1 Billion Smartphones a year and counting

How is your CICS connected?

Ian J Mitchell,
IBM Distinguished Engineer
z Systems Software Application Runtimes

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SHARE in Seattle 2015

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Agenda

- It's a Mobile world!
- CICS mobile enablement options
  - CICS TS JSON web services
  - CICS TG JSON web services
- z/OS Connect and CICS: an evolution
  - Compare and contrast
- CICS TS and IBM MobileFirst Foundation

  (formerly IBM Worklight Foundation)

It’s a Mobile world

THERE ARE CURRENTLY MORE THAN

1.038 BILLION SMARTPHONES IN USE

that's 1 out of every 6.7 people on the planet.

MOBILE USERS ARE

FIVE TIMES MORE LIKELY TO ABANDON IF THE

79%

WILL SEARCH FOR ANOTHER SITE TO COMPLETE THE TASK.

MEDIA TABLET SALES

in 2012

118.9 MILLION

by 2016

369.2 MILLION

tablets we will be sold

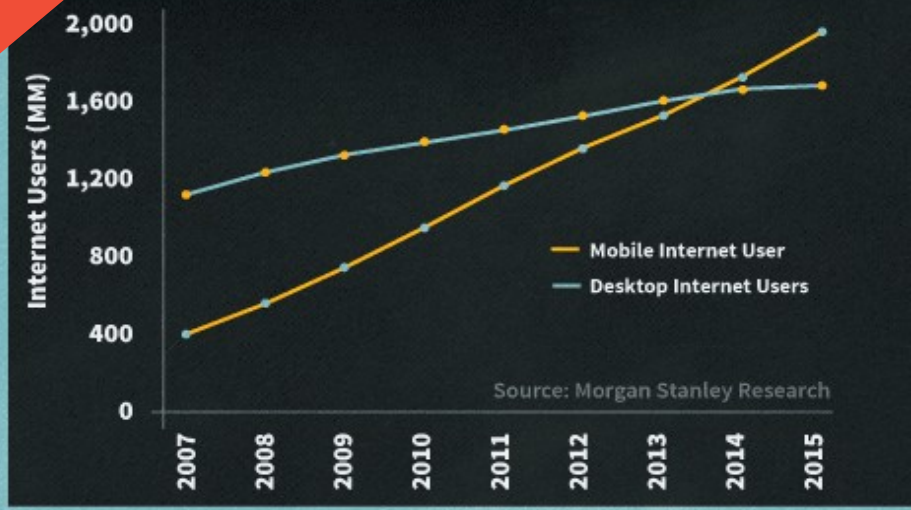
97 08 09 10 11 12 13 14

ONE BILLION UNITS SOLD

THE NEXT ONE BILLION WILL BE SOLD IN JUST THE NEXT 2 YEARS

Late 2012 Forecast

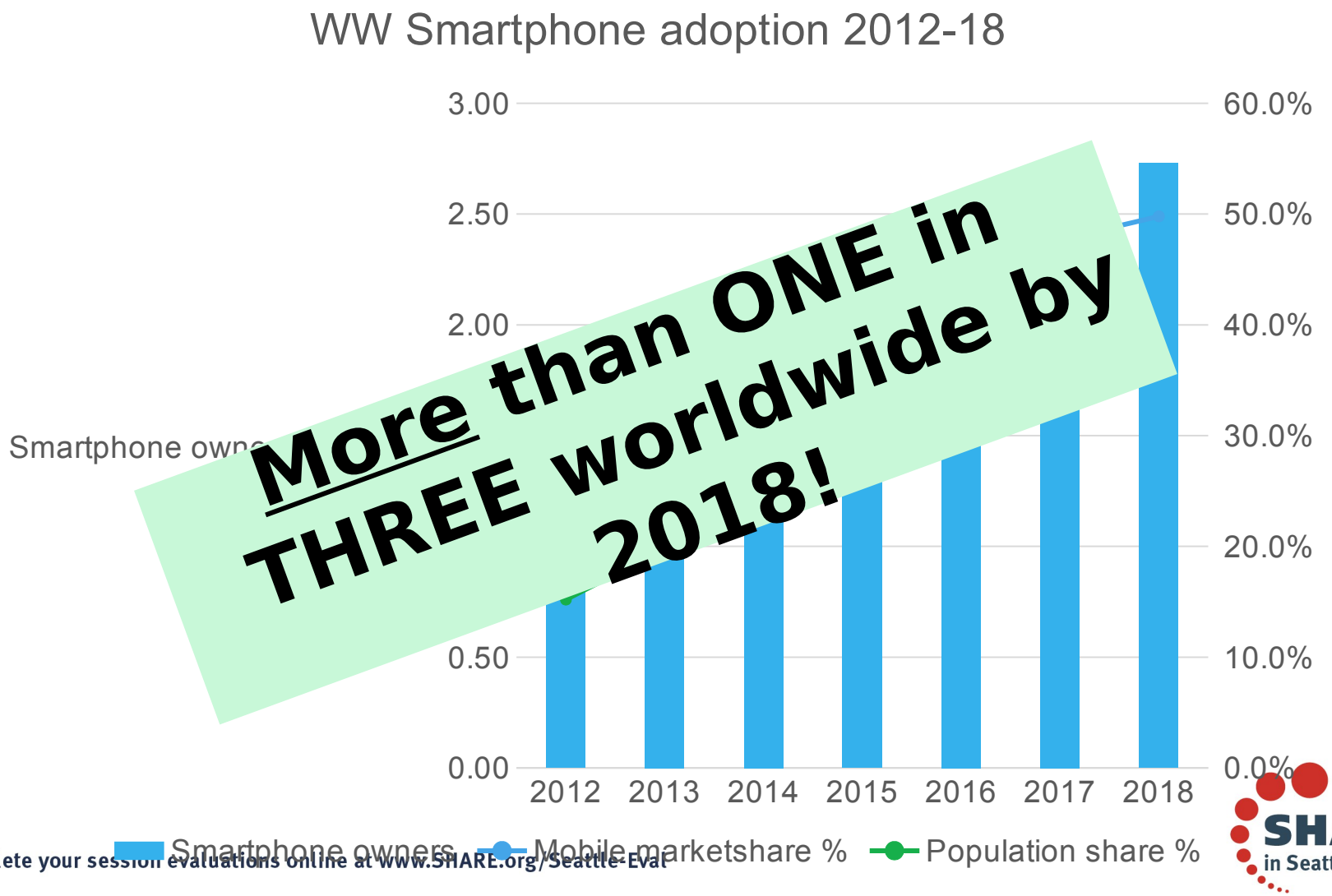
GLOBAL MOBILE VS. DESKTOP INTERNET USER PROJECTION, 2007 - 2015



Google estimates by 2013

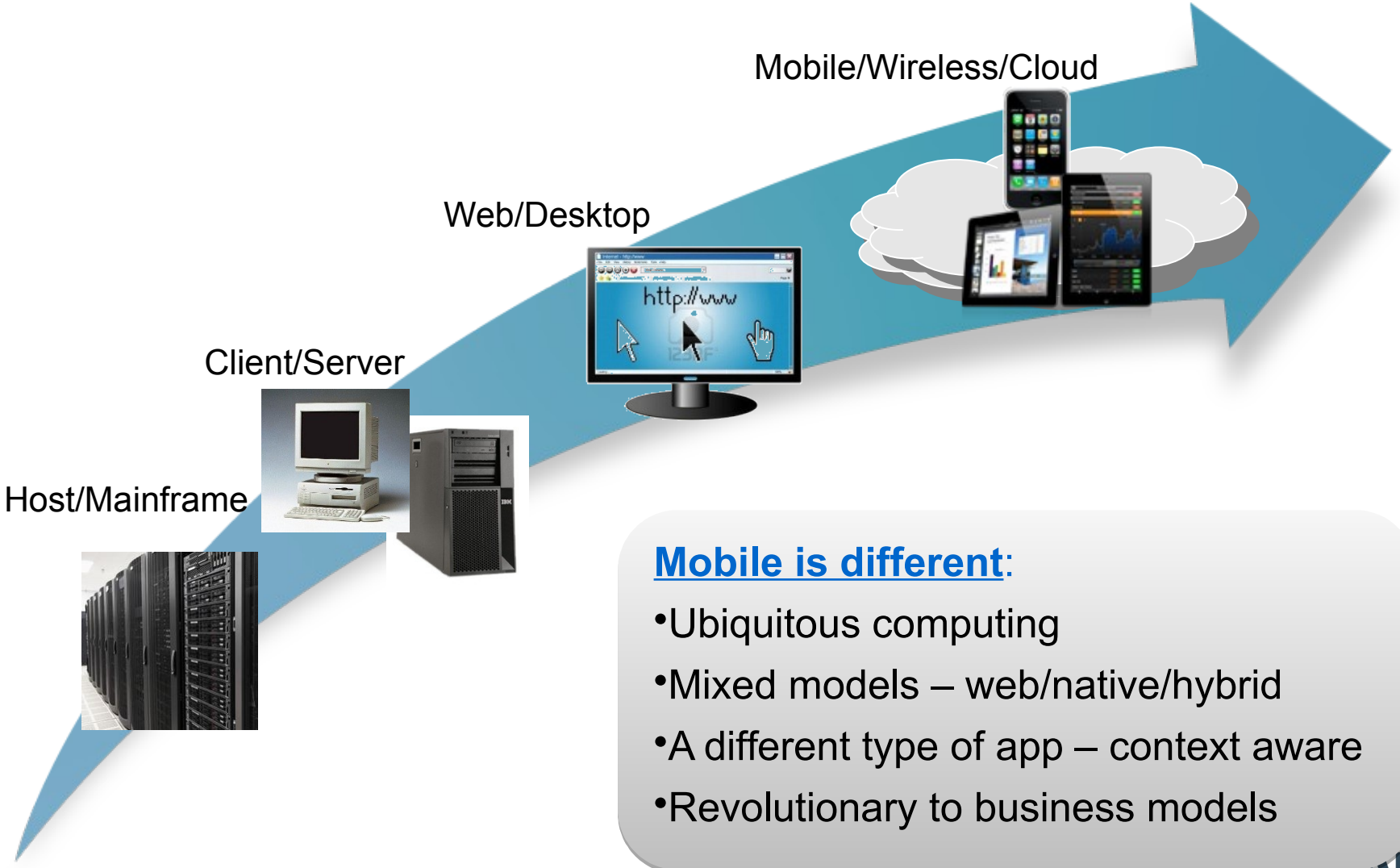
MORE PEOPLE WILL USE MOBILE PHONES THAN DESKTOP PCS TO GO ONLINE.

