IOTech and EdgeX

The EdgeX Adopter Series

January 19th, 2021
Today's Agenda

• Edge Market Trends
• IOTech Snapshot
• Leveraging EdgeX
• Our Products
• Edge Xpert
  • Architecture
  • Device & Cloud Connectivity
  • AI & Computer Vision
• The Time-Critical Edge
• Edge Management at Scale
• Customer Use Cases
• EdgeX Futures
• Q&A
Today’s Presenters

**Keith Steele | IOTech CEO**
- 30-year Global Middleware pioneer and entrepreneur
- Proven record of starting and growing successful software companies
- Champion of Open Standards in Distributed and Embedded Computing
- Founding Chairman, EdgeX Technical Steering Group, Marketing Outreach TSG Chair

**James Butcher | IOTech Product Manager**
- Responsible for Edge Xpert product strategy, roadmap and delivery
- Previously IOTech Solutions Architect helping customers with EdgeX
- Dedicated to usability and performance of IOTech products
- QA & Test Working Group Chair, EdgeX Foundry
Market Trends & IOTech Snapshot
State of the IoT Edge

• The leading verticals in Edge growth/investment
  • Industrial, energy & utilities, transportation and logistics lead the way, but some new areas are growing fast
  • Healthcare IoT - $534.3B by 2025
  • Smart City - $124B in 2020
  • Retail - $36B in 2020

• The Edge market trends – what we are seeing:
  • Customers want more ‘solutions’ than pieces/parts – Vendor collaboration
  • Proprietary versus flexibility to bring (or select) best of breed applications (analytics, cloud, visualization, …)
  • Increasing adoption of AI/ML at the Edge e.g., Video inferencing becoming a key application at the Edge across multiple verticals
  • Zero touch
    • “Plug it in and it works“ management
    • Automatic sensor / device provisioning
  • Hybrid Cloud/Edge - Acceleration from fully centralized cloud-based systems to distributed architectures driven by edge computing
IOTech: The Edge Software Company

• We accelerate ‘Time to Value’ for solutions at the IoT Edge
  • Shield our customers form complexity
  • Configuration versus coding
• Our Products: Edge Application Enabling Platforms & Tools supporting the rapid development, deployment and management at scale of software applications at the IoT Edge
• Open and vendor neutral: We enable best of breed user choice – cloud, silicon, hardware, application and minimize vendor lock-in
• Horizontal edge stack with ready-made vertical specializations
  • Retail, Utilities & Energy, Smart Venues, Manufacturing, Transportation
• Go-to market strategy through Global partner network
  • Our GTM Partners include: Dell Technologies, Microsoft, Intel, Accenture, HP, Schneider Electric, AWS and Google
Leveraging EdgeX
Leveraging Open Source & Ecosystems

- Over 180 EdgeX contributors
- >7 million container downloads
- ∼ 500K deployments
- ∼ 6K website users a month
- ∼ 30 global contributors per month
- > 150 commits per month

- Standard Open API’s
- Utilize broader development specialties
- Leverage larger ecosystem of companies
- Faster to GTM
- Save development costs
- Cross pollination with other OS projects
- Well tested
IOTech – A Major EdgeX Community Contributor

• A founding member of EdgeX
• We have led the EdgeX Foundry’s technical steering committee since its inception in 2017
• IOTech team members have made over 1100 commits and ½ million lines of code to EdgeX Foundry (2nd largest contributor)
• IOTech have played a key role implementing EdgeX Device Service SDK and overall Test and QA processes
• Outstanding innovation and contribution awards to Andy Foster and Cloud Tsai
• Major contributor to EdgeX marketing team, including leading the EdgeX website update
• Currently 4 TSC members from IOTech – Jim White, Keith Steele, Iain Anderson, James Butcher
• We know EdgeX!
Our Products...
Our Products...

