One Box- open platform for IoT

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Product marketing Manager
Freescale

The Promise of the Internet of Things

2.4 billion Internet users
12 billion connected devices in 2013

5 billion Internet users
50 billion connected devices by 2020

Devices talking to each other, all connected to the cloud and servers

All communicating securely

Resulting in savings and value creation
Impact on U.S. GDP ~$1.4 trillion in 2025

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Typical Views of IoT: Generalized

Building Automation

Smart City

Smart Lighting

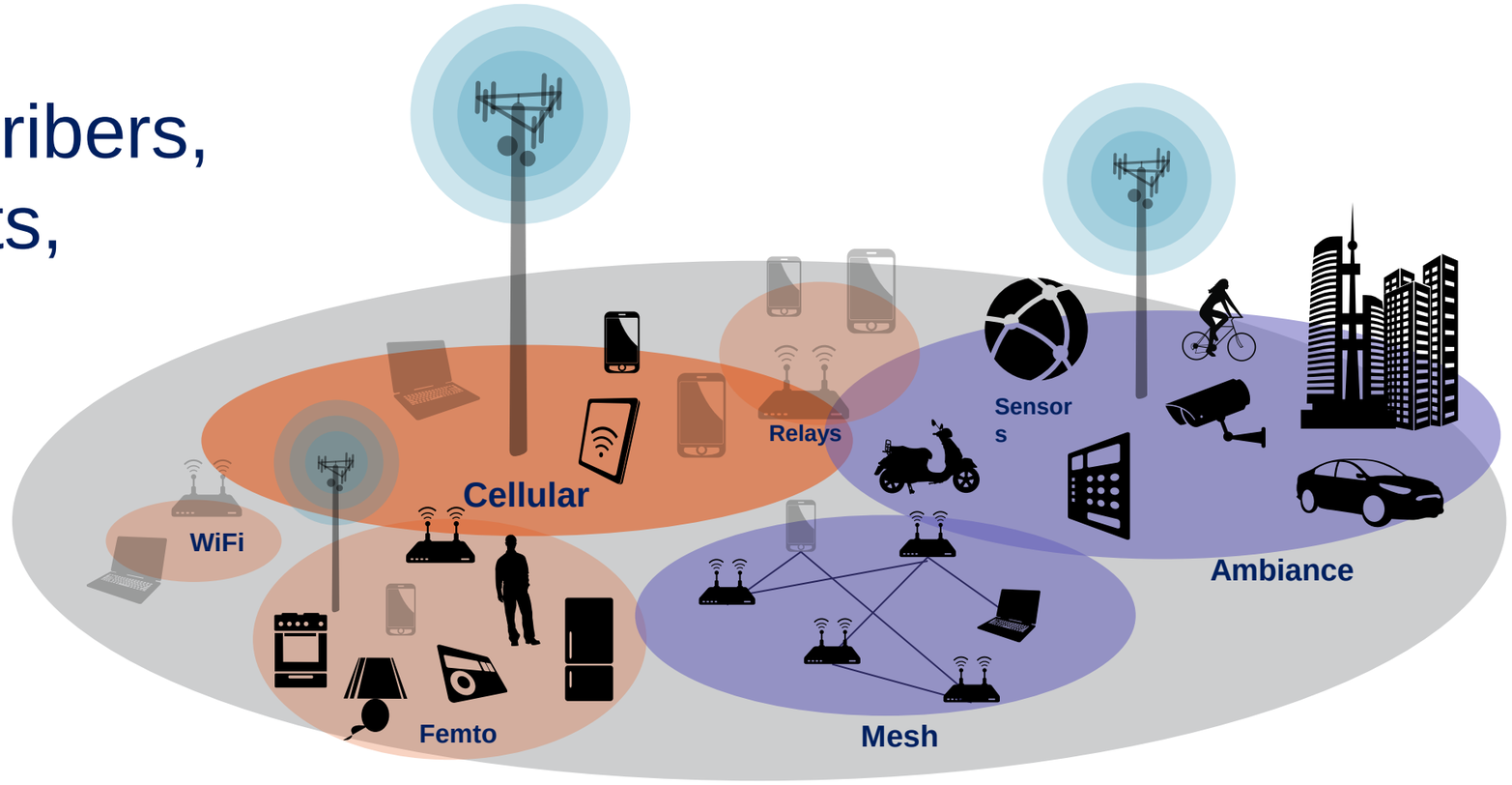
Smart Grid

Smart Health

Industrial Automation

Cellular-Centric View

Billions of subscribers,
trillions of objects,
All seamlessly connected to the cellular infrastructure



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Second View
Pervasive Remote Monitoring and/or Control

New breed of hierarchical gateways connecting tiny sensing nodes to the Cloud using the most efficient way to make the connection