>50% Smartphone adoption in 9 countries now



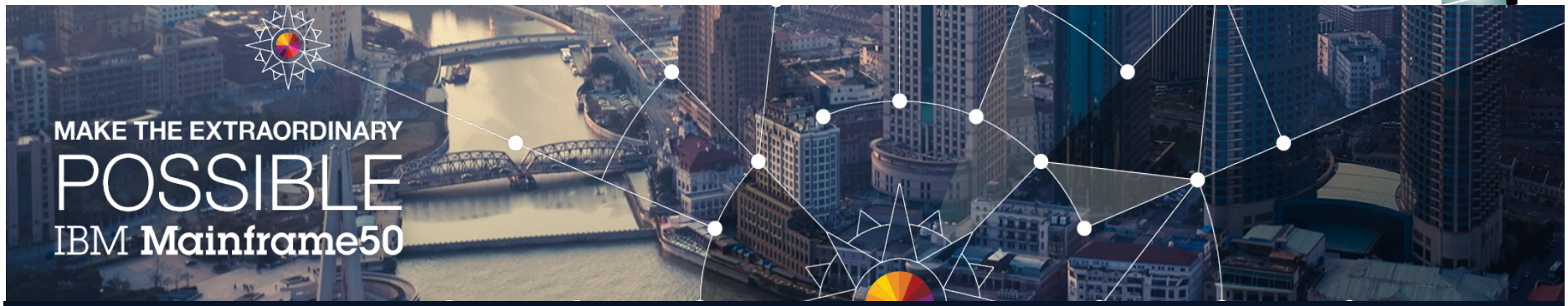
Source: emarketer.com

Mobile: Another stage in computing history



Mobile is different:

- Ubiquitous computing
- Mixed models – web/native/hybrid
- A different type of app – context aware
- Revolutionary to business models



Even though the world is awash in unstructured data, it's the transactional data that decision makers are focused on right now. And since the mainframe holds the vast majority of that data, it has a real role to play.

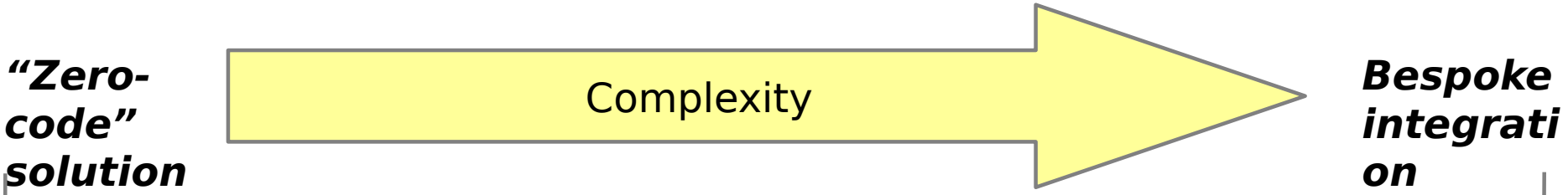
80%

of world's corporate data resides or originates on mainframes

CICS mobile enablement options: *The story so far*

CICS mobile enablement – solution complexity

The level of "friction" between SoE & SoR data models determine the complexity of the enablement solution



WSBind-based solutions

- Based upon tooling not coding
- Creates re-usable assets
- Ideal for top-down / bottom up
- Simple to use with fast ROI
- Less flexible in terms of data transformation options

Custom adapter / RESTful web app

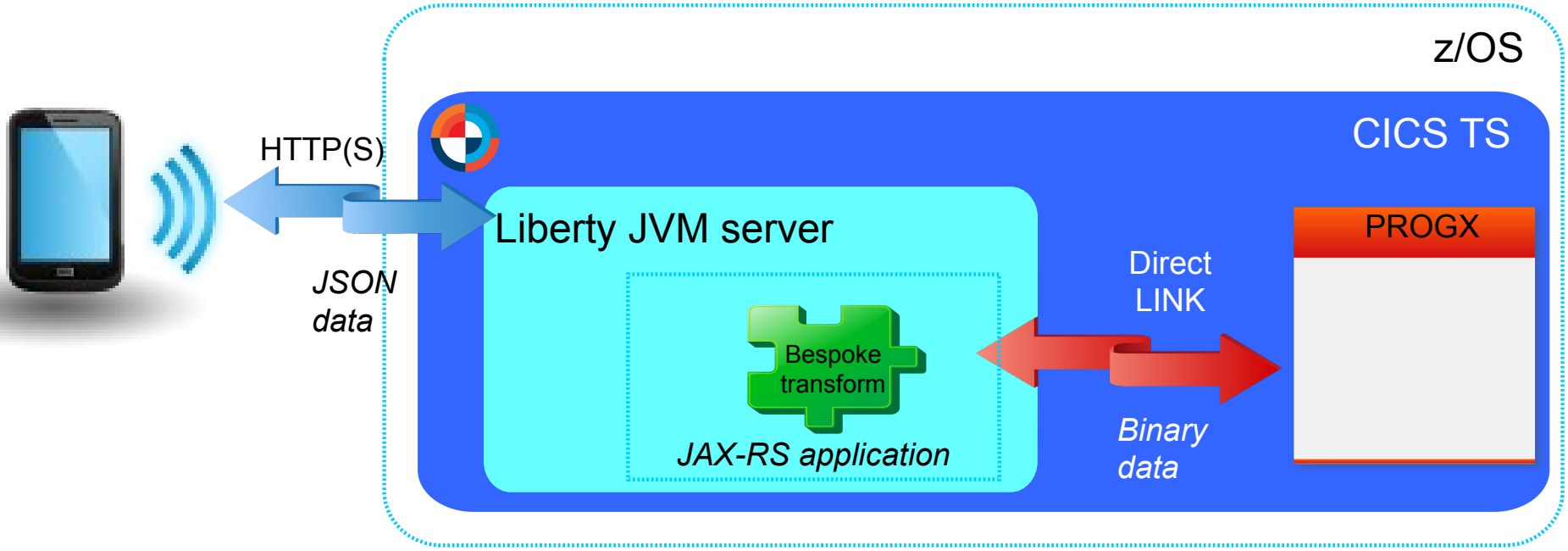
- Based upon bespoke integration code
- Can always integrate between independent SoE and SOR worlds
- Code must be written *somewhere* e.g.
  - JAX-RS application in WAS or CICS Liberty profile

Composite solutions might also use MobileFirst adapters, or CICS-COBOL wrapper with any of the above

