Agenda

• Welcome
• The Reality Discussion and Why this Initiative
• Guest Presenters
  • Jason Shephard – Dell
  • Kennedy Pereira – AT&T
  • Keith Steele - IOTech
• General Panel
• Wrap-up
How do I keep my stores relevant?

Pillars of the in-store experience:

- Immersive and Engaging
- Curated and Stocked
- Convenient and Frictionless
- Timely and Insightful Service
Modern Retailing

Retailers want to leverage technologies such as artificial intelligence to improve the experience with data.
Future Capabilities – *This Year*

- Personalization
- Wholesale
- Mobile POS – pop ups
- Drop Ship – endless aisle
- Advanced analytics
- Store traffic counting / pattern analysis
- Real time BOPUS
- In-store digital capabilities
- Space Planning
- Allocation & Replenishment – Next gen
- Advanced pricing and promotion tools
- Improved Forecasting - Advanced ship notices
Use Case 1: Computer Vision Based Vending

1. Gstreamer pipelines are spun up based on camera tags
2. IP cameras stream data to Gstreamer pipelines
3. Inference events are published to EdgeX Foundry™
4. EdgeX makes inference available for apps and export
5. Containers utilize accelerators when available
Basics of EdgeX Foundry™

- ~80 sponsoring companies & contributors from around the world
- Favorably licensed for integrations with proprietary software
- More than pub/sub: manage device configurations, caching, protocol adapters (southbound and northbound)
- We see it as a crucial element to bind diverse edge workloads
- Upgrading from IOT Gateway to edge integration platform

Internet of Things Group
*Other names and brands may be claimed as the property of others.*
Why EdgeX Foundry?

- Truly open, full transparency
- **Long-term durability** to address scale and growth needs
- **EdgeX Foundry momentum continues** for IoT interoperability across multiple industries
- **Linux Foundation mindshare and infrastructure** – largest and most pervasive open source software project
- **Marathon vs. Short Sprint** – learn, leverage and lead
Everyone in the Ecosystem is Valuable

- **Hardware**: Develop device services and pre-integrated offerings
- **OS**: Explore options for managed distribution
- **Application Provider**: Develop application services and cloud connectors
- **System Integrator**: Mapping applications and components
- **Retailer/Brand**: Business challenges, needs and requirements
How We Make An Impact

Commit to the initiative

• Join and follow the progress
• Promote to your networks

Collaborate on the Commerce Project

• Attend Commerce Project meetings
• Collaborate on project deliverables
• Promote to your networks

Contribute to EdgeX Foundry & LF Edge

• Become an EdgeX Foundry member and vote to shape standards
• On behalf of your company, contribute code and/or developer resources
• Promote to your networks

1. Code for the greater good
2. Use cases, components (and code)
3. Influence industry standards aligned to EdgeX

Reference Ready Kits (RRK) and Market Ready Solutions (MRS)
Next steps for the Commerce Project

1) Sign up for a free Linux Foundation account
   - Create an account at the Linux Foundation

2) Subscribe to the Commerce Project mailing list
   - Enroll for the mailing list and calendar subscriptions

3) Join the conversation

We’ll send a follow up email with instructions and links for the above actions
Enable Retail Optimization with EdgeX and ORI Collaboration

... and Scale to the Grail

Jason Shepherd
CTO, IoT and Edge, Dell Technologies
@defshepherd
Digital transformation requires an iterative model of development

Agile Development With Continuous Delivery
Improve Service & Experience

Speed

Data Analytics
Deliver New Insights

Deploy New Apps & Smart Devices
Drive Customer Engagement
It’s about outcomes.

Engine
Thruss

Thermostat
Comfort
It’s about a new mindset.
The new world is about floating all boats for scale and making sure yours is really good and really fast!
Leveraging EdgeX as baseline for data integration

*Coordinating through direct partnership and Open Retail Initiative*

Enterprise and cloud systems (e.g. POS, ERP, CRM)

Streams from OTS cameras

Supported smart cameras (events and control)

Additional sensors (e.g. RFID, BLE, LoRa)

Building automation, lighting and display systems
Dell Technologies Retail Edge Foundation

- Dell / Dell EMC Hardware
- Computer Vision Models
- OS / VMware Virtualization
- ML / DL Acceleration HW
- EdgeX Integration
- VMware SDDC and Pulse IoT Center
- Cloud-native IoT Workloads
- Traditional Workloads
- In-store Workloads
- Security

- Workload / Application Plane
- Infrastructure Plane
- Sensor Plane
- RFID

Choice of Cloud
Features and benefits

**Right-sized Infrastructure**
Modular and scalable compute, storage and networking; T-shirt sizing

**Workload Consolidation**
Traditional, virtualized and container-based

**Sensor Data Processing Ready**
Capable of processing multi-modal sensor data using open EdgeX framework

**Analytics Ready**
- Support for Traditional and Computer vision-based analytics

**Integration Ready**
Easy to integrate with IoT Frameworks, in-store, enterprise and cloud based systems

**Secured and Managed at Scale**
Remote management of store infrastructure, workloads and sensors and cameras from both on-prem and cloud consoles
IT’S MIDNIGHT…
DO YOU KNOW WHERE YOUR DATA IS?
THREE RULES FOR IOT SCALE