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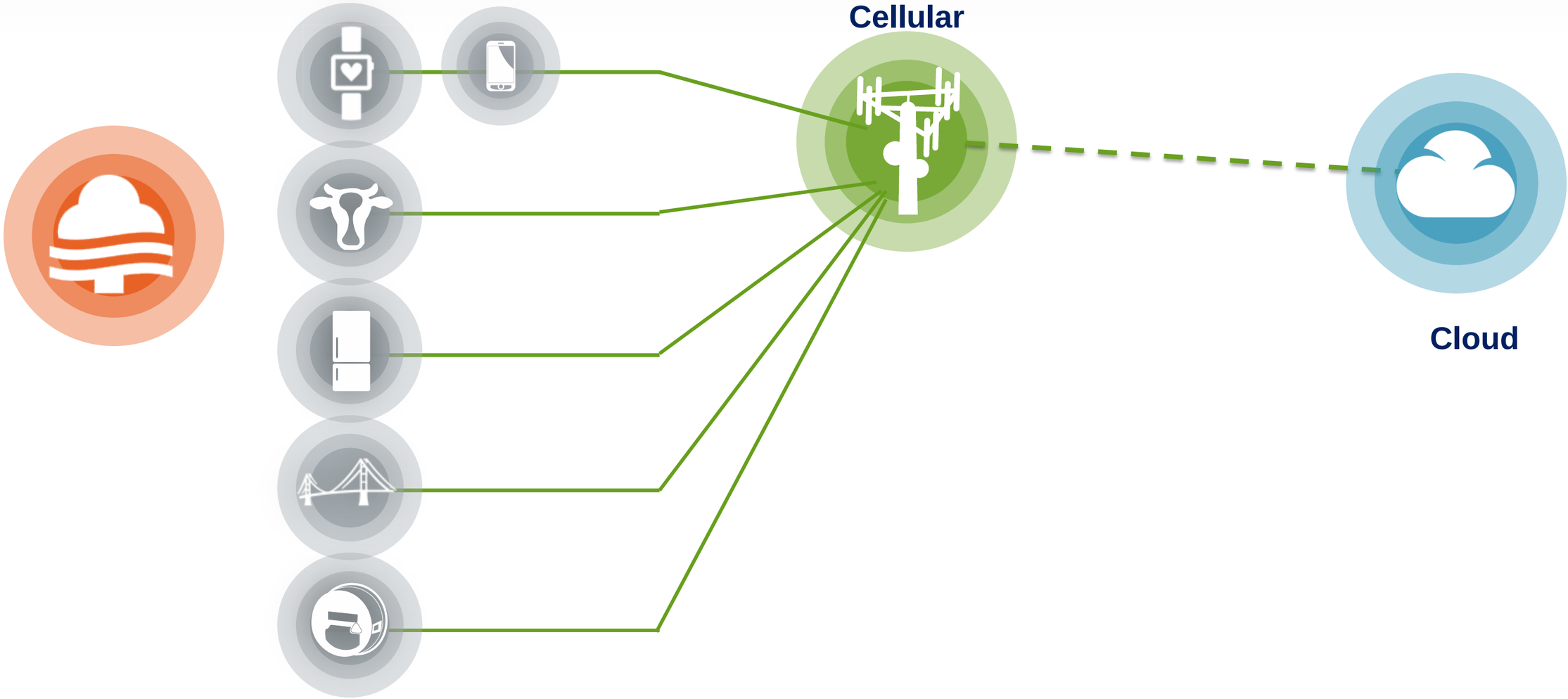
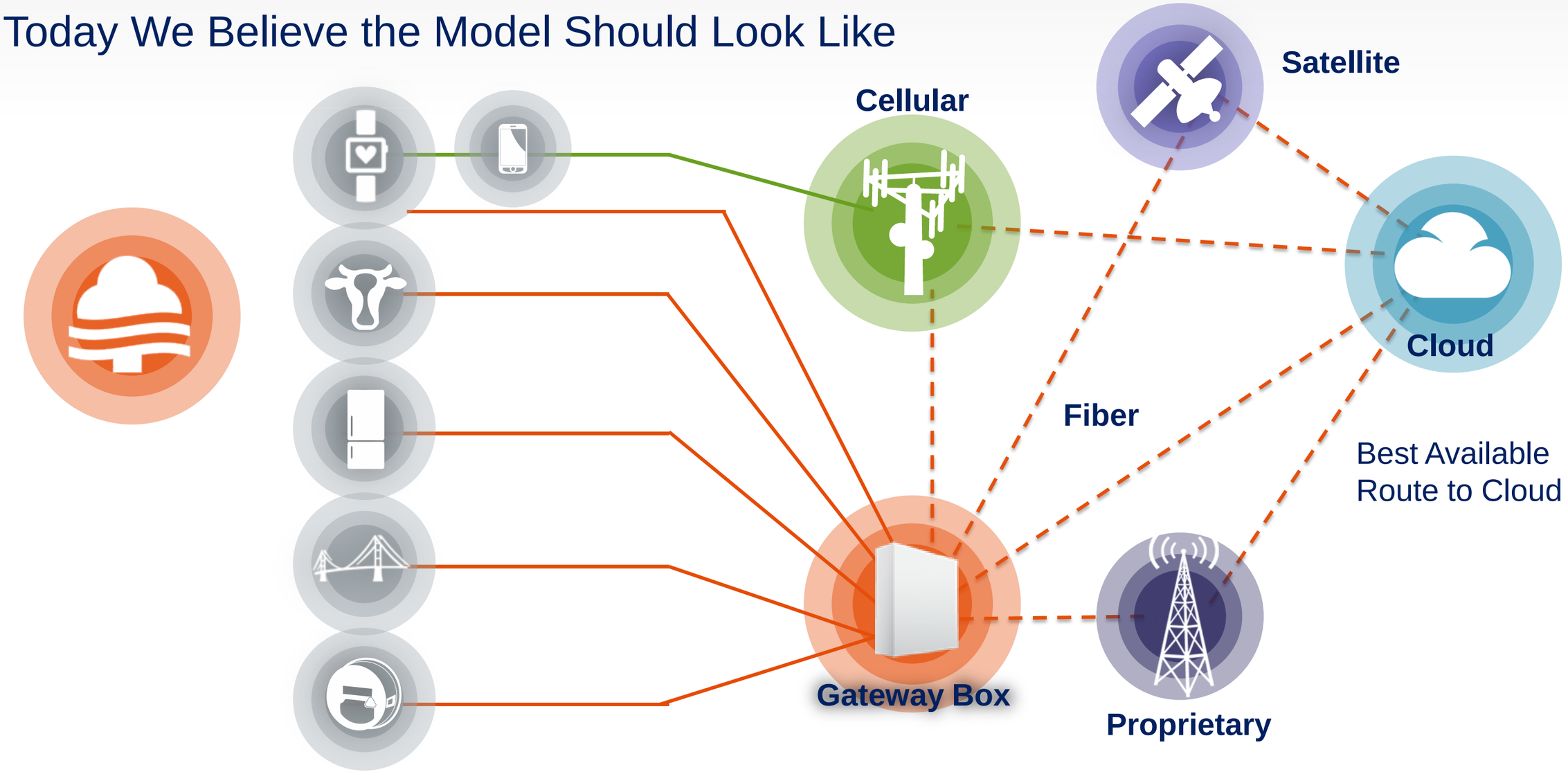
Fundamental Difference