Simplicity Vs Flexibility

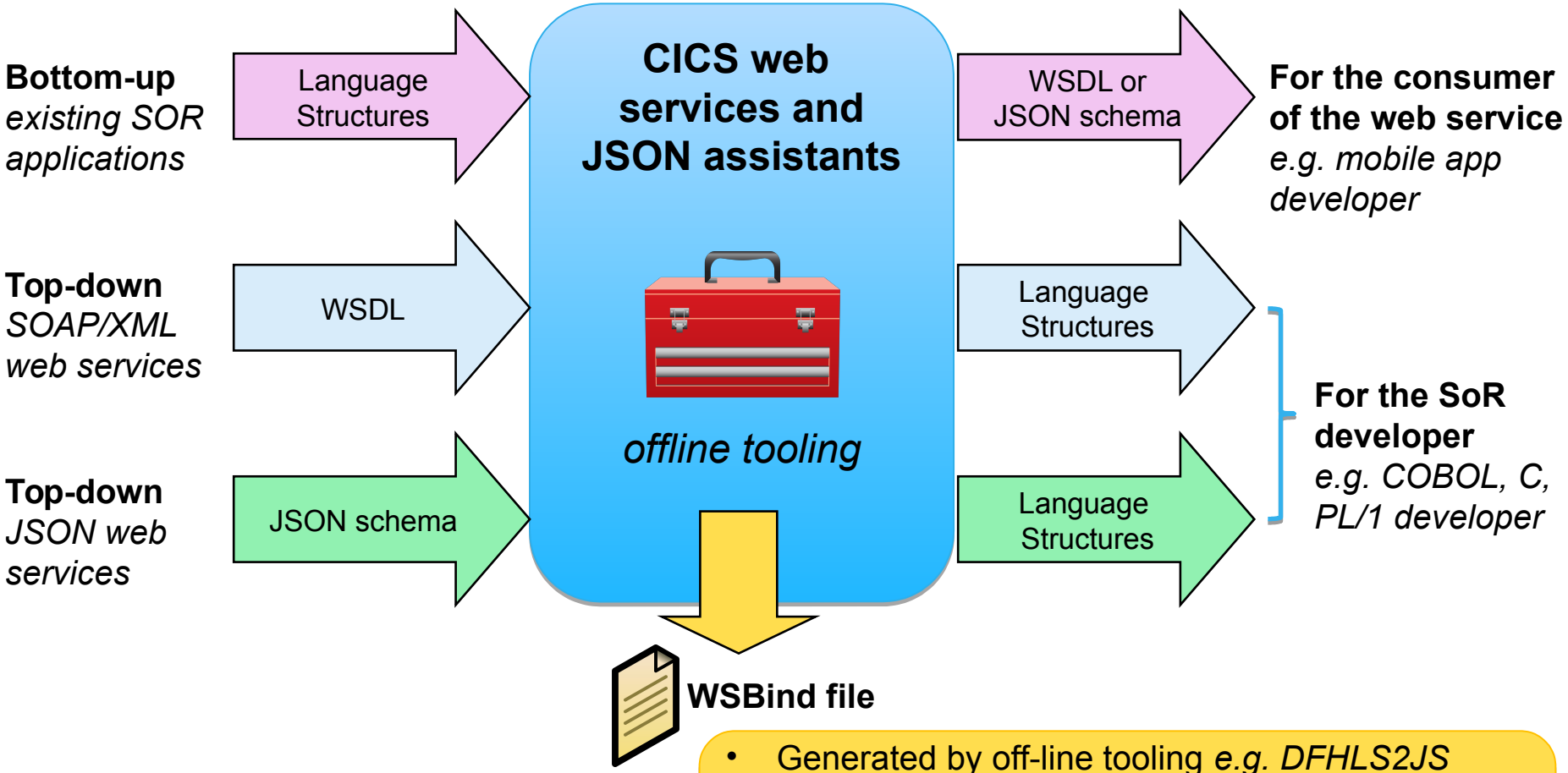
Topology #1: CICS Liberty JAX-RS

- **Web Service provider:** CICS Liberty
- **Data transform:** Bespoke/custom user code
- **CICS integration:** Direct LINK
- **Base release:** CICS TS V5.1



Bespoke transformation e.g. JZOS classes for Data Access

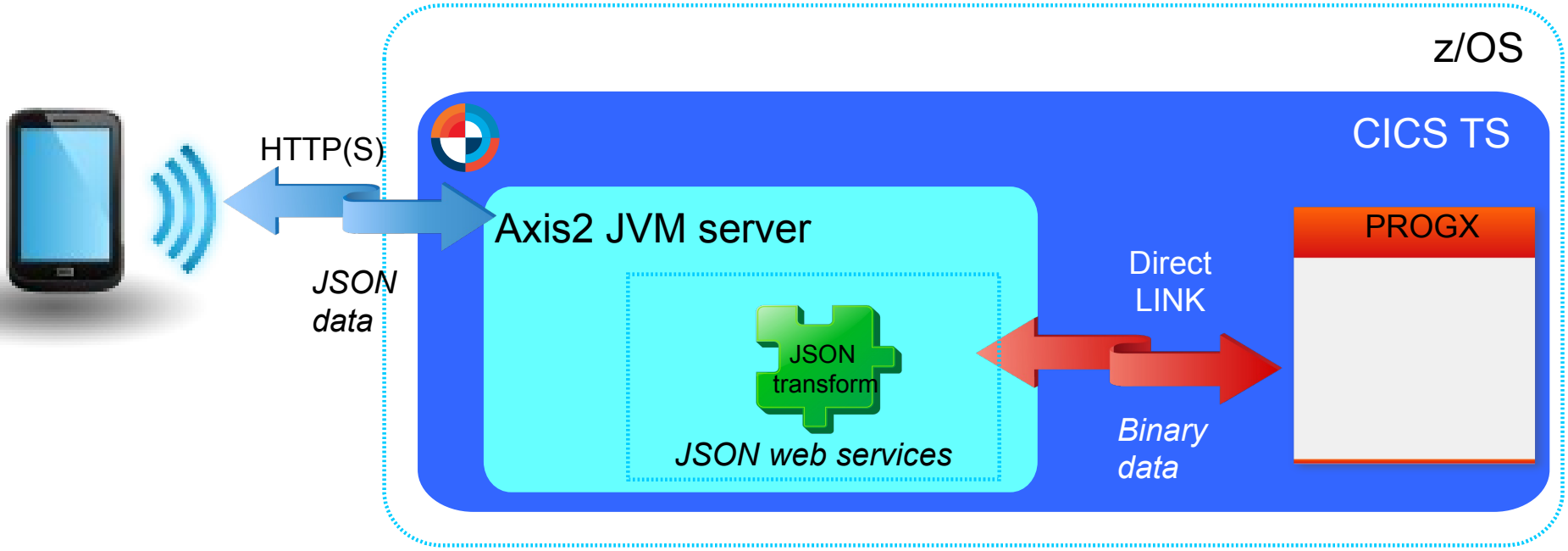
What are WSBind files and the assistants?



- Generated by off-line tooling *e.g. DFHLS2JS*
- Stored on zFS
- Maps data between a **web service** and an SOR **language structure** representation at run time
  - *e.g. JSON schema to COBOL copybook*

Topology #2: CICS TS JSON web services

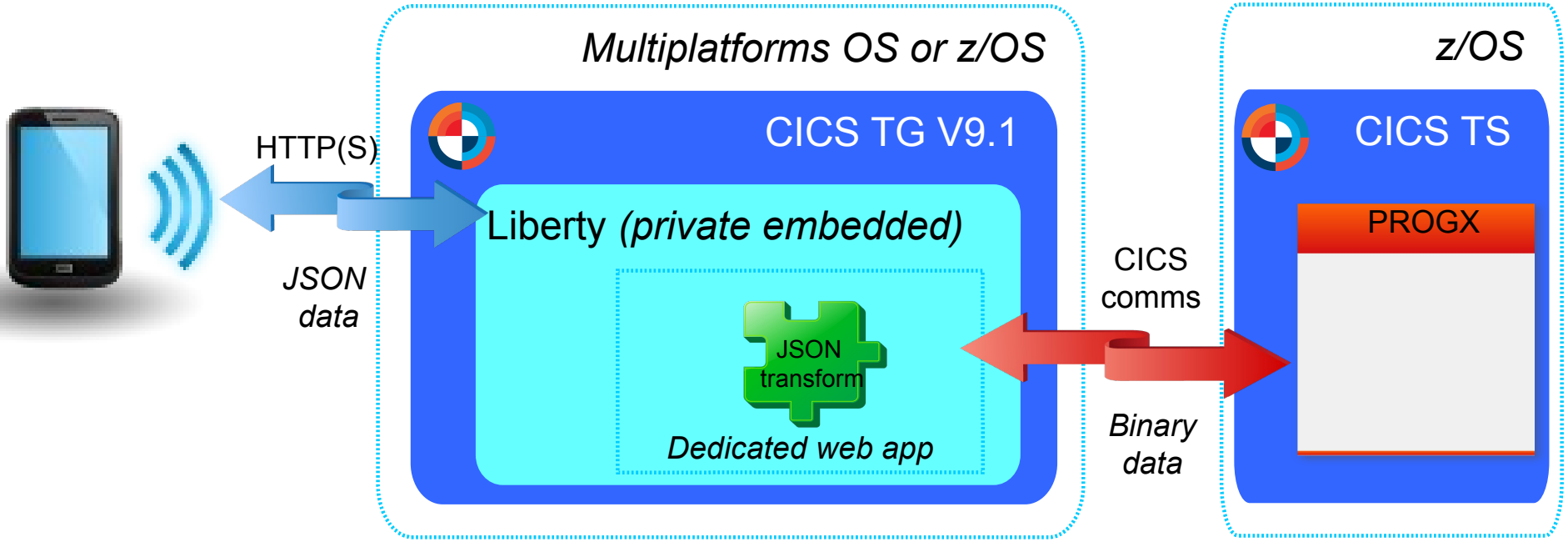
- **Web Service provider:** CICS JSON web services
- **Data transform:** WSBind files
- **CICS integration:** Direct LINK
- **Base release:** CICS TS V5.2



a.k.a. "CICS TS Feature Pack for Mobile Extensions" (V4.2, V5.1)

