Hewlett Packard
Enterprise

IoT Enablement

Mark Gullett
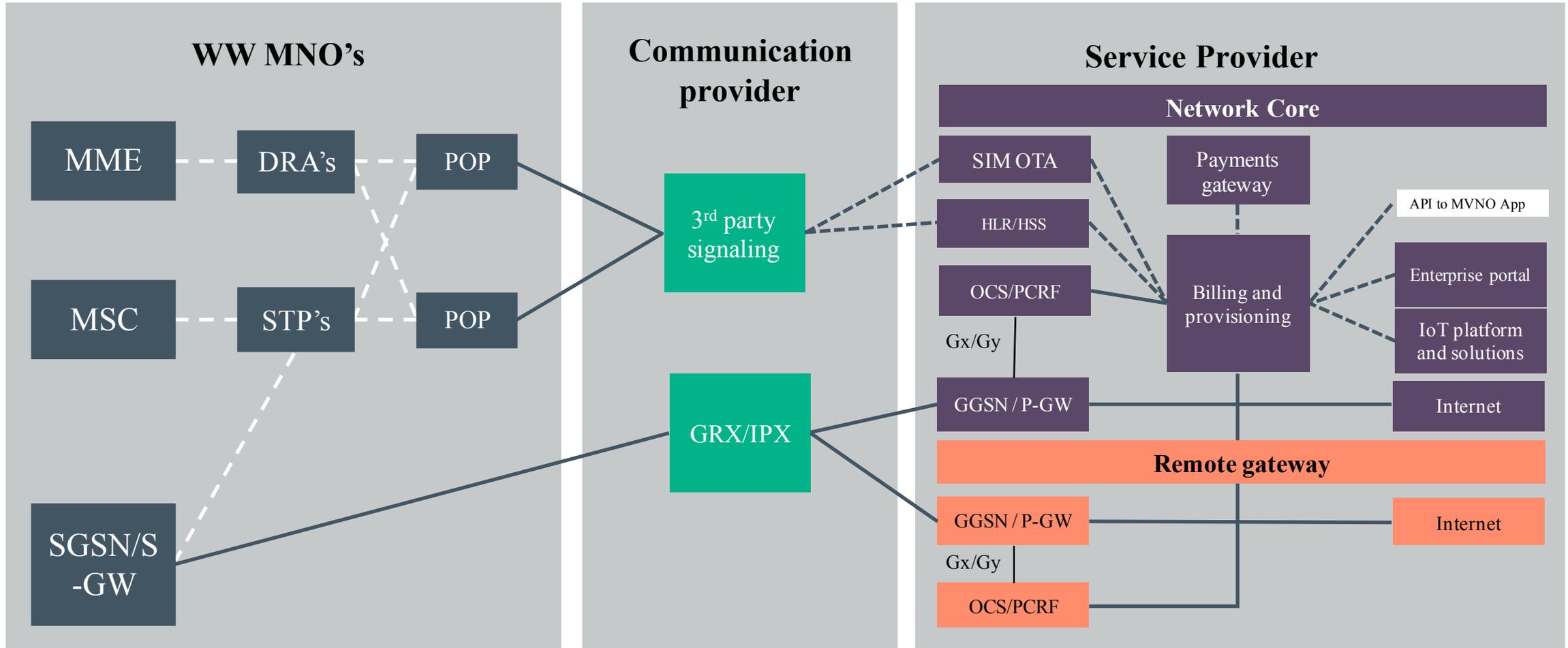Chief Technologist

Agenda

– HPE Communications and Media Solutions - Snapshot

– HPE IoT "stack"

– Edge Components

– Use Cases

– Couple Challenges

Upcoming announcement at MWC puts some restrictions on what can be shown

Confidential

Mobility Network Focus

Objects are more connected than ever

Product delivery

Air quality

Lighting

Product electronics & entertainment

Pumps

Electricity switch

Security

Noise

Fire & emergency

Asset tracking

Air conditioner

Access control

Vehicle leasing

Water distribution

Vibration

Digital signage

Roadside equipment

Telecom infrastructure

Driver behavior

Traffic lights

HPE IoT "Stack"

