumes grow

References / Further Reading:

- IMS Connect and TCP/IP communications
  - http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.ims10.doc.ccg/ccg_part_tcpip.htm#ccg_part_tcpip

- IMS Connect Extensions for z/OS®
  - http://www01.ibm.com/software/data/db2imstools/imstools/imsconnectext
  - http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.imstools.cex.doc.ug/cexhome.htm

- IMS TM Resource Adapter
  - http://www-01.ibm.com/software/data/ims/ims/components/tm-resource-adapter.html
  - http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.etools.ims.tmra.doc/topics/tmresoverview.htm
  - Common Client Interface (CCI)
    - http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.etools.ims.tmra.doc/topics/cimsCCIoverview.htm

- The synchronous callout function for IMS™ Version 10
  - http://www01.ibm.com/support/docview.wss?rs=81&uid=swg27014351
  - http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.ims10.doc.ccg/connect_callout_support.htm#connect_callout_support

- IMS Enterprise Suite SOAP Gateway
  - http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/index.jsp?topic=/com.ibm.etools.soap10.doc/soapoverview.htm

- Overview of IMS Connect commit mode processing
  - http://publib.boulder.ibm.com/infocenter/iadthelp/v6r0/index.jsp?topic=/com.ibm.etools.j2c.ims.doc/concepts/cimscommit.html

- WebSphere DataPower SOA Appliances
  - http://www-01.ibm.com/software/integration/datapower/

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Questions / Discussion