Topology #3: CICS TG JSON web services

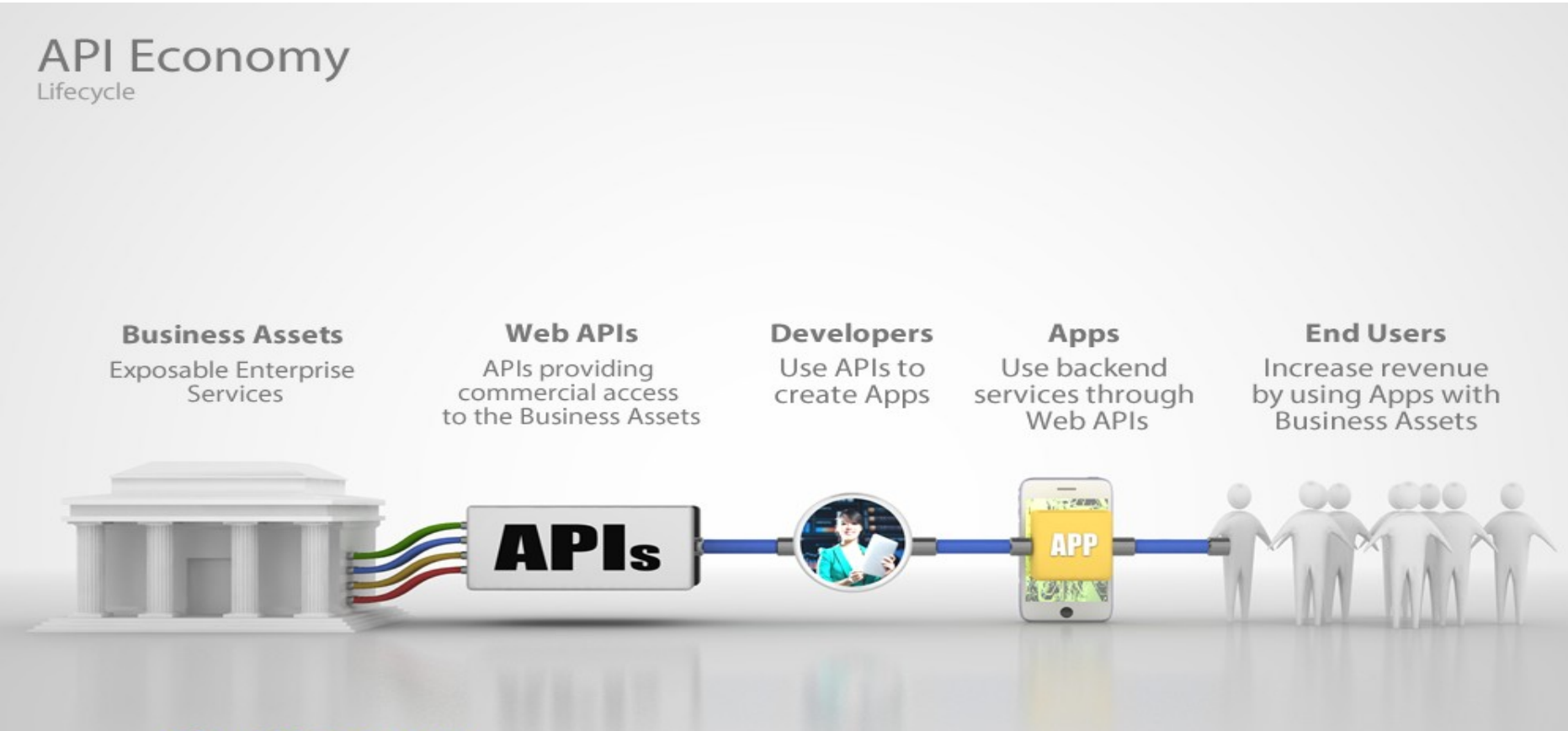
- **Web Service provider:** Liberty (embedded)
- **Data transform:** WSBind files
- **CICS integration:** Standard CICS communications
  - *enables z/VSE, TXSeries and "i" integration*
- **Base release:** CICS TG V9.1



https://ibm.biz/cicstg91

What is z/OS Connect?

API/Web Economy Lifecycle

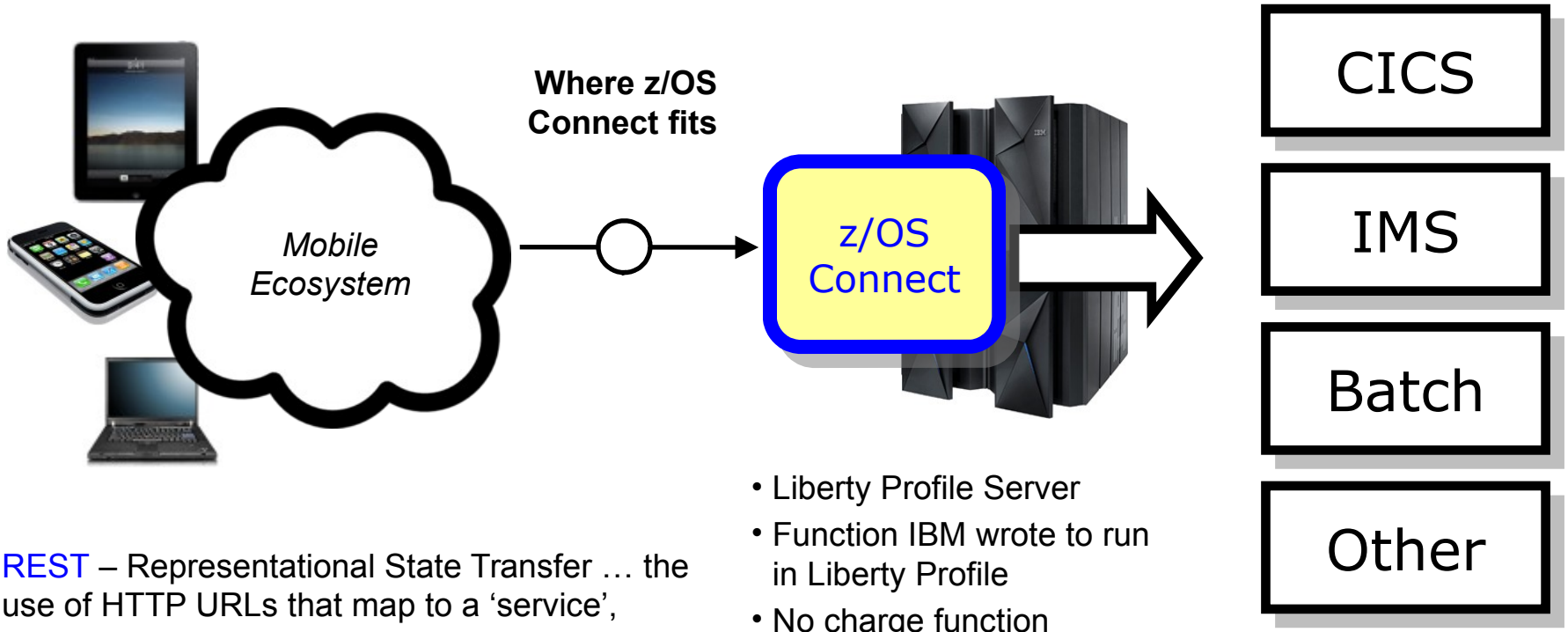


The API Economy

Where companies [providers] expose their (internal) digital business assets or services in the form of (Web) APIs to third parties [consumers] with the goal of unlocking additional business value through the creation of new assets

z/OS Connect – What is it?

It's about getting REST and JSON into your mainframe environment in a way that enables you to best take advantage of the assets that exist there:



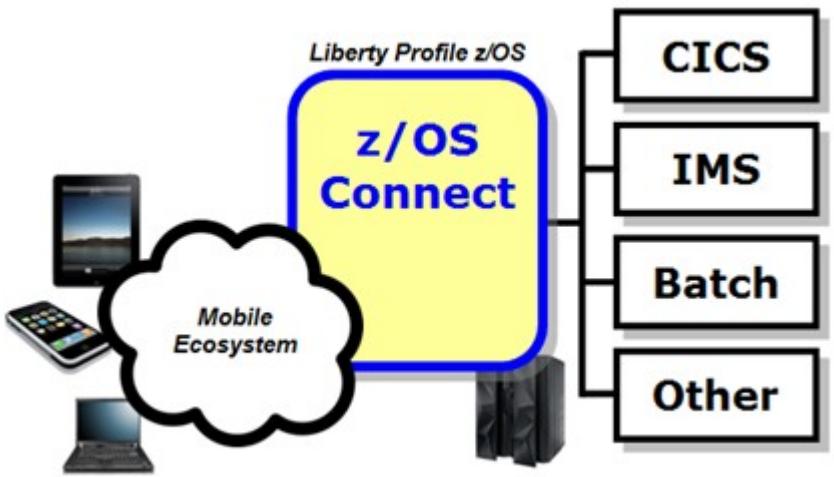
REST – Representational State Transfer … the use of HTTP URLs that map to a 'service', such as 'query account' or 'update data'

JSON – JavaScript Object Notation … a standard of representing data as a set of name/value pairs. This is passed back and forth along with REST request/responses

- Liberty Profile Server
- Function IBM wrote to run in Liberty Profile
- No charge function provided with license entitlement for WAS z/OS, CICS or IMS customers

Why z/OS Connect?

This represents another component to configure and maintain in your environment. So what value does it bring?



You *could* enable Mobile access without z/OS Connect

z/OS Connect simplifies and makes the environment more consistent and manageable

- Provides a common and consistent entry point for mobile access to one or many backend systems
- Java, so runs on specialty engines
- Shields backend systems from requiring awareness of RESTful URIs and JSON data formatting
- Provides point for authorization of user to invoke backend service
- Provides point for capturing usage information using SMF
- Simplifies front-end functions by allowing them to pass RESTful and JSON rather than be aware of or involved in data transformation

Different Delivery Approaches

This is planned to be delivered with WAS z/OS, CICS and IMS … objective is to provide different approach paths depending on what you have:

WAS z/OS

Delivered as function that runs inside Liberty Profile z/OS. Initially will use WOLA (WebSphere Optimized Local Adapters) to access backend.

CICS

Delivered as part of Liberty Profile that runs inside of CICS region with a JCICS local LINK, and CICS TG using standard CICS ISC connections.