Hewlett Packard
Enterprise
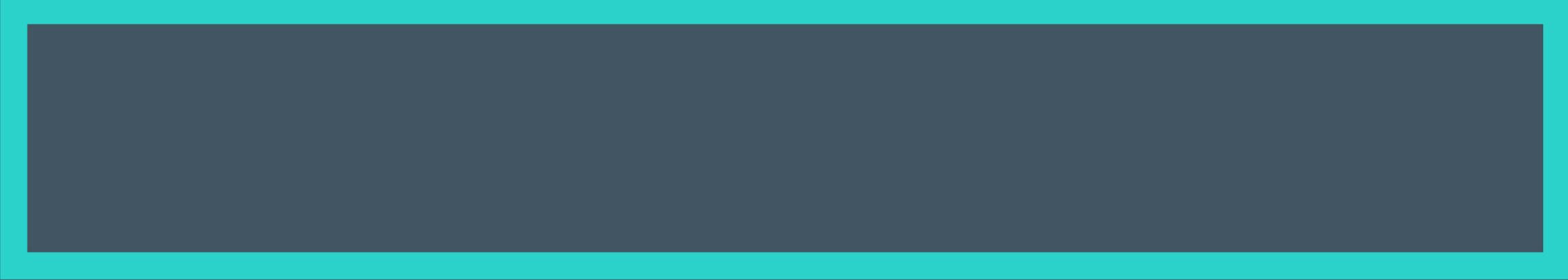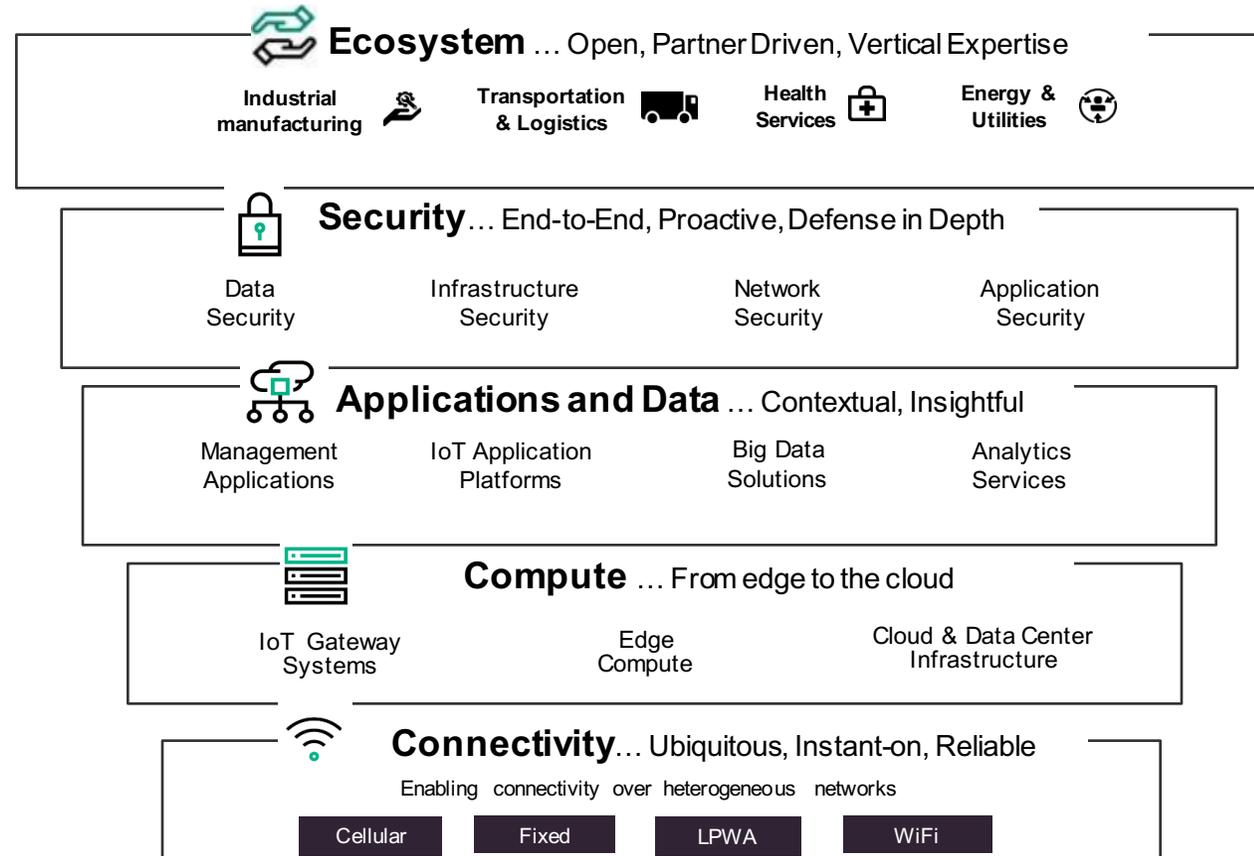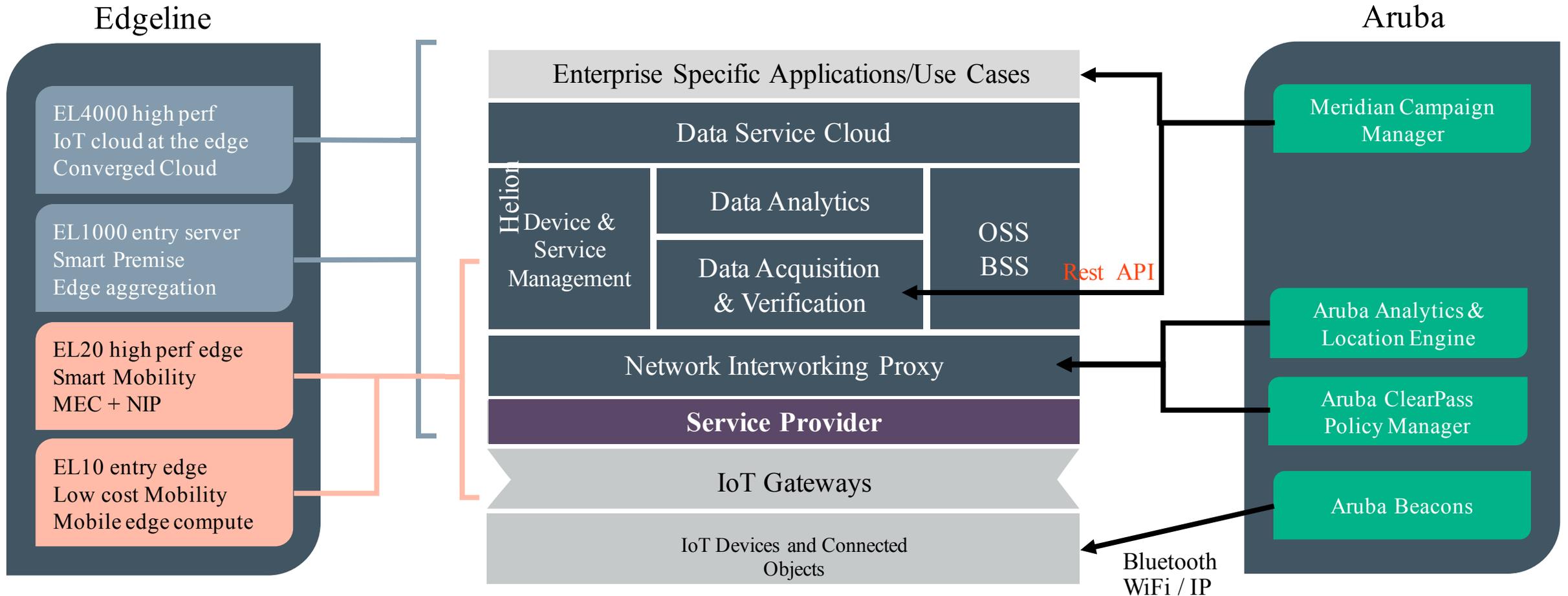
The IoT market is rapidly developing – Companies position products, solutions to address the various areas of the ecosystem. (HPE emphasizes IT for IoT)

Ecosystem … Open, Partner Driven, Vertical Expertise

| **Industrial manufacturing** | **Transportation & Logistics** | **Health Services** | **Energy & Utilities** |

Security … End-to-End, Proactive, Defense in Depth

| Data Security | Infrastructure Security | Network Security | Application Security |