Existing ISP Providers Believe in This Model



Fundamental Difference

Today We Believe the Model Should Look Like



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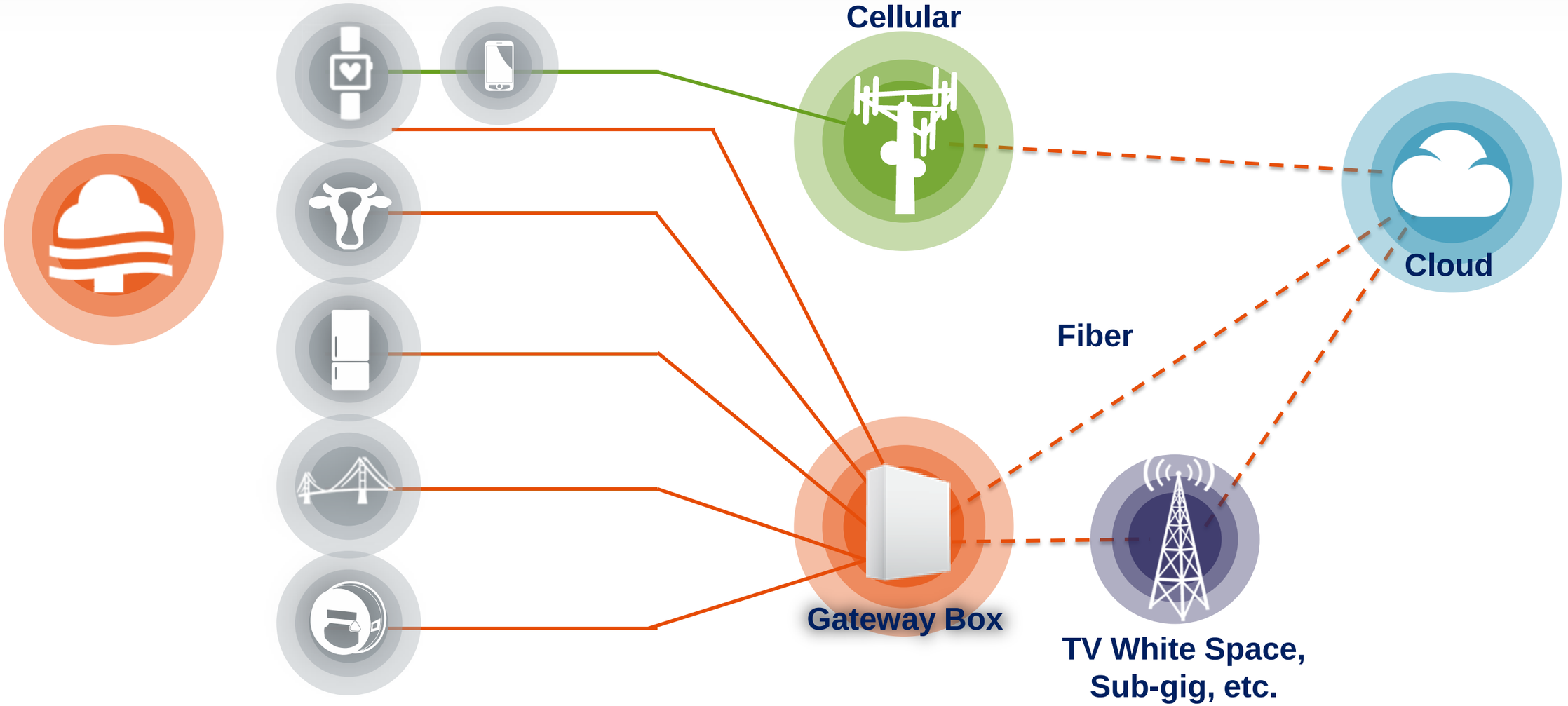
Fundamental Difference

In the Future We Believe the Model Will Look Like



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Infrastructure of the Internet of Things

The Challenge

Most parts of this infrastructure and, to the greatest extent, the edge nodes use different technology nodes, different tool sets, different development environments, different levels of security competence and resources, even different programming languages

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Infrastructure of the Internet of Things

The Solution

Java technology to embrace the entire system and unify the Internet of Things, even down to the tiniest and most resource-constrained edge/sensing nodes

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One Box: Connecting The Cloud to the Tiniest Edge Nodes

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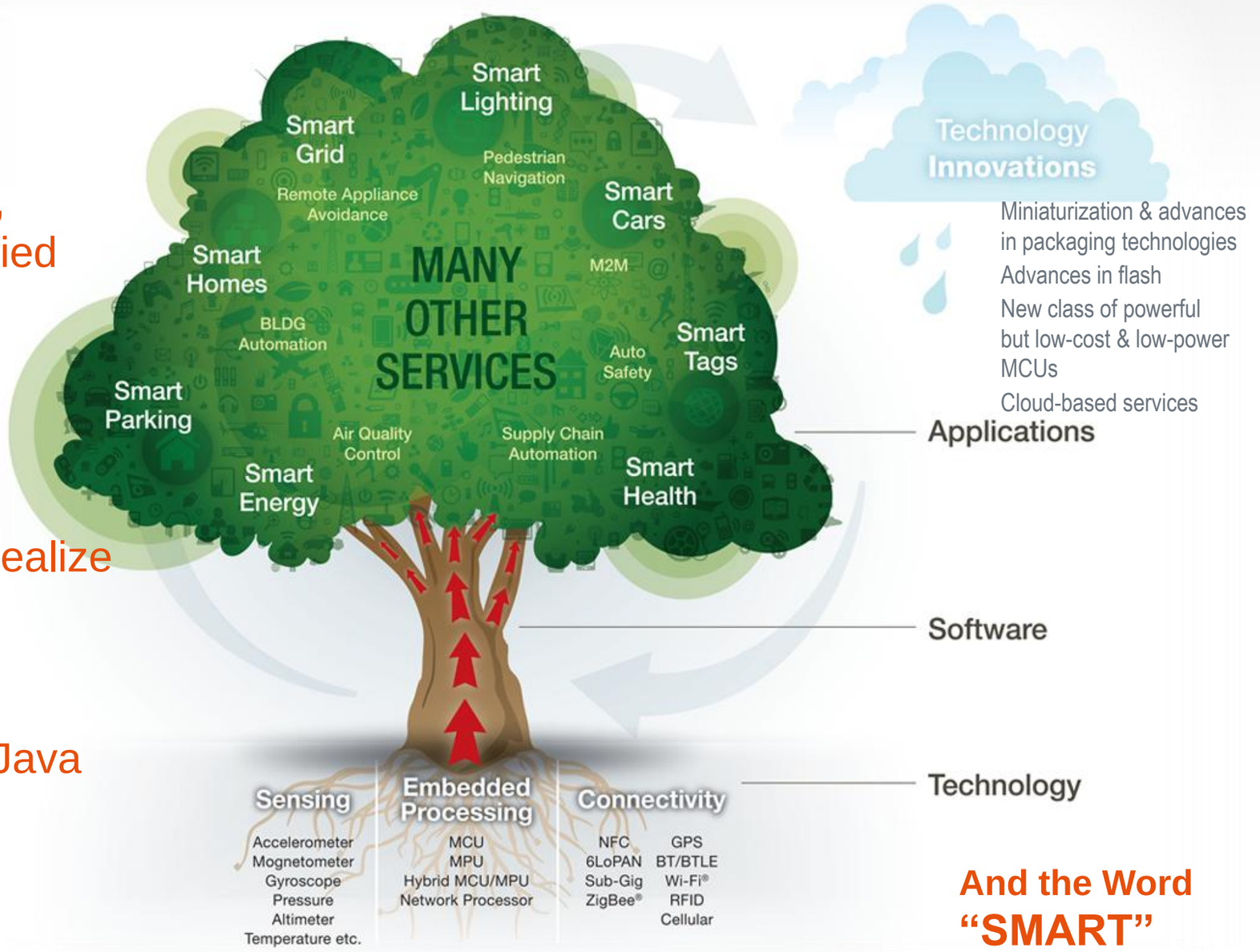
IoT (Internet Of Things) Vision