1. Decouple infrastructure from applications
2. Untether the edge from backend platforms, as close as possible to the point of data creation
3. Decouple domain knowledge from all underlying technology
Our open approach is the only path that will help customers achieve the ‘Holy Grail of Digital’:

Sharing and monetizing data, resources and services on your terms via total strangers.
NO SINGLE ENTITY CAN OWN THE TRUST
Achieving scalable, intrinsic trust to realize the Holy Grail spanning public and private entities

Key Requirements:
- AI for context awareness
- Distributed ledger
- Open APIs
- Trusted ZTP in the channel
- Silicon-based root of trust
AN OPEN EDGE IS REQUIRED TO SCALE TO THE GRAIL

Example implementation

Establish data ownership > Open data extraction > IPFS packaging > Blockchain data registration
Thank You!
Retail Store of the Future

AT&T Retail Industry Solutions

Kennedy Pereira, Director, Technical Sales
Engineering, Innovation & Strategy
June 25th, 2019
Technology powers the customer experience, increases revenues and guides our business transformation

- In-Depth insight into consumer behavior across the shopping journey
- Anonymized and aggregated by demographic sub-sets
- Opt-in consent
- Real-time decisioning
- Insights from moment of interest to in-store conversion
- Rinse & Repeat

AT&T Retail Stores

4 million people per month

5,300 stores
The 60 biggest themes driving growth in Tech, Media and Telecom in 2019

- 5G
- Connected Car
- Automated Home
- Drones
- Workflow Mgmt.
- Mobile Payments
- Online Banking
- Crypto-Currencies
- Wearable Tech
- Industrial Internet (IIoT)
- Ambient Commerce
- Smart Cities
- Robotics
- Robotic Process Automation
- SDN
- Data Centers
- Cloud
- Cyber Security
- Computer Vision
- Machine Learning
- Artificial Intelligence
- Conversational Platforms
- Autonomous Vehicles
- Blockchain
- Electric Vehicles
- Crowd Funding
- 3D Printing
- E-Commerce
- Internet TV (OTT)
- Big Data
- Artificial Intelligence
- AI Chips
- Quantum Computing
- MedTech
- China
- Electric Vehicles
- Batteries
- Open Source
- Digital Rights Mgmt.
- Internet Advertising
- Digital Media
- VR & AR
- Context Awareness
- M&A
- China
- Renewable Energy
- Sustainability
- Gaming
- Social Media
- Net Neutrality
- Data Privacy
- Weather
- Geopolitics
- India
- Brexit
- Patents
- Generation Hashtag
- Global Data: Tech, Media & Telecom Trends 2019
Key Initiatives for Retailers through 2020

5G
Connected Car
Automated Home
IoT
Robotic Process Automation
Mobile Payments
Online Banking
Crypto-Currencies
Telecom Convergence
Wearable Tech
Industrial Internet (IIoT)
Ambient Commerce
Smart Cities
Robotics
Workflow Mgmt.
Desktop Computing
Cloud
Cyber Security
Computer Vision
Conversational Platforms
Autonomous Vehicles
Blockchain
MedTech
Electric Vehicles
Crowd Funding
3D Printing
Data Centers
Cloud
Big Data
Artificial Intelligence
AI Chips
MedTech
Electric Vehicles
Blockchain
Crowd Funding
3D Printing
E-Commerce
Internet TV (OTT)
VR & AR
Context Awareness
AI Chips
MedTech
Electric Vehicles
Blockchain
Crowd Funding
3D Printing
Digital Rights Mgmt.
Internet Advertising
Digital Media
VR & AR
Context Awareness
AI Chips
MedTech
Electric Vehicles
Blockchain
Crowd Funding
3D Printing
Open Source
Sustainability
Batteries
Renewable Energy
China
Geopolitics
M&A
Brexit
India
Patents
Gaming
Social Media
Net Neutrality
Data Privacy
M&A
Brexit
India
Patents
Global Data: Tech, Media & Telecom Trends 2019
Retailer Challenges

Redefining Legacy business models

Executing Brand vision

Frictionless Customer Experience

Implementing at scale

Competitive Differentiation

Platform vs. Telco Model
The store 2019: **New expectations** create greater sophistication

As stores’ role evolves, retailers add functionality through technology and improved operations.