Applications and Data … Contextual, Insightful

| Management Applications | IoT Application Platforms | Big Data Solutions | Analytics Services |

Compute … From edge to the cloud

| IoT Gateway Systems | Edge Compute | Cloud & Data Center Infrastructure |

Connectivity … Ubiquitous, Instant-on, Reliable

Enabling connectivity over heterogeneous networks

| Cellular | Fixed | LPWA | WiFi |

Hewlett Packard Enterprise

HPE I-Connect Solution Architecture

- Integrated solution brings IoT compute, connection, data and analytics in a secure, standardized and modular architecture

Edgeline

Aruba

| EL4000 high perf
IoT cloud at the edge
Converged Cloud |
| EL1000 entry server
Smart Premise
Edge aggregation |
| EL20 high perf edge
Smart Mobility
MEC + NIP |
| EL10 entry edge
Low cost Mobility
Mobile edge compute |

Enterprise Specific Applications/Use Cases

Data Service Cloud

Helion

Device & Service Management

Data Analytics

Data Acquisition & Verification

OSS
BSS

Rest API

Network Interworking Proxy

Service Provider

IoT Gateways

IoT Devices and Connected Objects

Meridian Campaign Manager

Aruba Analytics & Location Engine

Aruba ClearPass Policy Manager

Aruba Beacons

Bluetooth
WiFi / IP

Hewlett Packard
Enterprise

IoT Reference Architecture

Device and Service Management

ETSI/oneM2M compliant component exposing oneM2M interfaces to applications and tenants for managing sensors connected to the platform and different level of services
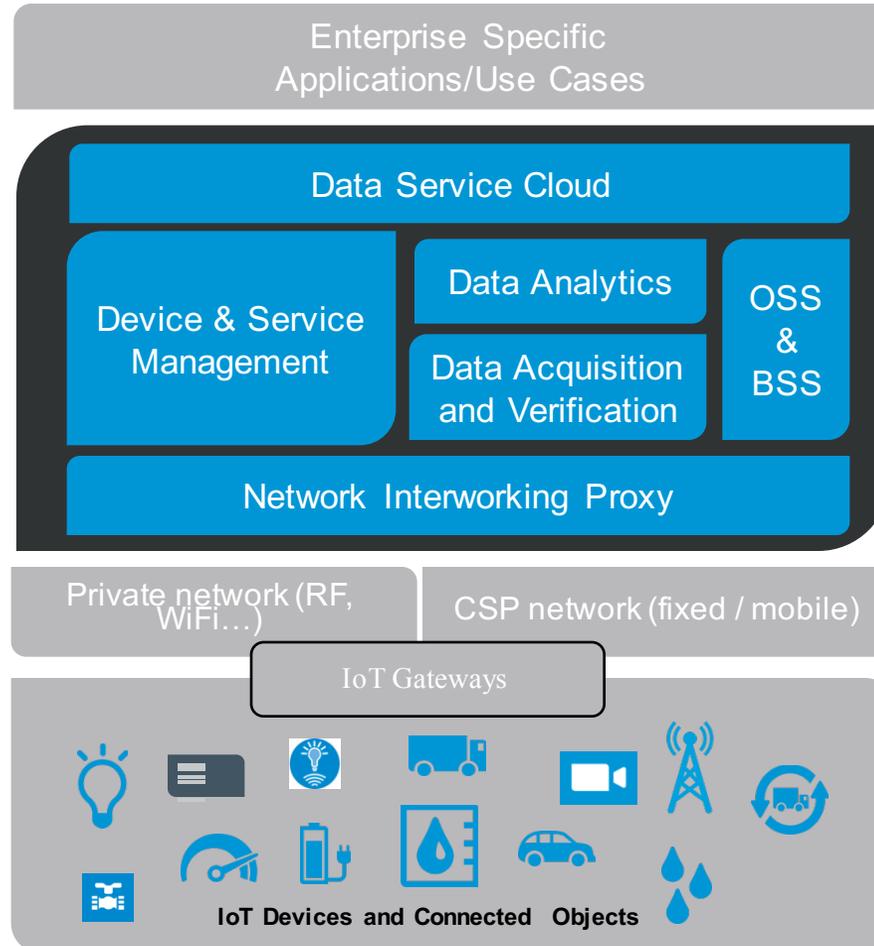
Network Infrastructure Proxy

ETSI/oneM2M compliant component providing support for IoT Protocol and GWs enablement

OSS, BSS

Leveraging existing Telco based OSS and BSS adapted to the technical and business requirements of IoT

Enterprise Specific Applications/Use Cases

Data Service Cloud

Device & Service Management

Data Analytics

Data Acquisition and Verification

OSS & BSS

Network Interworking Proxy

Private network (RF, WiFi…)

CSP network (fixed / mobile)

IoT Gateways

IoT Devices and Connected Objects

Data Service Cloud

IoT application studio, exposing oneM2M interfaces to the sensors data

Advanced data built from sensor data, enriched from contextual information

Partner oriented layer for securely managing data privacy, exposure, settlement

Data Analytics

Leveraging HP Vertica technology, discovery of meaningful patterns in data collected from sensors