- **Edge Management**
  - Any Cloud or IT Platform
  - Flexibility on cloud choice
  - Support for all major clouds
  - Edge-Only Options

- **Edge Applications**
  - Any Cloud or On-Premise
  - Management at Scale
  - Device Management
  - Application Management

- **Time-Critical Edge Applications**
  - Any Platform and OS
  - Sensor Data Fusion
  - Local AI/ML and Analytics
  - Cloud and IT integration

- **Universal Real-Time Device Connectivity**
  - Any Platform and OS/RTOS
  - High-frequency Processing
  - Ultra-low Footprint
  - Hard Real-time Execution

- **Any Device or Sensor**
  - Thing Connectivity
  - Multiple Protocol Support
  - Filtering and Transformations

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Edge Xpert
Commercial Implementation of EdgeX Foundry
Southbound Device Connectivity and Tooling

Intelligent Device Connectivity for the IoT Edge

• Based on EdgeX Device Services but enhanced, productized and ruggedized for industrial use
  • Performance enhancements
  • Robust and deployment-ready
  • Many not available in community
• Advanced online tooling to create device profiles
  • Intuitive wizards that greatly simplify creating & editing profiles
• Free use for EdgeX users: https://dct.iotechsys.com
• Creation of open-source library of EdgeX device profiles

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Cloud Connectivity

Easily integrate and share edge data to your choice of northbound Cloud & IT systems

- Based on EdgeX Application Services
- Enhanced for out-of-the-box use with extra App Service SDK functions
- Built-in support for authenticated streaming to the main cloud vendors, requiring just simple configuration:
  - AWS IoT Core
  - Microsoft Azure IoT Hub
  - Google Cloud IoT Core
  - IBM Watson IoT Platform
- Built-in support for MQTT, REST and Kafka, again requiring just simple configuration for use
- Filtering, Batching, Store and Forward, Security, etc
Computer Vision Capability

Major trend in customers deploying computer vision, AI and ML at the edge

- Camera Connectivity and Control: ONVIF
- Stream Management: GStreamer
- Vision Inference: OpenVINO
  - Inference results flow into Edge Xpert
  - Other engines to follow, e.g. TensorFlow
- Strong Partner Network
  - Intel, Hark (retail domain) and others
- Edge Data Fusion
  - Matching inference results with sensor data
- Edge Management
  - IOTech Edge Builder Product
Why Edge Xpert?

Edge Xpert Provides:

- Key value-add IP not available in the open source EdgeX Foundry
- Full commercial grade support for trusted deployment in business critical applications

Business Benefits:

- Simplified Development Processes
- Faster Time To Market
- Reduced Risk
- Reduced Total Cost of Ownership
The Time-Critical Edge
Introducing Edge XRT

The first edge software platform designed specifically for the Time-Critical and Resource-constrained edge

- Complementary to Edge Xpert and EdgeX systems
- Implemented in C, single address space architecture
- Pluggable, dynamic, user defined data processing

- Footprint < 100 KBs
- Latency < 100 µSec
- Real-time predictability
- Legacy portability
Edge Management at Scale
Introducing Edge Builder

- Designed by Edge Specialists
- Driven by Customer Requirements
- Independent of Edge Solution deployed
- Architected to support Cloud and On Prem
- Multi-Cloud Support
- Containerized & Non-Containerized Deployment
- Leverages Open Source
  - Leverages Open Source for faster GTM and Openness

- Manages any Applications
  - Deployment & orchestration
  - Lifecycle management - start, stop & restart
  - Application monitoring
  - Data monitoring
  - Device/Sensor provisioning

- Manages the Node
  - Device onboarding
  - Install/update OS, firmware, infrastructure, certs install & update
  - Node monitoring

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Edge Builder Road Map

- Node provisioning
- View node status
- Group actions (deploy to all nodes)
- View deployed applications

Initial node metrics collection (CPU/mem/...)
- Metrics display
- Deploy/remove containerized application
- Deploy IOTech Edge Xpert/XRT

Initial scale (100's nodes)
- Enhanced node metrics
- Improved application templating
- Deploy 3rd party containers

Configuration management
- Integration with Intel's Edge Software Provisioner
- Node updates
- Improve scale (>1K nodes)

Multi Tenancy
- Consolidated UI
- Deploy non-containerized application
- Improved scale (>10K nodes)

Integration with Intel's SDO
- Integration with Intel's DXO technology
- Orchestration options (e.g. Swarm → K3s)

V1 End Q1 2021
V2 End Q3 2021
V3 Q1 2022

Edge Builder Webinar Link:
https://www.iotechsys.com/contact/updates/events/i/iotech-webcast-series-edge-management-at-scale/
Customer Use Cases
Partner Solutions in Retail - HP

HP Engage Edge
Accelerate your Retail Solutions

Ready-to-deploy
• Edge Gateway HW/SW Bundle (Intel certified RRK - "RFP-Ready-Kit")
• Designed for extensive IOT use cases in Retail/Hospitality
• World-class compute hardware choices – Intel 4th-8th generation
• Backed by HP’s world class warranties/services