Data gathering, Connectivity, Scalability, Security and Management across a unified platform end-to-end (edge->gateway->servers->cloud)

Freescale, Oracle & ARM Sensinode engineering teams working together to realize the IoT vision

Creation of Demo (One Box) – running Java Software Suite on Freescale devices



And the Word "SMART" Is Everywhere!

One Box: Connecting The Cloud to the Tiniest of Edge Nodes

Hierarchical gateways act as the *glue* that pulls all of the pieces together and support:

- Modular BAN/PAN/LAN/HAN connectivity topologies
- Modular NAN/WAN communications solutions
- Protocol translation
- Security
- Firewall and VPN
- Switching and routing
- Storage

They perform new functions:

- Offload some/most of service provision from servers
- Intelligence and analytics: **Java Event Processing Embedded**
- Etc.

Java Embedded Product Portfolio

10MB-100MB

1MB-10MB

50KB-1MB

Footprint

Java Card

Java ME Embedded

Java SE Embedded

Java Embedded Suite

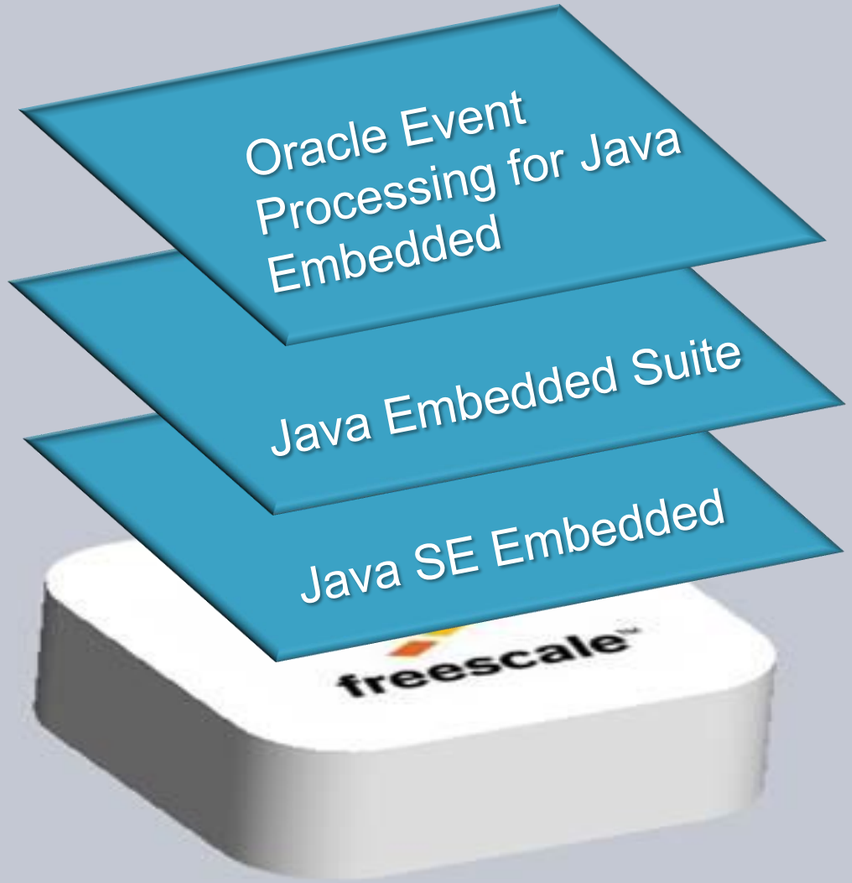
OEP for Oracle Java Embedded

Device CPU/ GPU/I-O

SECURITY SMALL MEDIUM LARGE

OneBox + Java Embedded

Enables Sophisticated Local intelligence



- Java SE Embedded provides a full featured Java SE platform for embedded environments
- Java Embedded Suite provides a modular, extensible middleware stack for embedded gateway devices
- Oracle Event Processing for Java Embedded enables tracking and analyzing real-world data to enable real-time intelligence on the device

IoT Products from Device to Cloud

Java ME

NanoService

Java Embedded Suite

NanoService

NSP Edge

Complex Event Processing

ARM SENSINODE
IoT Technology

Freescale K70

LWM2M: CoAP

LWM2M: CoAP / eDTLS

Freescale i.MX

NanoService

Native Device (mBed™ development platform)