Data Acquisition and Verification

Secured multitenant layer to acquire and validate data collected (push/pull) from the sensor and transform rough data into valid verified, possibly corrected data
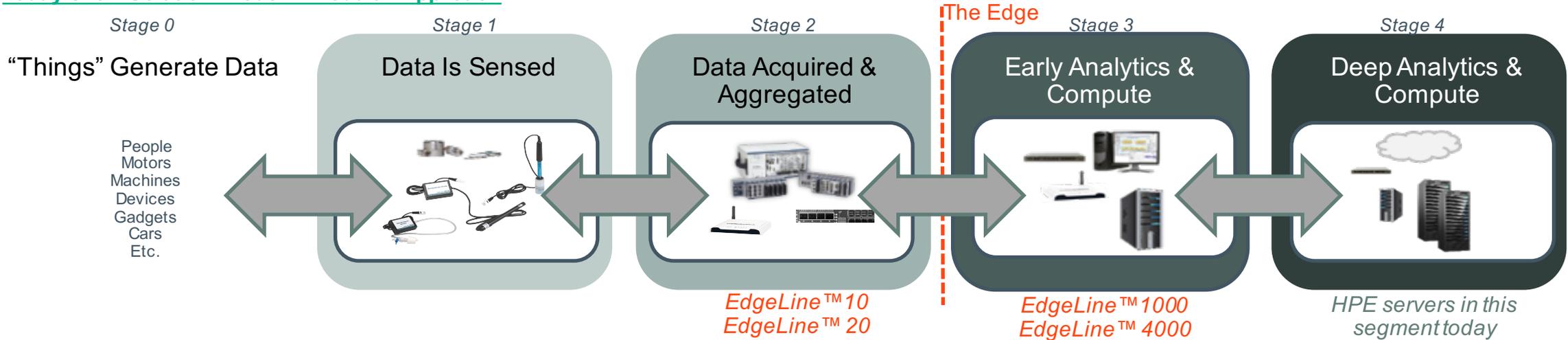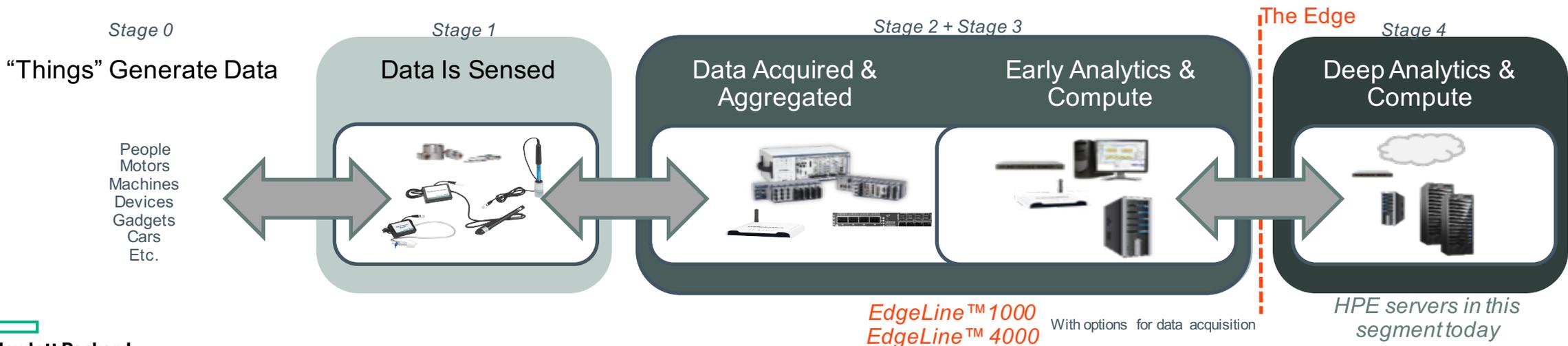
Edgeline components

HPE Edgeline – A New HPE Family of products

Today's IoT Solution Model – Modular Approach

| Stage 0 | Stage 1 | Stage 2 | The Edge | Stage 3 | Stage 4 |

"Things" Generate Data

Data Is Sensed

Data Acquired & Aggregated

Early Analytics & Compute

Deep Analytics & Compute

People
Motors
Machines
Devices
Gadgets
Cars
Etc.

EdgeLine™10
EdgeLine™ 20

EdgeLine™1000
EdgeLine™ 4000

HPE servers in this segment today

Tomorrow's IoT Solution Model - HPE Innovation – Converge Stage 2 + 3

| Stage 0 | Stage 1 | Stage 2 + Stage 3 | The Edge | Stage 4 |

"Things" Generate Data

Data Is Sensed

Data Acquired & Aggregated

Early Analytics & Compute

Deep Analytics & Compute

People
Motors
Machines
Devices
Gadgets
Cars
Etc.

EdgeLine™1000
EdgeLine™ 4000

With options for data acquisition

HPE servers in this segment today

Hewlett Packard
Enterprise

November 12, 2015
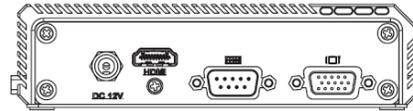
HPE Edgeline EL10 Intelligent Gateway

HPE Branding / Color NOT representative of final product

Front Panel External I/O Mechanical Layout/Drawing
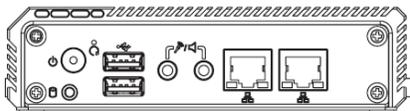
Rear Panel External I/O Mechanical Layout/Drawing

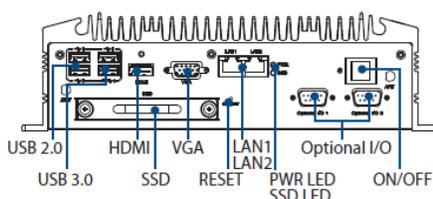|	
Compute	Intel E3826 dual-core Atom, operating at 1.46GHz with integral GPU 4GB DDR3L 1333MHz SO-DIMM (8GB CTO Option)
I/O	1 x Intel I210 10/100/1GbE Ethernet port 1 x Realtek RTL8111G 10/100/1GbE Ethernet port 1 x RS-232 or RS-422/485 serial port (BIOS configurable) 2 x USB 2.0 ports 1 x USB 3.0 port 1 x VGA and 1 x HDMI
Expansion	One full-size mini-PCIe expansion slot One half-size mini-PCIe expansion slot
Connectivity End User Upgradable	2x2 11ac Wi-Fi / BT (Standard on WindRiver SKU) WAN Ready (WAN antenna connectors and cables pre-wired in chassis) Coming Soon – Additional Connectivity Options
Storage	One 2.5" SATA HDD bay 32 GB SATA SSD (Standard) mSATA support via mini-PCIe slot
Mechanical	Aluminum housing, 5.5" wide x 1.4" tall x 4.6" deep Universal Mounting Kit – DIN, Wall (In-Box))
Environmental	Extended Temperature : -20oC to 60oC (incl WAN configuration) Operating Temperature: 0oC to 60oC (based on configuration)
Shock & Vibe	3 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 hr/axis 30 G, IEC 60068-2-27, half sine, 11 ms duration
Power	12 Volts DC, with total consumption, 10.5 Watts typical Universal Power Kit- USA, UK, Euro, JPN (In-Box)
OS	Wind River Coming Soon - Windows IoT Core, Ubuntu Snappy
Management	Wind River Helix Device Cloud
Security	I /O Port Disablement, BIOS Password , Secure Boot