IMS

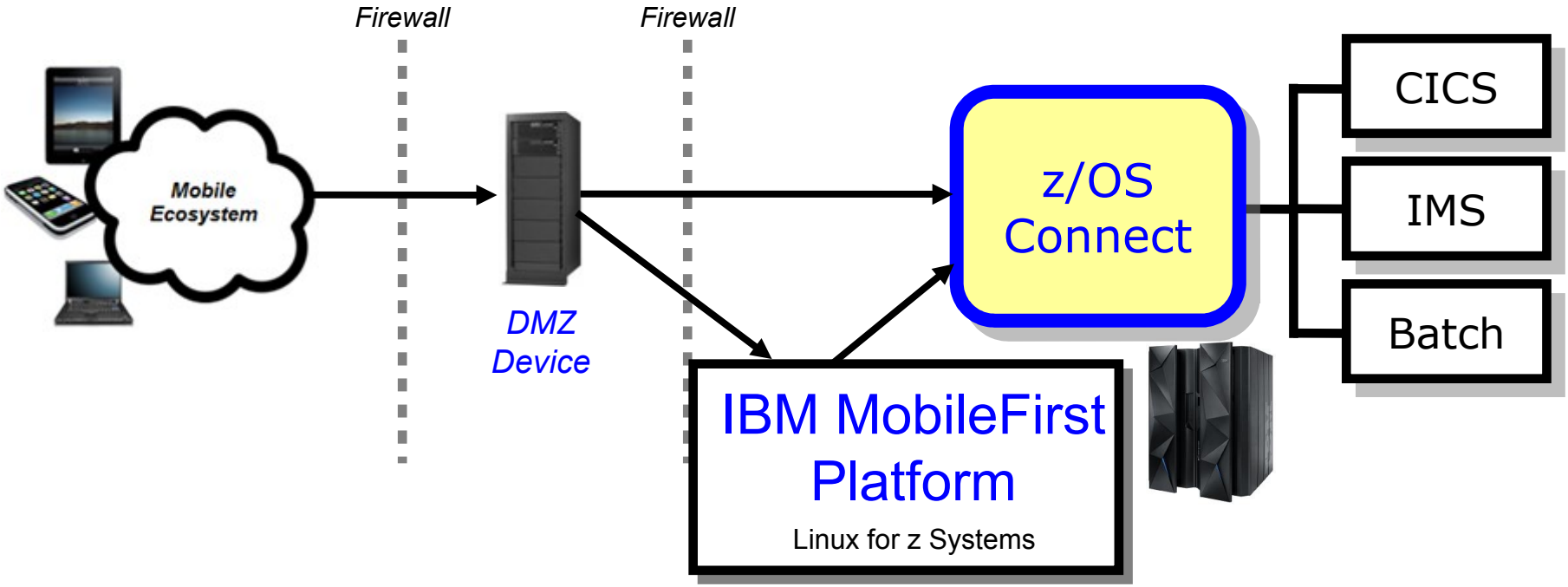
Initially this ends up looking just like the WAS z/OS approach: that is, Liberty Profile z/OS with z/OS Connect inside. Difference is this: IMS z/OS Connect uses JCA* to talk to IMS Connect to get access into IMS.

These different delivery mechanisms tend to obscure the main story of what it is and how it works, so for now let's stipulate IBM offers several ways to get this and now focus on some details

* A supplied IMS JCA resource adapter, as opposed to the local adapter support

Context within Mobile Architecture

The message here is that z/OS Connect is a *piece* of the Mobile architecture, but in most cases will not be the only component:

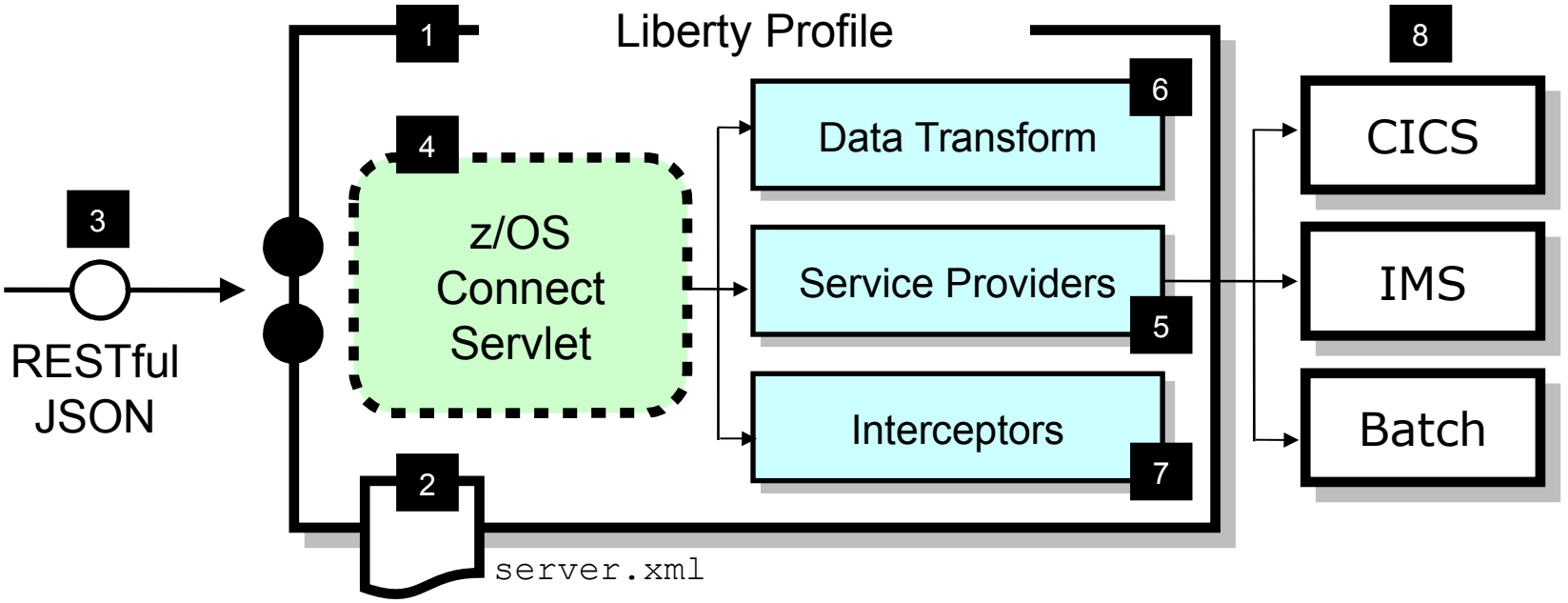


Users of z/OS Connect would access through normal corporate firewall infrastructure

IBM MobileFirst Platform to provide application management, security and operational governance for mobile applications

z/OS Connect would be behind the secure firewall, and on LPARs along with backend systems

z/OS Connect anatomy



1 z/OS Connect is software function that runs in a Liberty Profile

2 z/OS Connect is described and configured in the Liberty `server.xml` file

3 z/OS Connect is designed to accept RESTful URIs with JSON data payloads

4 One part of z/OS Connect is a servlet that runs in Liberty Profile

5 A 'Service Provider' is software that provides the connectivity to the backend system

6 z/OS Connect provides the ability to transform JSON to the layout required by backend

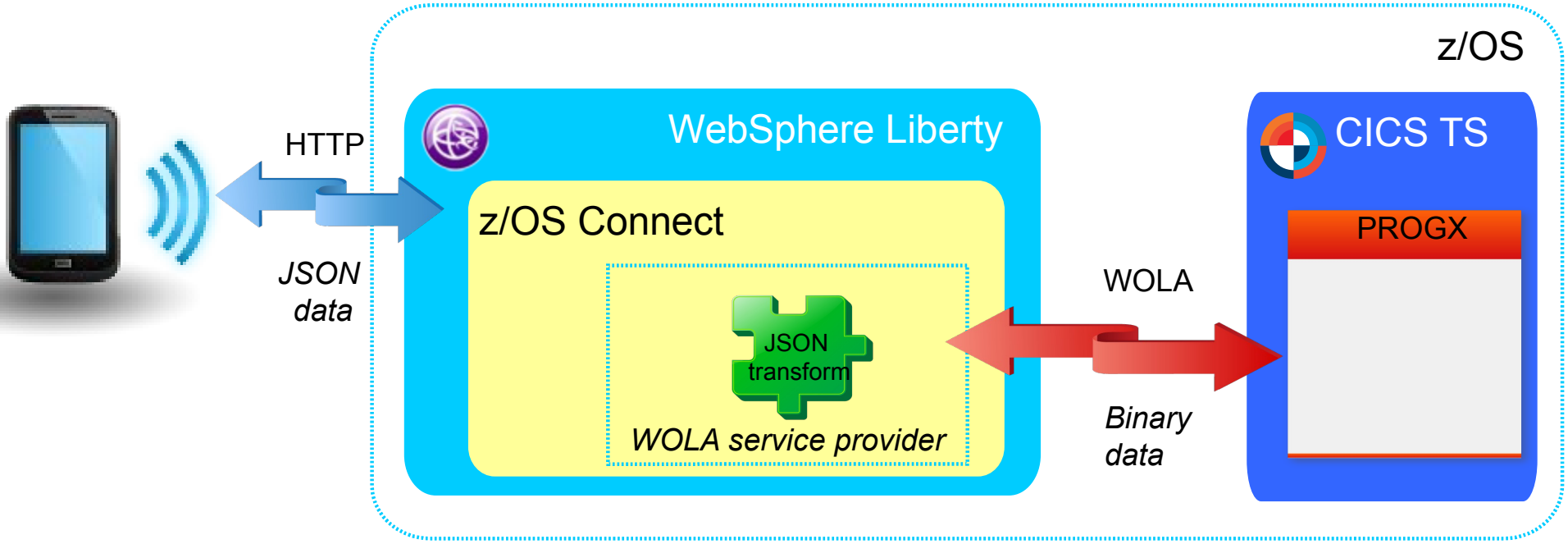
7 'Interceptors' are callout points where software can be invoked to do things such as SAF authorization and SMF activity recording