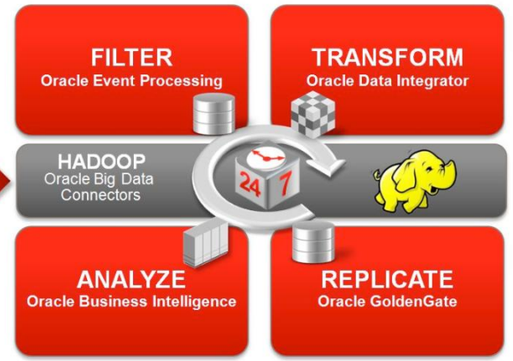
Java EE

NanoService Platform

Authentication

Identity Management

Big Data



Embedded Devices

Gateway

Backend – Private or Public Cloud

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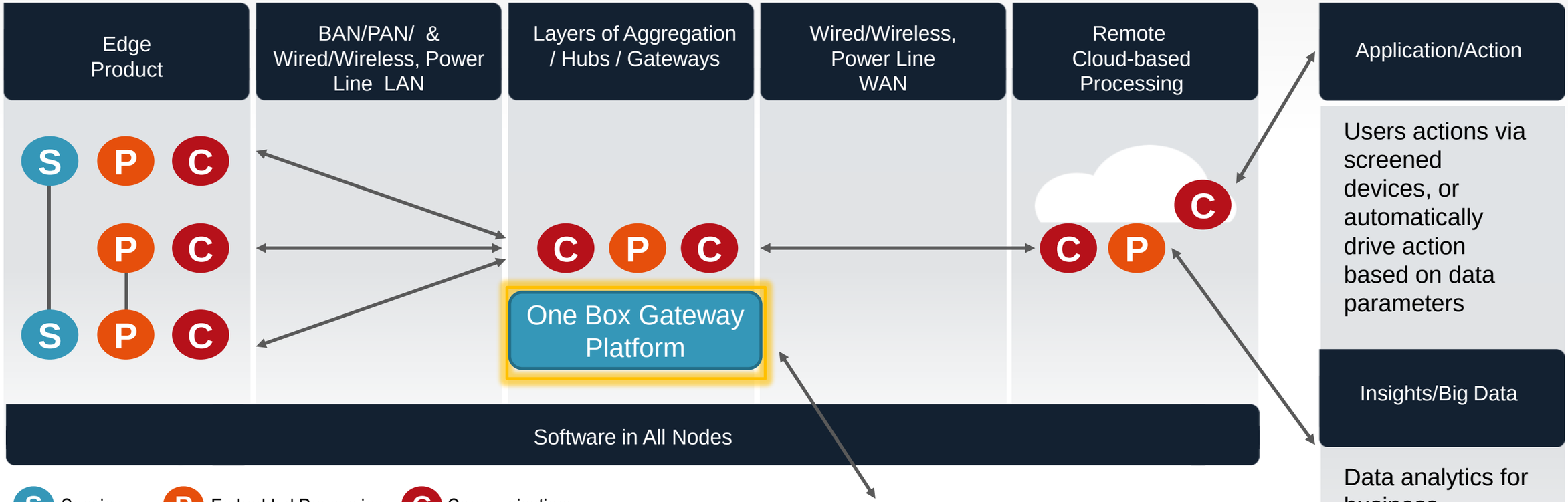
IoT ‘Box-level’ Product View



Medtronic's glucose monitor uses Bluetooth to "talk" to Ford Sync,

Secured Wireless Router ++

M2M Gateway, Cloud connect

Remote Access/Management

Storage Synchronization

Processing (Service Delivery Platform)

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Freescale “One Box” interface with Cloud Apps

- Discovery
- Interoperability
-- Autonomy

Cloud Server Apps
(Big Data, etc)

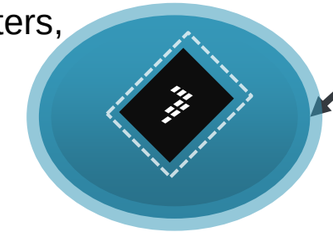
Applications / Services
Health | Industrial | Home Automation | Smart Energy | Business Logic

Communication Mgt
XMPP | SMS | Alert

Device Management
Diagnostic | Remote Access | Remote Provision TR69

Mobile Apps
Java FX

Sensor nodes:
Temp/Pressure, Acceleratometers, Gyro, etc
Java ME



OMA

CoAP Application Protocol (Requests/Response) (or HTTP/REST)
ARM
JAVA ME
ORACLE

Future consideration: Publish/Subscribe: - XMPP, MQTT

Web-server
Storage
Sensor data (JAVA DB) in Flash, SD, USB, etc.
JAVA SE
JRE
ORACLE

Security: Authentication, Access Control Intrusion Prevention: DOS – IDS/IPS Encryption,: IPSEC, SSL, DTLS

OSGI Framework

Networking: uPnP
IPv4/v6 128bit IP address,
Virtual LAN - VLAN,
Domain Name Server- DNS

Management:
Remote Provisioning
TR69
Traffic Policy QoS

Storage

FSL Wireless IoT Gateway Platform
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Secure Boot
Wireless Security WEP, WPA2

FSL Linux-SDK BSP Drivers
(i.MX Solo, Wi-Fi, BT, ZigBee, etc.)

GPS
NFC
weightless

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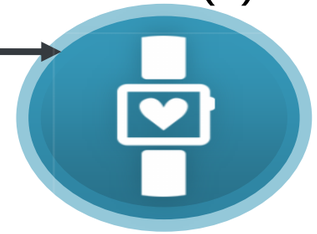
Sensor Node(s)



Other sensor nodes:
Health monitoring sensors, safety/security sensors, image sensors -- surveillance
JAVA SE

Smart energy sensor nodes:
Smart meters, plug, appliances
Java SE

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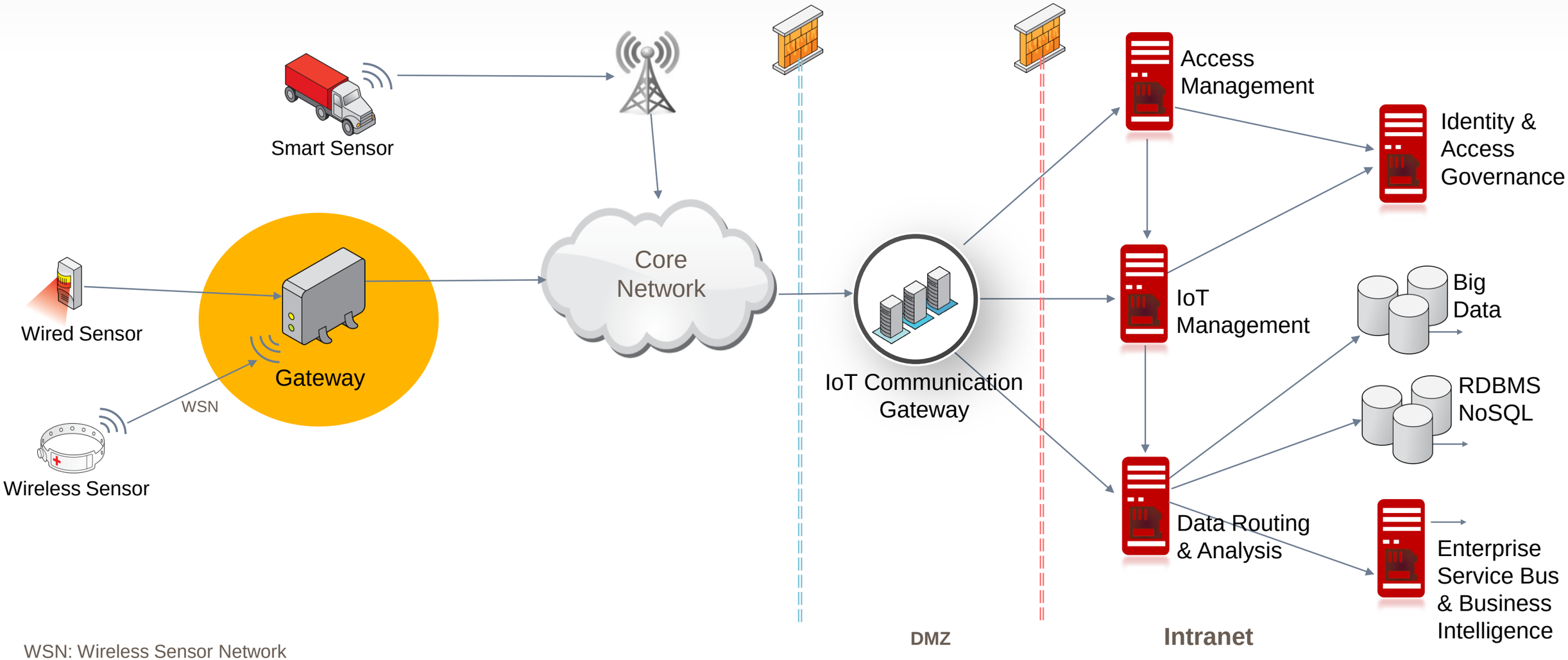
Intelligence Is Real-Time, Event-Based Analytics