BTO SKU #1 – Intel Atom 1.46GHz, 4GB, 32GB SSD, Wi-Fi with WindRiver OS (0 -60oC with extended temp Wi-Fi solution coming soon -20-60oC)
BTO SKU #2 - Intel Atom 1.46GHz, 4GB, 32GB SSD without OS (Extended temp -20-60oC includes optional WAN configuration)

Hewlett Packard Enterprise

January 10 2016

HPE Edgeline EL20 Intelligent Gateway

Front Panel External I/O

USB 2.0 · HDMI · VGA · LAN1 LAN2 · Optional I/O
USB 3.0 · SSD · RESET · PWR LED SSD LED · ON/OFF

Rear Panel External I/O

DC INPUT · Digital IO · LINE-IN
POE · MIC · LINE-OUT
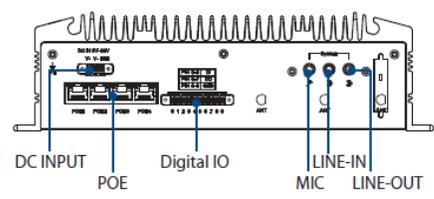
Compute	Intel 4300U Dual-core i5, operating at 1.9GHz GT2-4400 Graphics 8GB DDR3 1600MHz SO-DIMM
I/O	1 x 10/100/1Gb Intel I-210 Ethernet port, with WOL 1 x 10/100/1Gb Intel I-218 Ethernet port, with WOL 2 x RS-232/422/485 serial ports (BIOS configurable) 2x USB2.0, 2x USB3.0 1 x VGA and 1 x HDMI 4x POE / 1 X 8 Bit DIO (6in, 2out)
Expansion	3x full-size mini-PCIe 1x half-size mini-PCIe expansion slots
Connectivity End User Upgradable	2x2 11ac Wi-Fi / BT (Standard on WindRiver SKU) WAN Ready (WAN antenna connectors and cables pre-wired in chassis) Coming Soon – Additional Connectivity Options
Storage	One 2.5" SATA HDD bay 64 GB SATA SSD (Standard) mSATA support via mini-PCIe slot
Mechanical	Aluminum housing, 10.41" wide x 2.96" tall x 5.24" deep Universal Mounting Kit –DIN, Wall (In-Box)
Environmental	Extended Temperature : -20oC to 60oC (incl WAN configuration) Operating Temperature: 0oC to 60oC (based on configuration)
Shock & Vibe	3 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 hr/axis 30 G, IEC 60068-2-27, half sine, 11 ms duration
Power	9 to 36 Volts DC input Universal Power Kit - USA, UK, Euro, Japan (In-Box)
OS	Wind River Coming Soon - Windows IoT Core, Ubuntu Snappy
Management	Wind River Helix Device Cloud
Security	I /O Port Disablement, BIOS Password , Secure Boot

BTO SKU #1 – Intel i5, 8GB, 64GB SSD, Wi-Fi with WindRiver OS (0 -60oC - extended temp Wi-Fi solution coming soon -20-60oC)
BTO SKU #2 - Intel i5, 8GB, 64GB SSD without OS (Extended temp -20-60oC includes optional WAN configuration)

Hewlett Packard Enterprise

Use Cases : Samples

Hewlett Packard
Enterprise

Hewlett Packard Enterprise IoT Vertical Focus

Drilling

Hewlett Packard
Enterprise
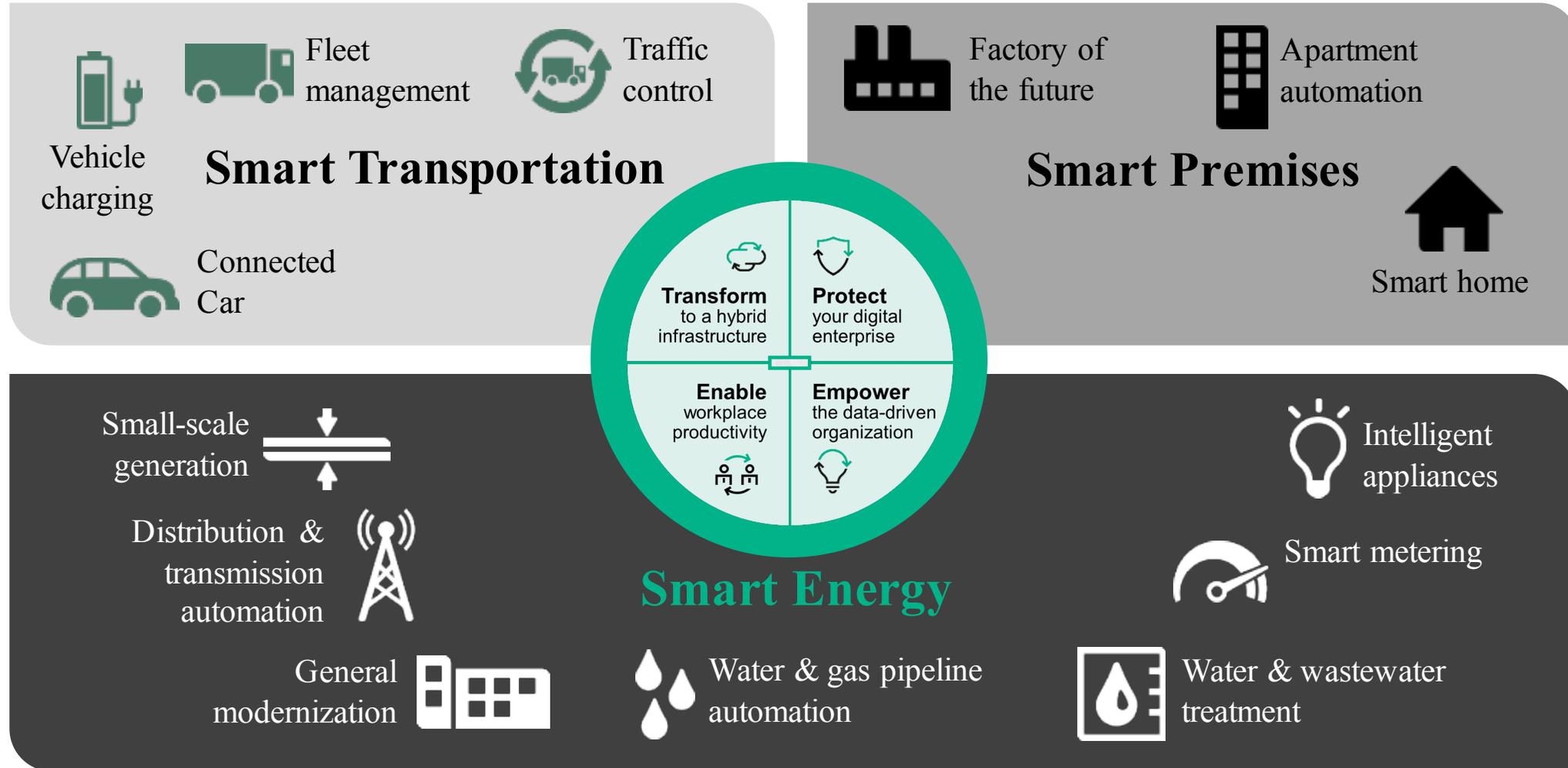
# The Industrial Internet of Things (IIoT)