8 Initially the backend systems supported will be CICS, IMS and Batch

z/OS Connect and CICS

Topology #4: WAS z/OS Connect

- **Web Service provider:** WebSphere Liberty on z/OS
- **Data transform:** WSBind files
- **CICS integration:** WebSphere Optimized Local Adapter (WOLA)



IBM CICS Transaction Server V5.3 open beta

enterprise grade mixed language application serving

Service Agility

Enhanced support for Java and the WebSphere Liberty profile

- Additional Liberty features
- Enhanced interoperability
- Simplified management
- Enhanced Java SE support

Operational Efficiency

Performance optimizations, enhanced metrics and additional security

- Web service optimizations
- Performance improvements
- Enhanced metrics
- Additional security options

Cloud with DevOps

New cloud and DevOps support to automate CICS deployments

- Automated builds
- Scripted deployments
- UrbanCode Deploy support
- Enhanced cloud enablement

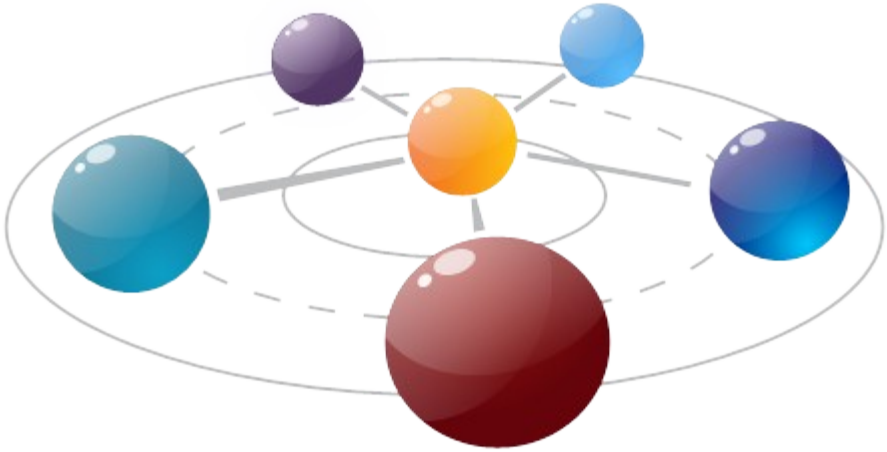
Planned open beta availability : 23rd Mar 2015

Announcement letter **ENUS215-020**

z/OS Connect: Statement of direction

ENUS214-107, April 7th, 2014

"IBM intends to deliver IBM WebSphere Liberty z/OS Connect (z/OS Connect) as a common program component of WebSphere Application Server for z/OS, IMS™ Enterprise Suite for z/OS, CICS Transaction Server for z/OS, and CICS Transaction Gateway."



GA June 2014

- **IBM WebSphere Application Server** delivered Liberty z/OS Connect as a new repository feature
- **IMS™ Mobile Feature Pack** delivered, based upon Liberty z/OS Connect

CICS TS V5.3 open beta : Service Agility

Enhanced support for Java and the WebSphere Liberty profile

Additional Liberty profile features

Enhanced interoperability

Simplified management

Enhanced Java SE support

The CICS TS V5.3 open beta offering also includes a technology preview of the ability for Java programs in a Liberty profile JVM server and non-Java programs to call each other using standard CICS API calls. This technology preview enables:

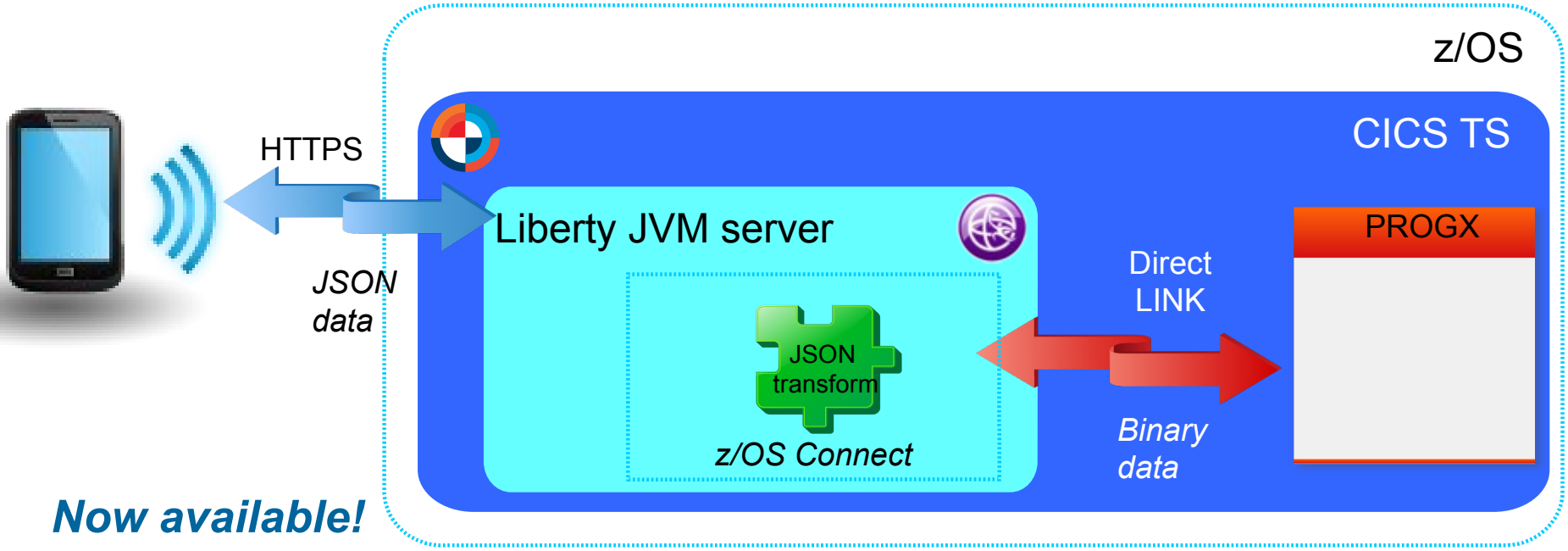
- Java applications to use the standard JEE Connector Architecture (JCA) to invoke CICS programs in any supported language.
- Non-Java CICS programs to issue an EXEC CICS LINK to call a Java application running in a Liberty profile JVM server.

Additionally, the **Liberty z/OS Connect** feature is now supported by the CICS TS V5.3 open beta offering*. This provides RESTful APIs and accepts JavaScript Object Notation (JSON) payloads between CICS, mobile devices, and cloud environments.

* Also available in CICS TS V5.2 via APAR PI25503.

Topology #5: CICS TS z/OS Connect

- **Web Service provider:** CICS TS z/OS Connect (embedded)
- **Data transform:** WSBind files
- **CICS integration:** Direct LINK



Now available!

- **CICS TS V5.3 open beta** includes embedded z/OS Connect
  - *Also available in CICS TS V5.2 via APAR PI25503*

CICS mobile enablement – Product options

Product	Delivery vehicle	Characteristics
CICS TS for z/OS	CICS Mobile Feature pack • CICS TS V4.2, V5.1 JSON web services • CICS TS V5.2, or later	✓ Proximity to data ✓ Integrated with CICS admin ✓ Outbound invoke
	CICS z/OS Connect • CICS TS V5.2 PTF • CICS TS V5.3 open beta	✓ Proximity to data ✓ Service management + APIM integration
CICS TG products	JSON web services • CICS TG V9.1 • CICS TG V9.2 open beta	✓ CICS TS family + TXSeries ✓ Choice of platforms including cloud e.g. SoftLayer
WAS for z/OS	WebSphere Liberty z/OS Connect • WAS for z/OS V8.5.5.2 Liberty repository feature	✓ Multiple z/OS subsystems *CICS, IMS, Batch* ✓ Service management + APIM integration

WAS for z/OS + CICS TS for z/OS both also offer JAX-RS through Liberty

CICS mobile enablement – Product options

Product	Delivery vehicle	Characteristics
CICS TS	CICS Mobile Feature pack	✓ Proximity to data
	WebSphere Liberty z/OS Connect	✓ Multiple z/OS subsystems CICS, IMS, Batch
	WAS for z/OS V8.5.5.2 Liberty repository feature	✓ Service management + APIM integration

Each of these solutions share common code for both tooling and run time to transform data between JSON and binary representations.

Data transformation for CICS programs is based around "**WSBind**" files. They represent the SOR data structure and enable the run-time transformation for JSON web services.