Java Embedded enables you to harvest real-time business insights from edge devices

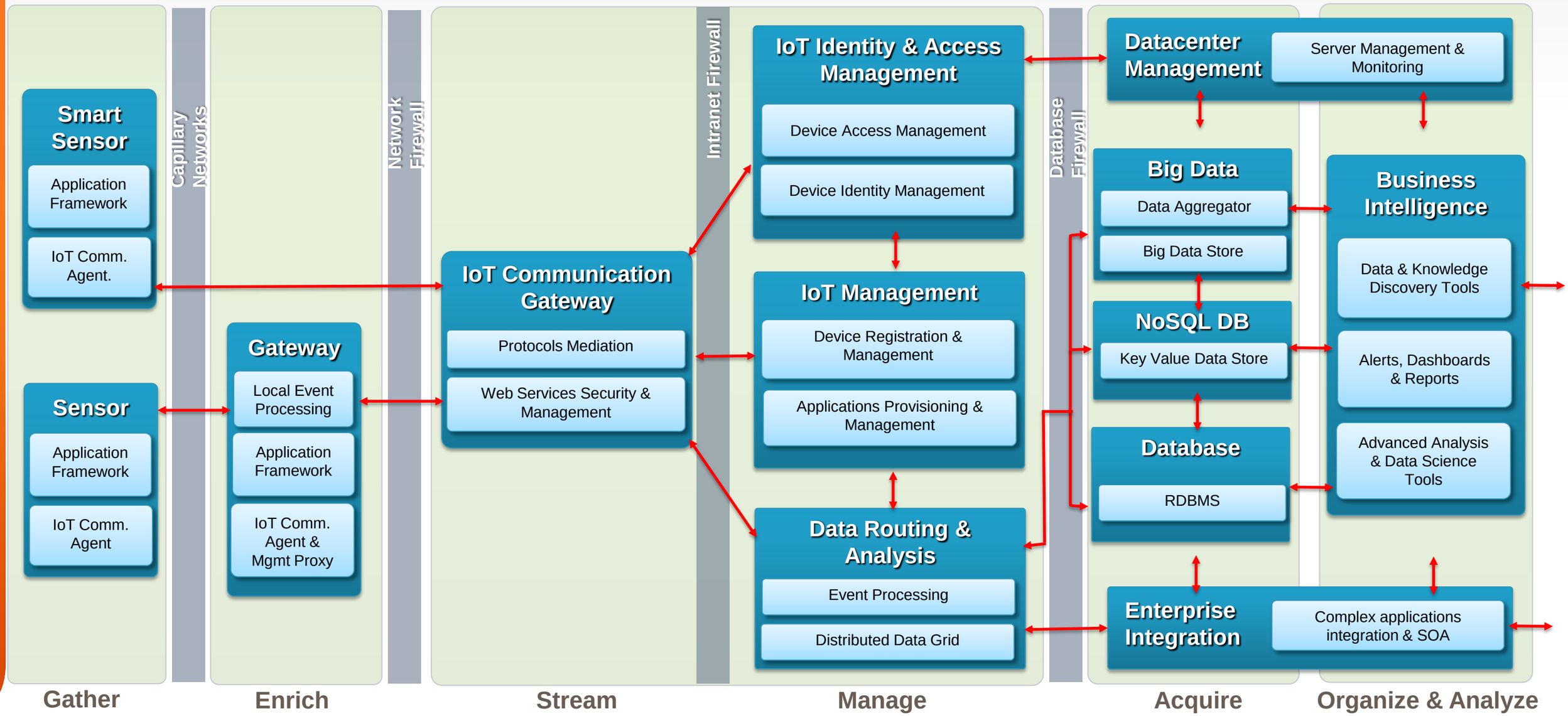
Communication Events	Machine Events	Security Events	Environmental Events	Business Logic Events

IoT Conceptual Architecture



WSN: Wireless Sensor Network

IoT Reference Architecture: Components View



One Box Roadmap

Supporting “Smart” Applications:

- Home Automation
- Energy
- Health
- Industrial

Off-the-Shelf Box (i.MX6)
- ZigBee – Smart Plug
- ZigBee – Smart Meter
- WiFi – Thermostat
- WiFi – Security Camera
- 3G

3Q2013 – Phase 1
Java One 9/23/13

Off-the-Shelf Box (i.MX6)
- Add BTLE – Wearable, BPM
- Add NFC – Security

4Q2013 Phase 2

New Custom Enclosure And Board (i.MX)
- Add PLC (AC in box)
- Add IPv6 Lite Wireless
- Add Echonet (SubGHz)
- Add Wireless M-BUS
- Add VLAN, DNS, IPS ..