- The IIoT can combine solutions and data types to enable transcending views that have never been possible before

- Data Types
  - Structured from row & column data bases
  - Semi-structured such as WITSML, PRODML, RESQML
  - Unstructured such as video analytics, email, analytics, audio analytics

- Edge Compute for remote locations

- Connection to Context Aware Wireless Networks

- Data driven insights accessible on mobile devices

- Levels of automation making Oil Fields much safer than they have ever been

- Operations made better through higher levels of intelligence made available to decision makers in Real Time

Hewlett Packard Enterprise
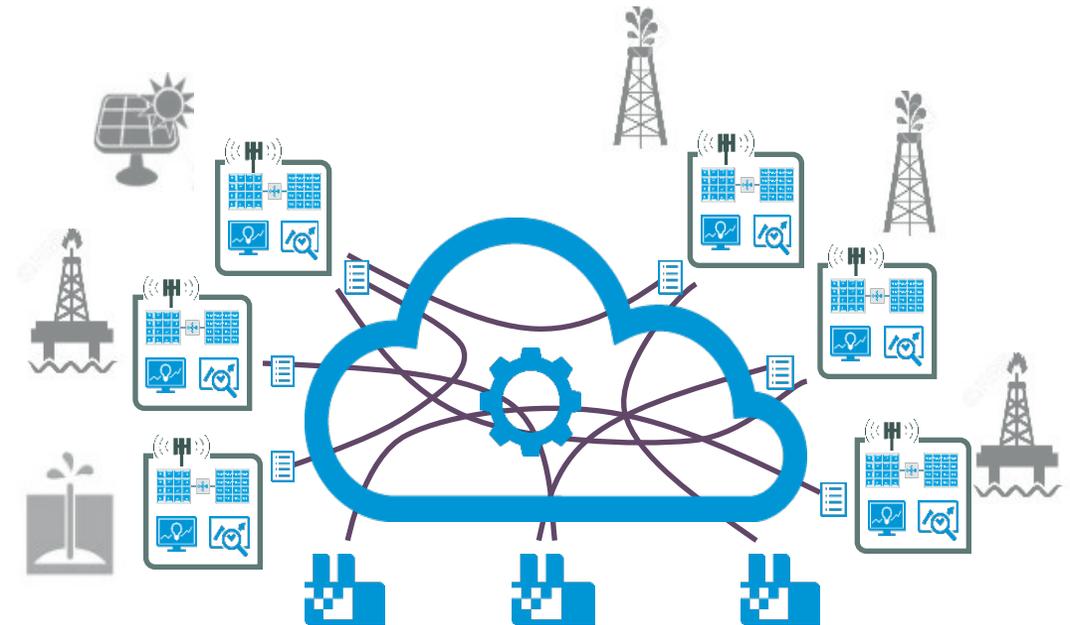
Project Scope