Powerful, Compact yet ruggedized design
• For everyday retail environments
• Powered by Intel 8th Gen Core-i7 processor (& choices)
• Extensive on-board ports / connectivity options

Ships with pre-loaded Edge Gateway Software
• Powered by HP ThinPro OS
• Linux Foundation EdgeX open framework
• Commercial Grade Support (SLAs)
• Extensive IoT Connectivity options
• Extend your use case recipes post-initial deployment

* schedules being worked
Remote monitoring of gas turbines across the distribution network

- The operator of one of the largest natural gas distribution networks needs to reliably and remotely monitor their systems with Edge IoT Technology

**Business Challenge:**
- Ensure gas is available 24/7 so its flow around the pipelines must be accurately monitored and controlled
- The large compression tanks are driven and controlled by powerful turbines provided by different vendors

**Why Edge Xpert was selected:**
- Capability to monitor data from turbines provided by different vendors using different protocols
- Cloud-agnostic and on-premise solution
- Agile approach needed so flexible microservice architecture required
- Open source basis key, but with SLA guarantees
Accenture & IOTech with AIP+

Accenture incorporates Edge Xpert in the AIP+ Edge Agent

- Accenture to benefit from a commercially supported EdgeX framework and IOTech’s library of Device Protocol Implementations
- Edge Xpert integrated with Accenture’s Edge IP
- Hear why Accenture chose EdgeX and IOTech [https://youtu.be/3k6RaB5s93Ug](https://youtu.be/3k6RaB5s93Ug)

"IOTech's solutions and deep device expertise will strengthen Accenture’s own edge software and further help AIP+ to deliver new customer outcomes by combining edge processing with a wide range of device data sources"

Peter Utzschneider, Managing Director, Accenture Platforms Product Management
Partner Solutions in Transportation - Ship Borne Monitoring

- Large European shipbuilding company
- Edge Xpert positioned as the Data Acquisition System (DAS) in the ship
- Pilot project with potential roll out to many ships
- Southbound: Modbus, OPC-UA, GPS, BACnet
- Northbound: Kafka – store and forward, failover solutions
Partner Solutions in Hybrid Cloud – AWS and Google

- The cloud vendors represent major opportunities to IoTech
- No cloud vendors have complete IoT ‘Thing’ connectivity - none have a ‘Time Critical’ story, some have no edge products
- We are seeking to leverage AWS and Google partnerships, early days with Google but good progress with AWS...

**Edge Gateway or Server**

**AWS – In The Cloud**

**Hot data path**
- AWS IoT Core
- Amazon Timestream
- Near Real-time

**Cold data path**
- AWS IoT Analytics
- Historical Processing
- AWS QuickSite
- Historical Dashboarding

**Edge Device Data**

**AWS Kinesis Firehose**
- Buffering

**AWS S3 Buckets**
- Storage

**AWS SageMaker**
- ML
AWS Leveraging Edge Xpert - Demo
EdgeX Futures
EdgeX Futures

Our thoughts on futures....

Features we believe are key from the EdgeX community going forward:

• Completion of the EdgeX V2 APIs in the Ireland release
• Completion of the messaging architecture within EdgeX
  • Device Service to Application Service message bus
  • This is key for more dynamic data flow and bi-direction Cloud comms
• Migration tools supporting V1.x to V2.x user upgrades
  • For example: device profiles and meta data
• EdgeX LTS (Jakarta release)? To help our own LTS and customer support plans
• Continued gathering of performance metrics
  • Especially scalability measurements (and improvements)
• Consideration of deployment concerns
  • Edge Xpert to be deployed on 1000s of nodes; advanced configuration can help
Summary

- IOTech has helped grow EdgeX to be the dominant Global Open Edge Platform
- We will continue to contribute, innovate and provide leadership in the EdgeX Foundry and LF Edge ecosystem
- Exciting new developments coming in 2021
  - Edge Xpert Video inferencing support
  - Major enhancements to our cloud connectivity (Bi-directional data flow)
  - Significant investment in usability
  - At the end of Q1 we will launch Edge Builder – Edge management at scale
  - We will soon launch our own on-line store
  - Major customer win announcements soon with XRT!!
- We’re looking forward to working with you all in 2021 (hopefully face to face!!!)
Q&A

Thank You

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