WAS for z/OS + CICS TS for z/OS both also offer JAX-RS through Liberty

z/OS Connect vs CICS JSON web services

Point-in-time comparison for CICS TS z/OS Connect

- IBM API Management
  - z/OS Connect and support for IBM API Management

- Non-RESTful CICS programs (JSON RPC, request/response)
- RESTful CICS programs
  - z/OS Connect must return JSON

- Outbound JSON web services
  - Not available with z/OS Connect

z/OS Connect is evolving…*we'd like your input!*

IBM MobileFirst

CICS Transaction Server

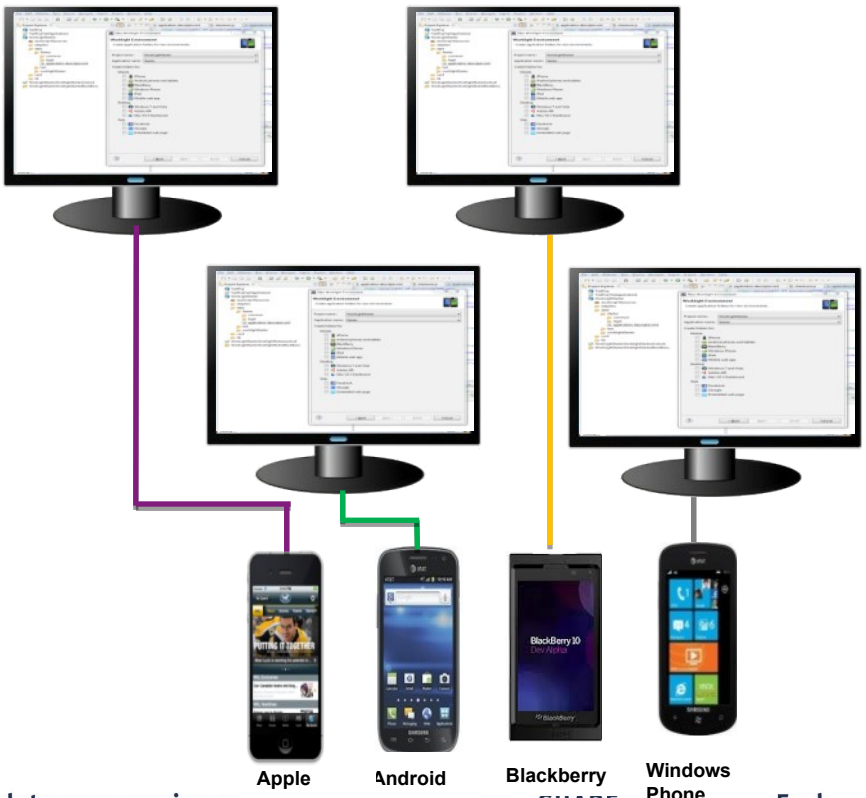
SHARE
Educate · Network · Influence

CICS TS and IBM MobileFirst Platform Foundation

Rapid multi-platform development using a single shared codebase

From the complexity of many…

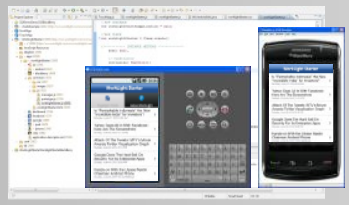
- Multiple sets of tools & frameworks
- Four codebases to develop and maintain



To the simplicity of one

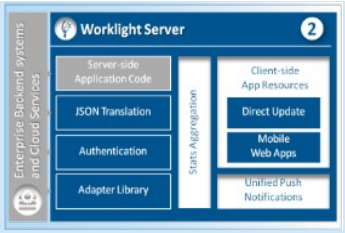
- One development environment
- One codebase to develop and maintain

IBM MobileFirst Platform Foundation components



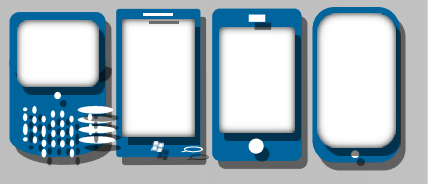
MobileFirst Studio

Leading tools for native and hybrid development that help maximize code reuse and accelerate development.



MobileFirst Server

Mobile-optimized middleware providing a gateway between applications, back-end systems and cloud-based services.

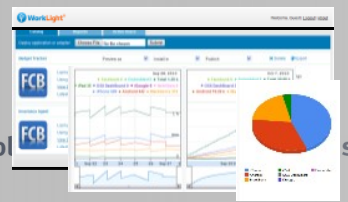


Client-side runtime components

Runtime client APIs designed to enhance security, governance and usability

Application Center

Set up an enterprise app store that manages the distribution of production-ready mobile apps

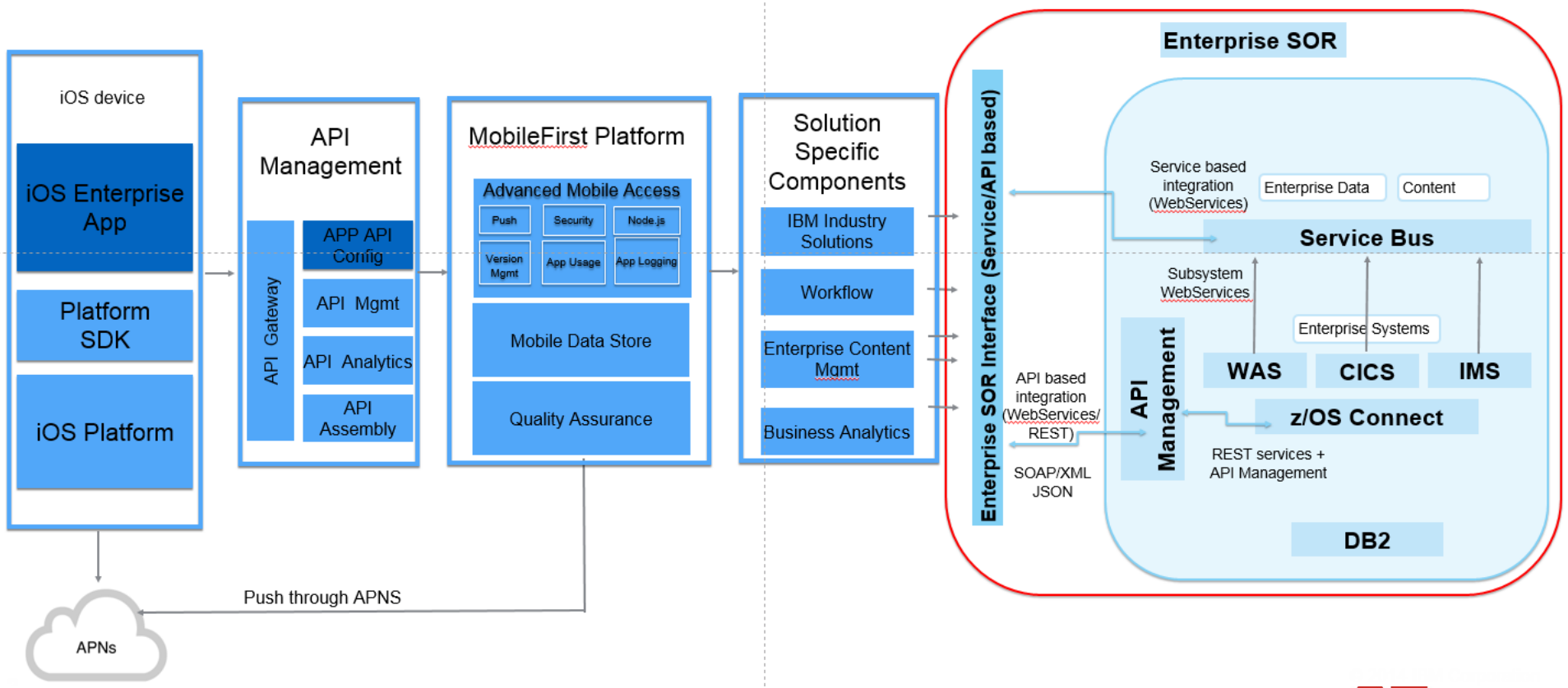


MobileFirst Operations Console

An admin GUI with real-time operational analytics for the server, adapters, applications and push services. Manage, monitor & instrument.

Compl s onli at www.SHARE.org/Seattle-Eval

MobileFirst iOS Solution standard architecture
z Systems detail



Mobile scenario

Connect directly to CICS z/OS Connect from MobileFirst
using end-to-end JSON

```
function getCustomerDetails(custNum) {
    var pathURL = "GENAPP/getCustomerDetails";
    var request=
        {
            "LGICUS01Operation":{
                "ca" : {
                    "ca_request_id" : "01ICUS",
                    "ca_return_code" : "00",
                    "ca_customer_num" : custNum,
                    "ca_num_policies" : ""
                    }
            }
        };
```

Step 1

DFHLS2JS to generate the JSON artefacts for the target CICS service.

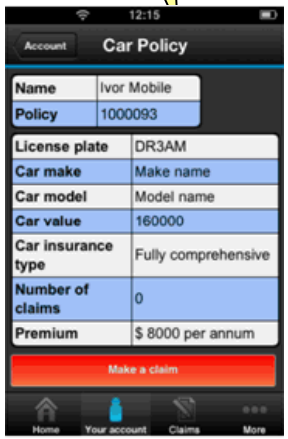
Step 2

Mobile developer uses JSON schema to build a MobileFirst adapter.

Step 3

Frontend mobile developer calls the MobileFirst adapter which calls the service hosted in CICS.