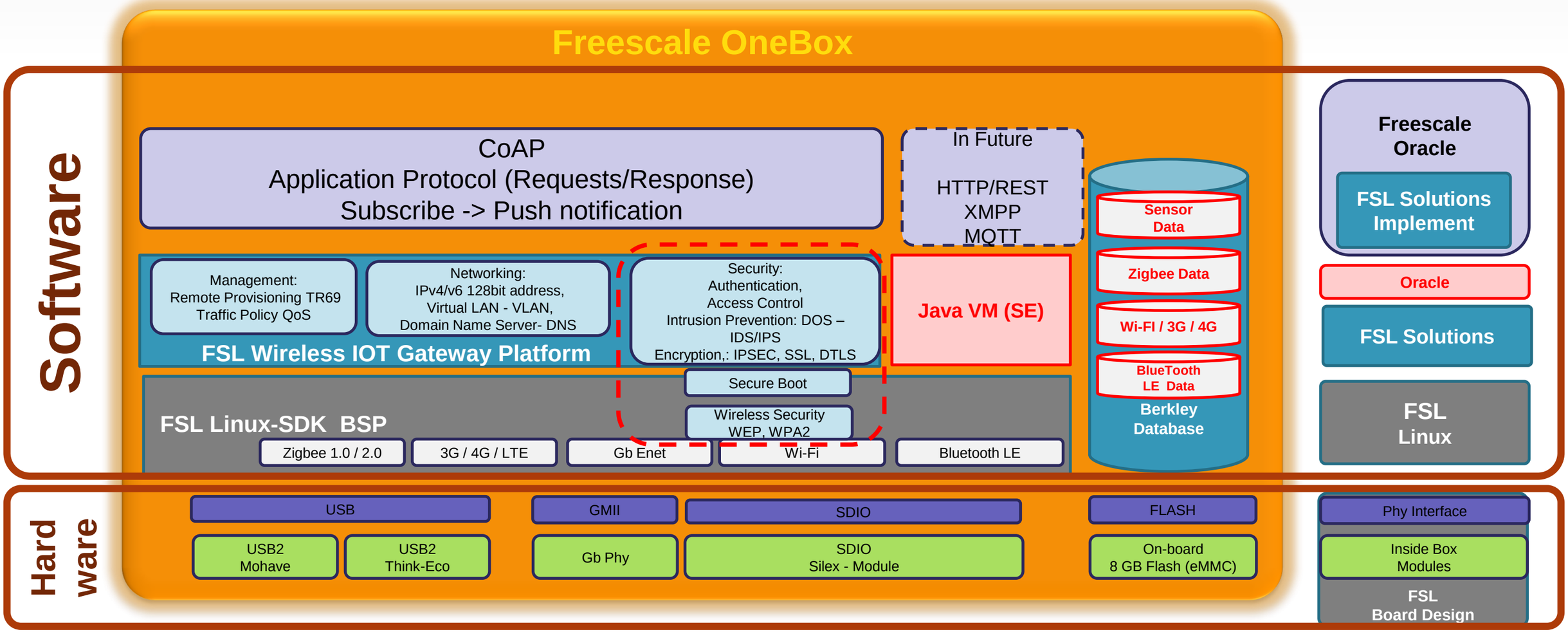
2Q2014 Phase 3

i.MX
- Add 3G/4G
- Add VoIP phones
- Add EV Charger
- Add Weightless

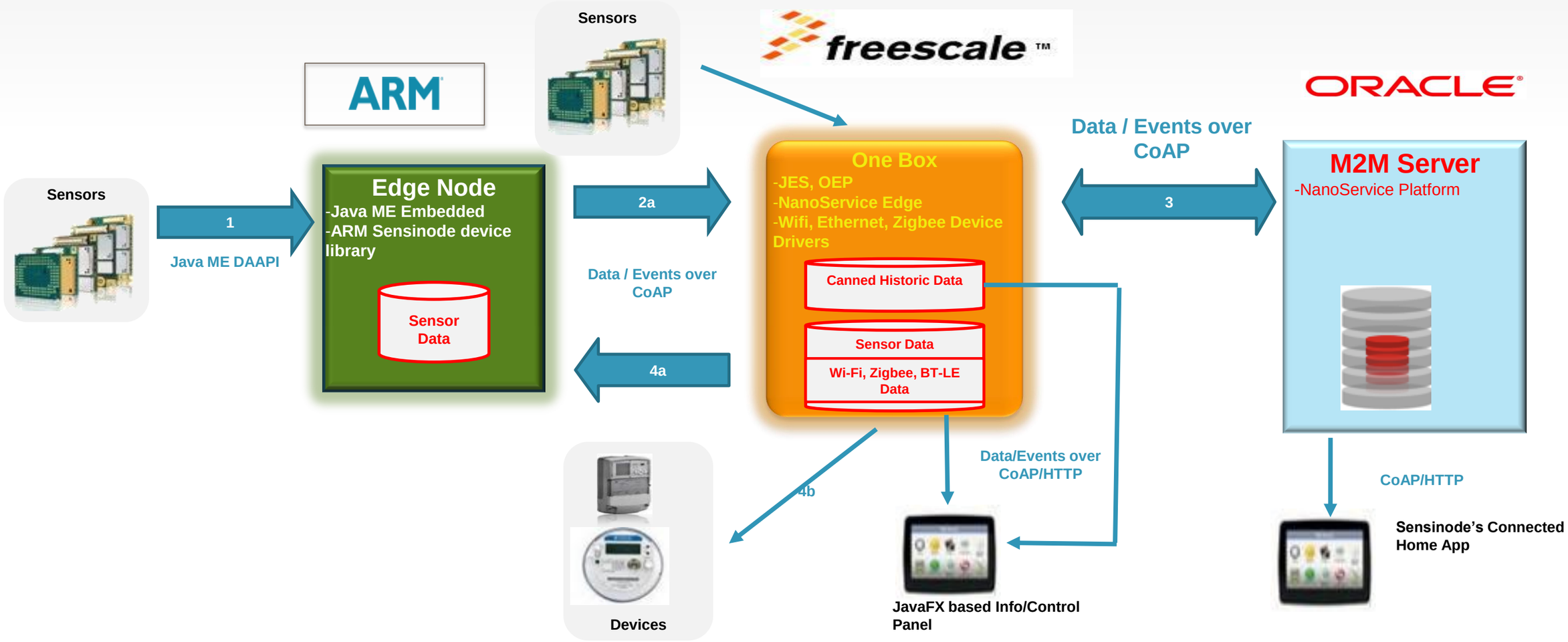
1Q2015 Phase 4

Scalable One Box Platform supports various Freescale devices (QorIQ, LS102x, Kinetis etc)