Scope

- Sensors and actuation
- Data acquisition & aggregation
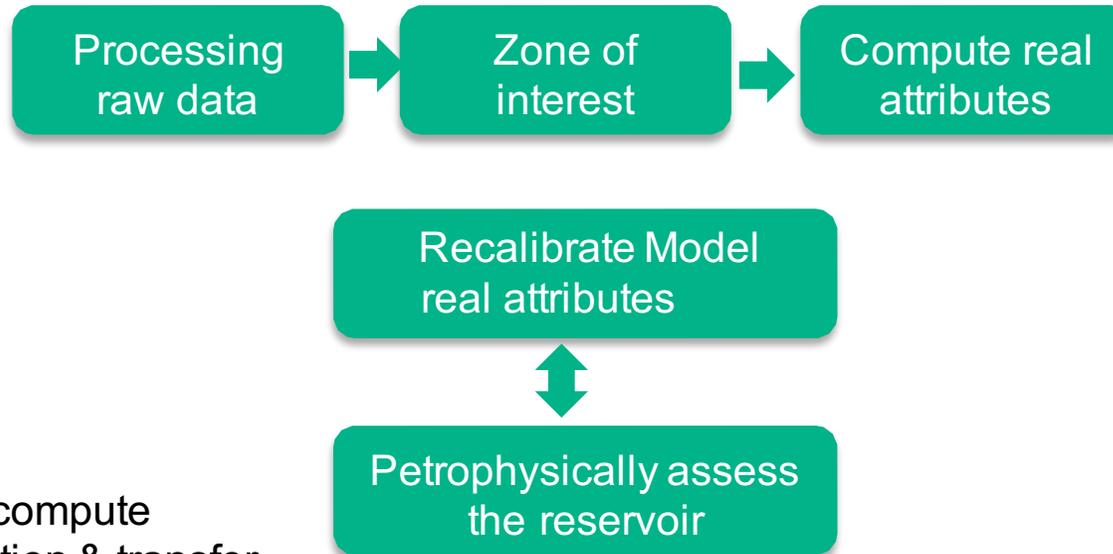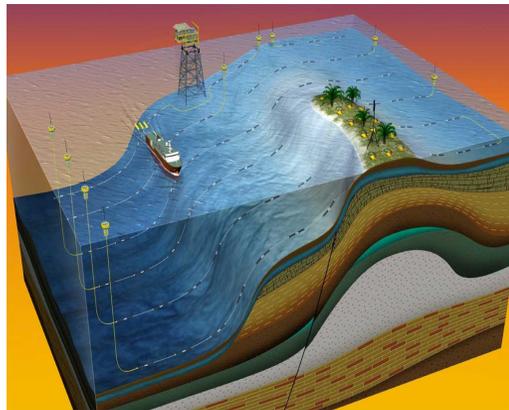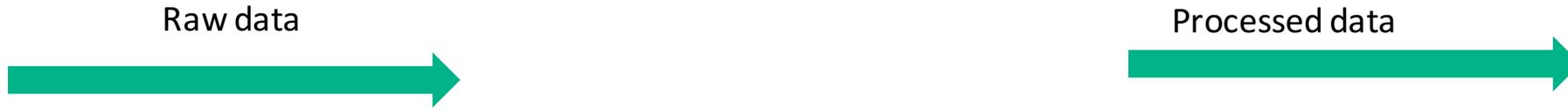- Early analytics compute
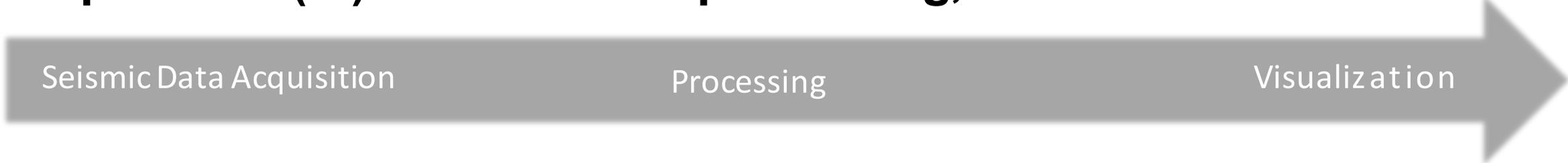- Collaboration
- Workflow processing
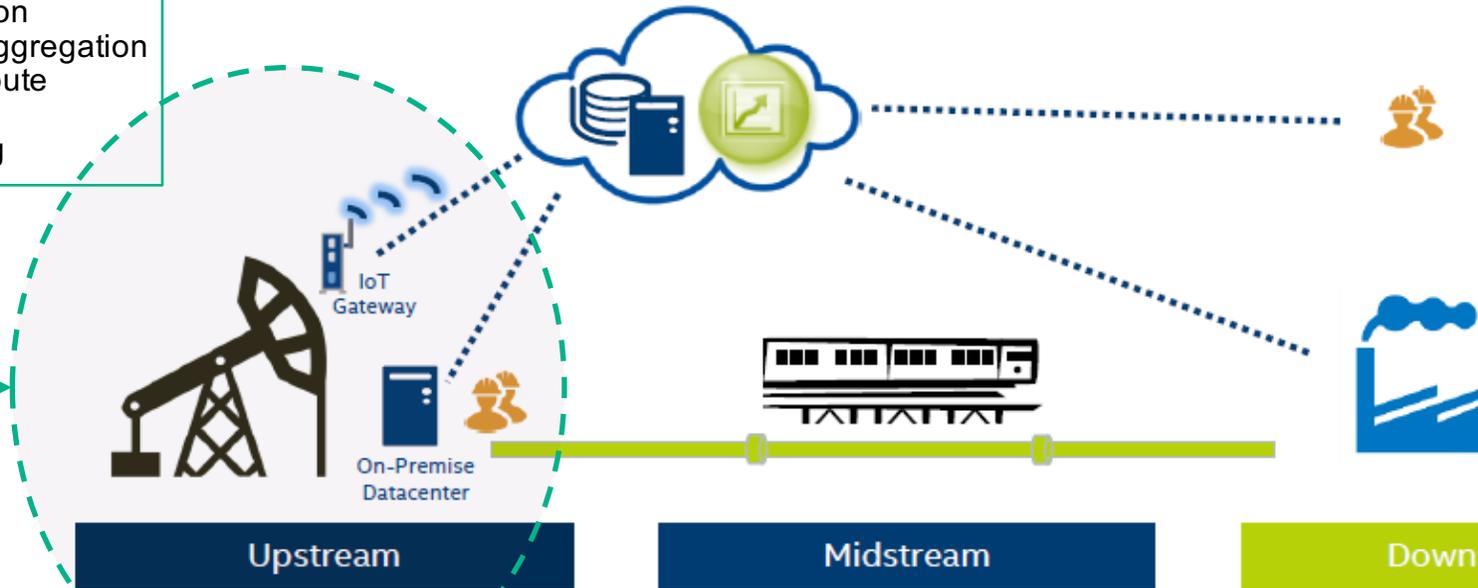
1. **Exploration :**
   a. Seismic data processing & visualization
   b. Reservoir Simulation
   c. Digital (exploration) rigs
2. **Drilling :**
   a. Unplanned events
   b. Drilling efficiency
   c. Rate of Penetration
   d. Rig States
   e. Kick Detection
3. **Production (TBD):**
   a. Reservoir Management
   b. Production Optimization/Digital Oil Field

IoT Gateway

On-Premise Datacenter

Upstream	Midstream	Downstream

Exploration & Drilling	Production	Transportation	Refining
• Local Big Data, Low Latency, High Volume, Real-time (RT) and Near Real Time (NRT) Analysis and Well Monitoring, simulation, control, optimization Problems	• Geo-Dispersed, **Fixed Location**, Low Data Rate, Telemetry based, RT / NRT Time **Well** monitoring, simulation, control, optimization problems	• Geo-Dispersed, **Moving**, Low Data Rate, Telemetry based, RT / NRT **Truck and Rail** monitoring, simulation, control, optimization problems	• Local embedded solutions, w\Varied Data Rates, Telemetry or Wired Backhaul options, RT / NRT monitoring, simulation, control, optimization problems