CICS GENAPP Mobile application



1. Mobile user sends an insurance customer request

3. CICS z/OS Connect converts the JSON request to the COMMAREA interface of the GENAPP application

MobileFirst

GENAPP Mobile

Inquire Adapter

CICS

z/OS Connect

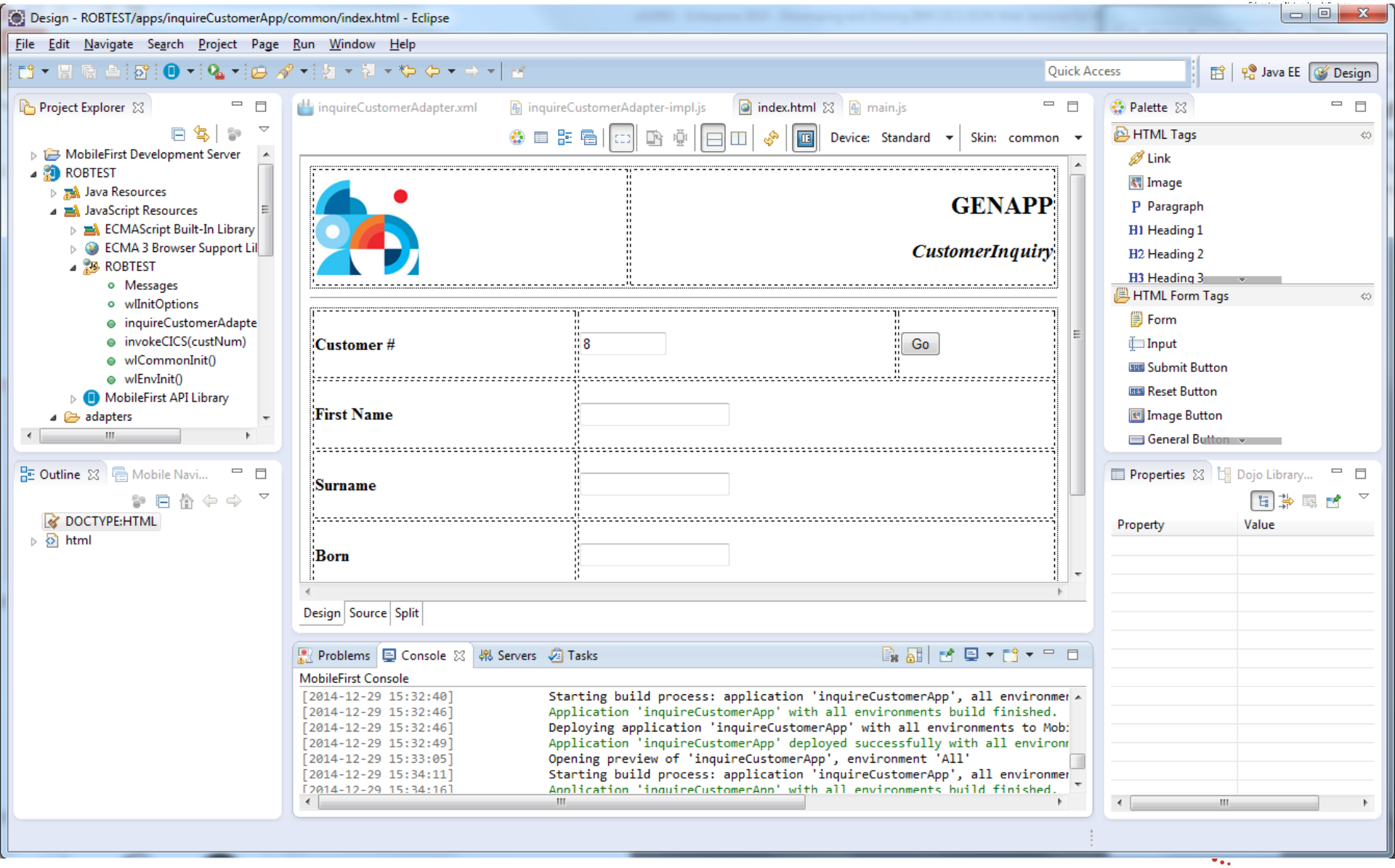
GENAPP

DB2

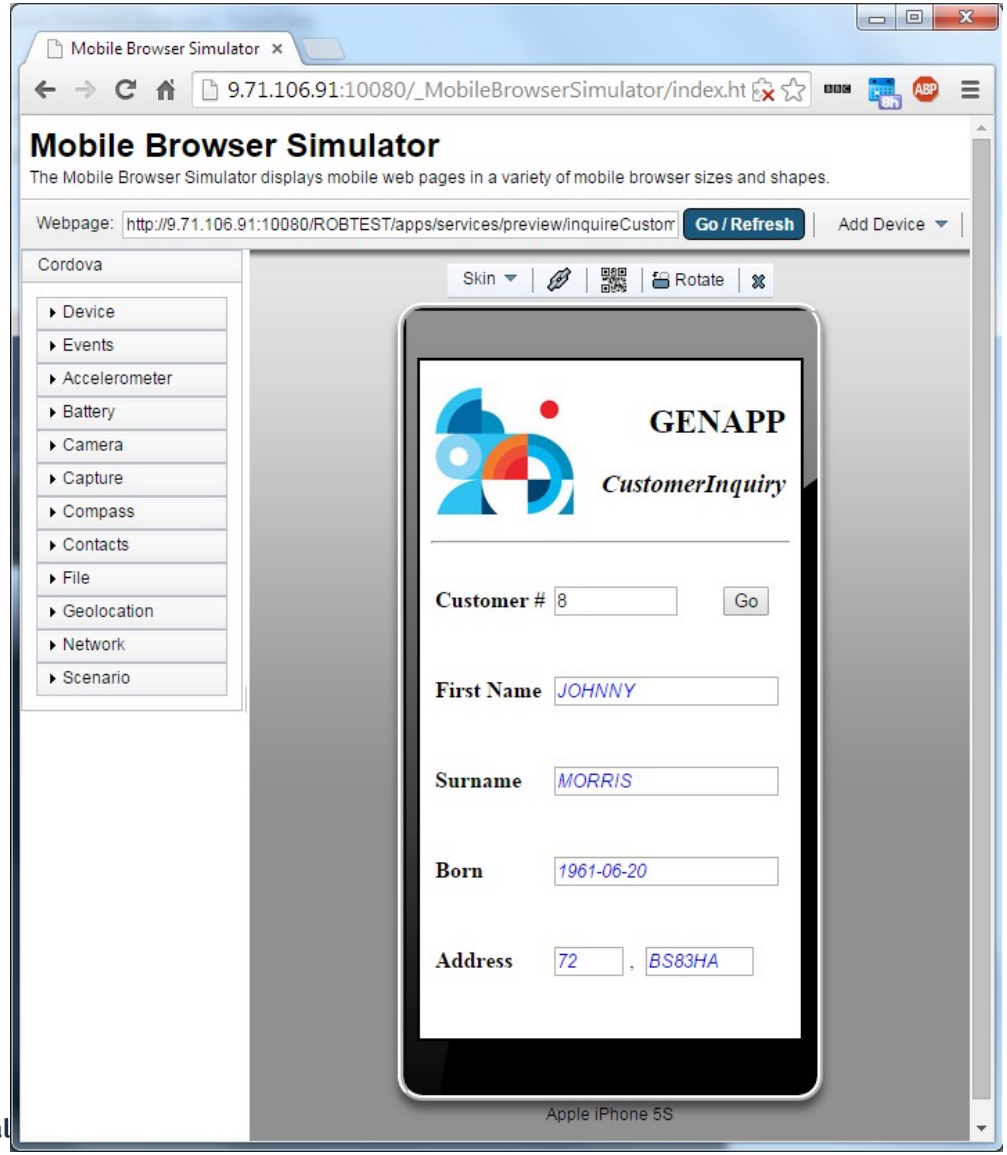
2. The CICS application is invoked by a MobileFirst adapter

4. The GENAPP Cobol application processes the insurance policy customer details

IBM MobileFirst Platform Studio: Development



IBM MobileFirst Platform Studio: Simulator



IBM CICS Transaction Gateway V9.2 open beta

CICS intercept plug-in allows virtualization of CICS servers

DevOps

Zero MIPS continuous integration testing option for integrated CICS solutions

Service Agility

Enhanced OS support adds **Ubuntu** (Intel x86-64) as a Multipaltforms option for CICS TG run time, and **Apple OS/X** for CICS Explorer users

Operational Efficiency

IBM® SDK, Java™ Technology Edition, Version 8 delivers significant performance benefits for **IBM z13**

- IBM intends to deliver enhanced capability for IBM Rational Test Workbench to exploit IBM CICS TG V9.2 open beta
- Ubuntu continues to grow in the enterprise, is popular with developers, and available on SoftLayer
- Use the CICS TG plug-in for CICS Explorer on Apple OS/X
- Simultaneous-Multi-Threading (SMT) facility for zIIP processors
- Encryption exploitation of zEDC and CPACF hardware

Planned open beta availability : 23rd Mar 2015

Announcement letter **ENUS215-031**

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IBM® SDK, Java™ Technology Edition, Version 8 delivers significant performance benefits for **IBM z13**

- IBM intends to deliver enhanced capability for IBM Rational Test Workbench to exploit IBM CICS TG V9.2 open beta
- Ubuntu continues to grow in the enterprise, is popular with developers, and available on SoftLayer
- Use the CICS TG plug-in for CICS Explorer on Apple OS/X
- Simultaneous-Multi-Threading (SMT) facility for zIIP processors
- Encryption exploitation of zEDC and CPACF hardware

Planned open beta availability : 23rd Mar 2015

Announcement letter **ENUS215-031**

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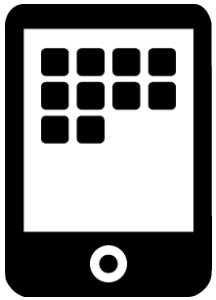

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