- Customer Wi-Fi to meet shopper expectations
- Beacons for proximity-based marketing and to track traffic flow
- Beacons for proximity-based marketing and to track traffic flow
- Order management systems to manage new fulfillment options and single view of inventory
- Mobile POS to ease checkout
- Kiosk ordering to add efficiency
- Contactless payment options to remove buyer friction
- Pick-up towers and lockers to increase efficiency
- Clienteling applications for cross-sell/upsell
- IoT to better manage inventory
The value of technology in retail: AT&T brings it all together

**Operational efficiency**
Orchestrated and responsive to real-time demands

**Customer 360**
Care & marketing. Deep visibility, actionable customer insights and execution

**Robotics**
Task automation, inventory automation, redirects associate productivity toward revenue generation

**Internet of Things**
Use of NFC, beacons, Wi-Fi, LTE technologies improve experience and automate operations

**Augmented & virtual reality**
Immerse the customer in “new” brand reality and add to customer experience

**Curated product management**
Product assortment, development and sourcing

**Responsive supply chain**
Real-time, one-click in stream of operation AND customer stream of life
Introducing EdgeX

Keith Steele
EdgeX TSC Chair and CEO IOTech
June 2019
IoT is moving to the Edge

Many IoT deployments face challenges related to latency, network bandwidth, reliability and security, which cannot be addressed in cloud-only models.

Source: OpenFoG Consortium
Why is IoT at the Edge hard to do?

- Heterogeneity of platforms
  - Diverse collection of OS and OS variants
    - Linux, Unix, Windows, VxWorks, embedded and RTOS, …
  - Various Hardware (Intel, AMD, ARM, …)
  - Cloud, gateway, smart thing (the “Fog continuum”)

- Thing protocol soup
  - Industrial: BACNet, Modbus, OPC-UA, …
  - Wireless: BLE, Z-Wave, Zigbee, …
  - Message: MQTT, AMQP, DDS, …

- Variety of cloud platforms
  - Azure IoT Hub, AWS IoT Platform, Google IoT Core, IBM Watson IoT Platform, …

- Add your favorite selection of…
  - Applications, edge analytics/intelligence, security, system management, …

- Difficulties in determining where to start
Introducing EdgeX Foundry

- The World’s first plug and play Ecosystem enabled Open platform for the IOT Edge

- EdgeX delivers a highly flexible software framework that facilitates interoperability between heterogeneous devices and applications at the IoT Edge, along with a consistent foundation for security and manageability regardless of use case.

- The open, vendor-neutral platform speeds time to market by providing replaceable reference services for device-data ingestion, normalization, analysis and sharing in support of new IoT data services and advanced edge computing applications.

- Developers, technology providers and end users can realize business-value faster at a lower cost and risk level through the skills, resource sharing and economies of scale of the EdgeX ecosystem, either for their own implementations of offering commercial “EdgeX-ready” offerings to others.

- EdgeX is unique in its scope, broad industry support, credibility, investment and vendor-neutral Apache 2.0 open source licensing model under the Linux Foundation. As such, EdgeX is a key enabler of digital transformation for IoT use cases and businesses in all vertical markets. An open source, vendor neutral project (and ecosystem)
EdgeX Foundry Goals

• To build and deploy the pervasive open source Edge platform for the Internet of Things that helps drive innovation, global market adoption, velocity and scale
• Build and promote EdgeX as the common open platform unifying edge computing
• Enable and encourage a rapidly growing global ecosystem of IoT solutions providers to create a rich set of interoperable plug-and-play components
• Certify EdgeX components to ensure interoperability and compatibility
• Provide tools to quickly create EdgeX-based IoT edge solutions
• Collaborate with relevant open source projects, standards groups, and industry alliances to ensure consistency and interoperability across the IoT
A Global Partner Ecosystem
“NORTHBOUND” INFRASTRUCTURE AND APPLICATIONS

LOOSELY-COUPLED MICROSERVICES FRAMEWORK

EXPORTING AND APPLICATION SERVICES
- ADDITIONAL SERVICES
- APPLICATION SERVICE

SUPPORTING SERVICES
- RULES ENGINE
- SCHEDULING
- ALERTS & NOTIFICATIONS
- LOGGING

CORE SERVICES
- CORE DATA
- COMMAND
- METADATA
- REGISTRY & CONFIG

DEVICE SERVICES (ANY COMBINATION OF STANDARD OR PROPRIETARY Protocols VIA SDK)
- REST
- OPC-UA
- MODBUS
- BACNET
- ZIGBEE
- BLE
- MQTT
- SNMP
- VIRTUAL

CONTAINER DEPLOYMENT

REMOTE/LOCAL GUI

“SOUTHBOUND” DEVICES, SENSORS AND ACTUATORS
RRK description

- Integrated retail-focused support
- IOTech Edge Xpert Platform
- Pixeom Cloud based application
- Intel OpenVINO framework
- Intel-based hardware
The key components of the solution include

• IOTech’s Edge Xpert Edge IoT platform that simplifies IoT device integration and enables local analytics and decision making

• Out-of-the-box support for a range of retail focused use-cases including people counting, line estimation and shift management, stock control and point of sales, HVAC and lighting control

• Latest high-performance Intel-based edge computing hardware

• Pixeom’s Cloud based application provisioning and orchestration which simplifies application life-cycle management in retail
Demo Overview

EdgeXpert IoT platform: Building Automation Analytics

Computer Vision Analytics

Occupancy Counting