Freescale One Box System Overview



One Box – Demo Overview



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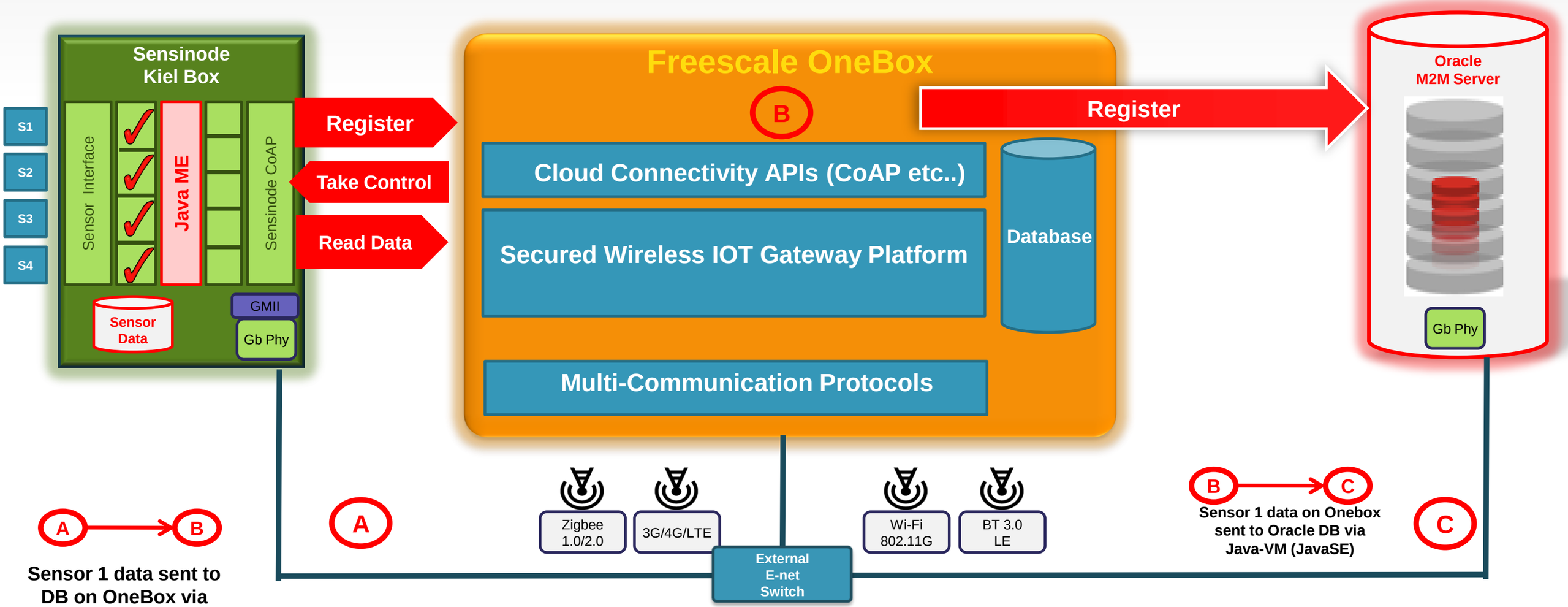
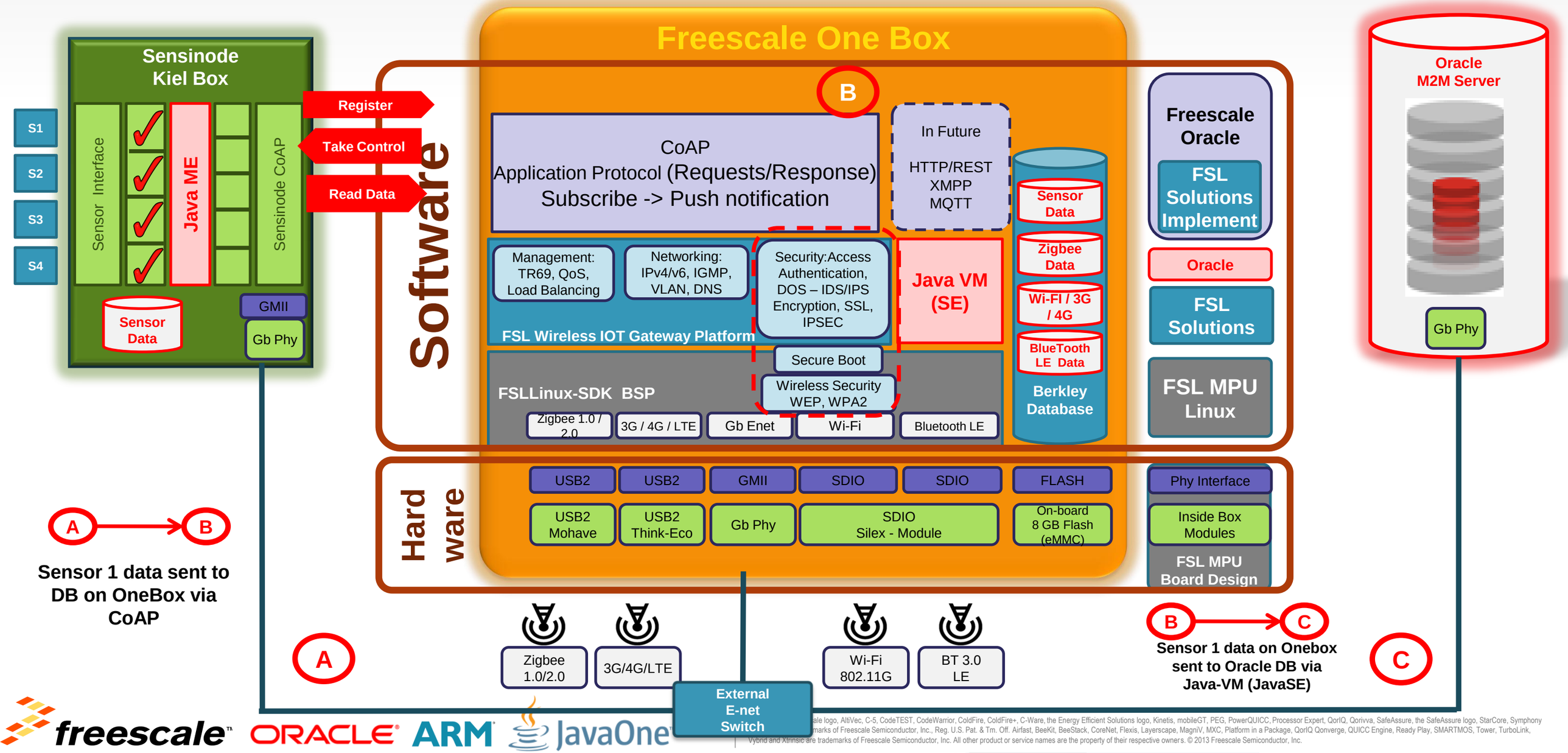
Platform based on Kinetis and i.MX 6 MCUs
ARM Sensinode – sensor data collection
Oracle – Java ME and Java SE running with data analysis

Freescale One Box Data Flow



Freescale One Box Data Flow



One Box Software/Hardware