Hewlett Packard Enterprise

Exploration (NI): Seismic data processing, visualization & simulation

Seismic Data Acquisition   Processing   Visualization

Raw data   Processed data

Processing raw data	→	Zone of interest	→	Compute real attributes

Recalibrate Model real attributes

↕

Petrophysically assess the reservoir
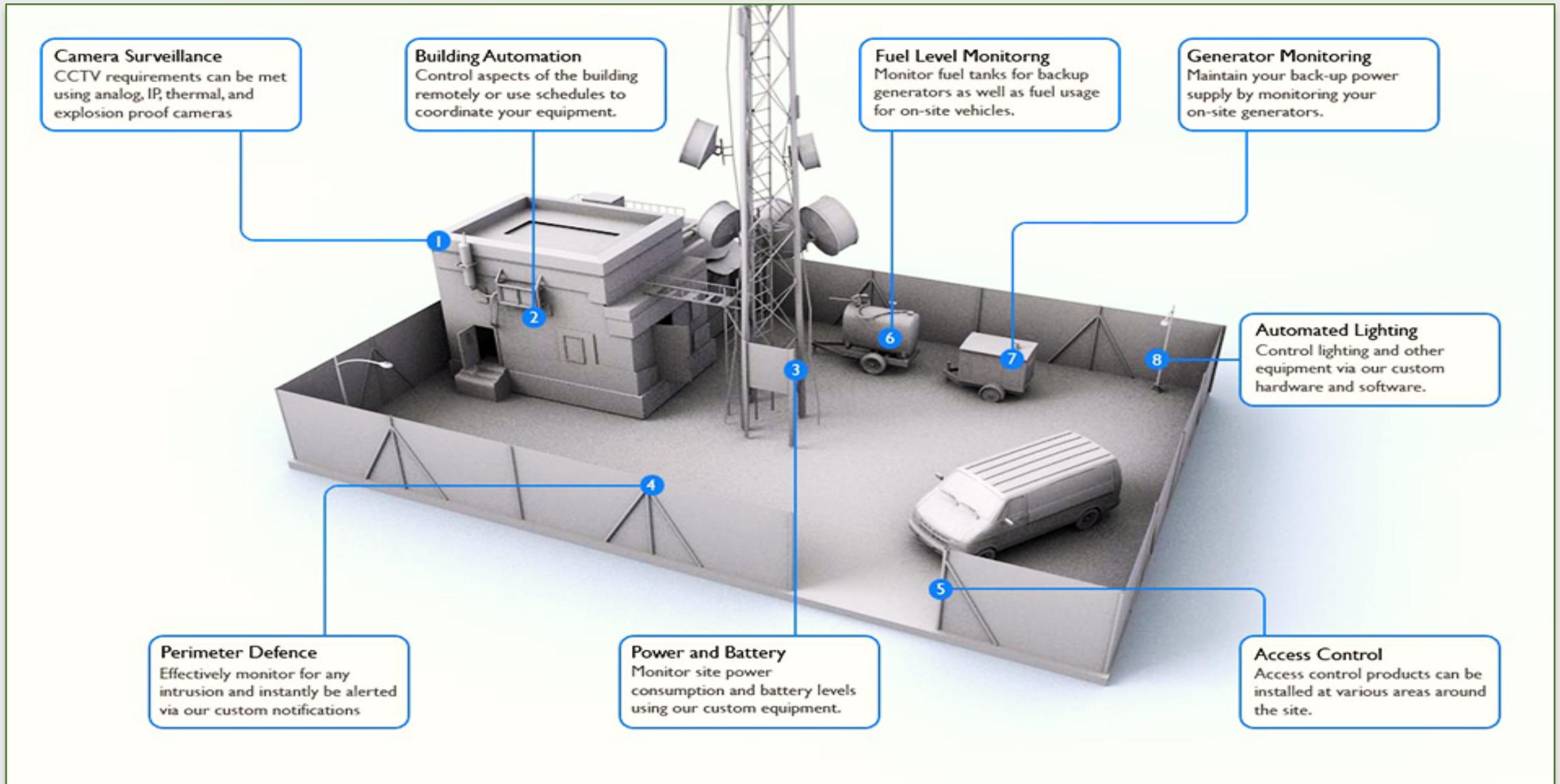

Central visualization rooms

Local Users

Remote Users

- Scalable, High Performance compute
- Large amount of data acquisition & transfer
- Security of highly sensitive data
- High availability and throughput

Hewlett Packard
Enterprise

18

Smart Towers

View of Smart Tower

Camera Surveillance
CCTV requirements can be met using analog, IP, thermal, and explosion proof cameras

Building Automation
Control aspects of the building remotely or use schedules to coordinate your equipment.

Fuel Level Monitorng
Monitor fuel tanks for backup generators as well as fuel usage for on-site vehicles.

Generator Monitoring
Maintain your back-up power supply by monitoring your on-site generators.

Automated Lighting
Control lighting and other equipment via our custom hardware and software.

Perimeter Defence
Effectively monitor for any intrusion and instantly be alerted via our custom notifications

Power and Battery
Monitor site power consumption and battery levels using our custom equipment.

Access Control
Access control products can be installed at various areas around the site.

Hewlett Packard
Enterprise

Turning Telecom Tower into a Smart Tower (Requirements)

Automotive – Connected Car

Hewlett Packard
Enterprise

The future of now

Advanced diagnostics

Vehicle-to-Everything (V2X)

Advanced telematics

Vehicle-to-Vehicle (V2V)

Sample Data
- Connected Car

(MWC – demo)

- Vehicle Type
- Primary/Secondary Fuel Type
- Primary/Secondary Fuel Volume
- ProfileID
- Transient Vehicle ID
- …

Vehicle State
- Timestamp
- Transmission Mode
- LightState
- Wiper State/Speed
- Driver Wheel Reference
- Chasis Clearance
- …

Exceptional Vehicle State
- Tire Slippage Event
- Crash Detection Event
- Emergency Braking Event
- Electronic Stability Control Event
- Anti Lock Braking Event
- …

Environment Status
- Light Condition
- Air Temperature
- Precipitation
- Visible Distance
- Road Surface Temperature
- …

Hewlett Packard Enterprise

Challenges

Hewlett Packard
Enterprise

Couple "current" Challenges

- At the edge, more study for several of the active use cases and respective prototypes is required
  - What are the risks of losing availability
    - Smart metering very different from smart car, from drilling, from monitoring security, etc.
  - Do we duplicate edge platforms, multiple network connections, define safe modes and respective behavior,
- Define the decision criteria for data processing at the Edge versus in the Cloud
  - Are there a concise set of conditions that can be defined that lend toward the decision of respective logic and processing

Hewlett Packard
Enterprise

Hewlett Packard Enterprise

Thank you