Speed with Security

Joe Speed
CTO IoT
@JoeSpeeds
made MQTT open
put IoT into cars 🚗
lunched IBM IoT 🎈
people + things 🤔
COULD WE?
YES WE CAN!
co-creation with IoT
connecting all the things!
Who is ADLINK?

• 1,900 people making cool stuff & IoT software
• all about rugged, industrial edge compute
• connect the unconnected for 20 years
  ... “Aye-Dee-Link” as in “Analog to Digital Link”
• never heard of us ... unless you make robots, trains, factories ... or military planes & tanks
• growing fast, $340M last year
• We’re awesome! Love to work with you
Connecting the Unconnected
The Foundation for the Connected Enterprise

Vibration
Acoustic
Force
Distortion
Temperature
Power
Pressure
Flow
Insulation Degradation
Structure Dislocation

Partial Discharge Sensor
Pressure Sensor
Acoustic Emission
Flow Meter
Current Transducer
RTD/TC

Accelerometer
Microphone
Load-cell
Strain Gauge

Human Machine Interface
Historian
Protocols
# ADLINK IoT

## Comprehensive Solutions for edge IoT

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<td>Monitor, Manage, Analyze</td>
<td>Data to the right place</td>
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<td><strong>Building blocks for rich data capture</strong></td>
<td><strong>Peer to Peer intelligent devices</strong></td>
<td><strong>Vendor-agnostic cloud connectivity</strong></td>
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- **Solutions**:
  - **Connect the Unconnected**: People, Places & Things
  - **Intelligence at the Edge**: Monitor, Manage, Analyze
  - **Connect the Clouds**: Data to the right place

- **Solutions Provided**:
  - Building blocks for rich data capture
  - Peer to Peer intelligent devices
  - Vendor-agnostic cloud connectivity

- **Technology Partners**:
  - Modbus
  - kepware
  - BACnet
  - OSIsoft
  - VMware Pulse
  - ioTrust
  - IBM Bluemix
  - Amazon Web Services
  - Microsoft Azure

- **Platforms**:
  - BACnet
  - Modbus
  - OSIsoft
  - VMware
  - ioTrust
  - IBM
  - Amazon
  - Microsoft

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*Image Source: ADLINK IoT*
hand-eye coordination for robots

camera is edge compute and IoT gateway

install on your robot and train in 1 hour
The challenges to IoT adoption

What are the chief obstacles currently to your organisation using the IoT?
Select up to two.
(% respondents)

- High costs of required investment in IoT infrastructure: 29%
- Concerns about security and privacy: 26%
- Lack of senior management knowledge/commitment: 23%
- Weaknesses in your organisation’s technology infrastructure: 16%
- Regulation (eg, relating to data privacy): 12%
- Weaknesses in public communications infrastructure available to your organisation: 12%
- Immaturity of industry standards: 10%

IoT – Challenging for All
Driven by the ADLINK Vortex Data River™

• Connect Once - Stream Anywhere
• Enterprise Resiliency and Security for IoT
• Analytics Where It’s Needed
• On-ramp to Monetize your IoT Data Services
How the Vortex Data River™ works
Helping IT and Operational Technology Converge

1. Data producer registers as a thing with the river. Including its metadata, state and telemetry data. This also includes some rules as to who can view the different pieces of data.

2. Data producer updates state and produces telemetry data.

2'. Data producer receives updates to its expected state that it must execute.

3. Data consumer looks up the data available.

4. Data consumer subscribes to state changes and/or telemetry data for the thing.

4'. Data consumer begins to receive data.

5. Configure what IT data can be shared with the OT River.

5'. Configure whether OT can write to IT River.

Configure which Things can be securely shared outside of the River. And for each Thing or Thing type which pieces of data.

Also configure whether desired state can be configured outside the river.

Configure whether IT can write to the OT River.
Digital Experiments Get You Started Fast

“Connect the Unconnected, Stream it the Cloud”
Use Case – Gas Turbine Analysis

• Gas Turbine Data Analysis
  – Challenge – Making data from OSIsoft PI System part of a connected IoT data value chain
  – Solution – Vortex Edge PI Connect as part of a Vortex Data River enabled IoT solution
  – Benefits:
    • Stream your historian data to any data center, cloud based AI and cognitive services
    • Historian data can be published to one or multiple clouds concurrently
    • Enables you to switch cloud or analytics providers more easily
    • Publish cloud based analytics back to your historian to maintain a single vision of the truth
    • Share OT information with your business partners securely
Digital Experiments in Our Own Factories

• Pain point: air compressor is noisy so was locked away in a small chamber with no one around, BUT if compressor stops then whole factory shuts downs
• Solution: real-time condition monitoring to ensure 7 x 24 service
  – Already discovered compressor parts damage twice last year per ISO 10816-8:2014 without involving compressor manufacturer
  – Non stop service is more reliable then regular check
IoT is an ecosystem ... so is security

• One that we work with is Entrust Datacard
• Worked with Entrust Datacard for years in B2B, web APIs, et al.
• Securing IoT devices, containers, microservices
• Authenticating producers & consumers
Securing the Flow: endpoint agent

- Managed and secured Identity for Authentication to Data River
- Data Security for MQTTs, TLS 1.2, Payload encryption
- Secure enrollment with service discovery

- Unique for attestation and provisioning
- Cryptographic identity to ensure binding to the customer entity
Securing the Flow: Edge gateway

- Secured connectivity brokerage between thing network and data flow
- Local enforcement point for security policies and entitlement

**Vortex Data River**

- Service/app developer registers their offering including how much they are charging for others to consume/use it
- Service user signs up to an app/service which creates a smart contract between the provider and user
- Data producer can view subscribers to their data and receive payment
- User subscribes to state changes and/or telemetry data for the thing

**Apps/Services**

- Providers can view users of their service and receive payment
Securing the Flow: service gateway

- Identity Issuance, Enrollment, and Provisioning services
- Identity Life-cycle services
- Data aggregation and routing

Provider registers their data stream including how much they are charging for others to consume/use the data.

Service/app developer registers their offering including how much they are charging for others to consume/use it.

Service user signs up to an app/service which creates a smart contract between the provider and user.

Consumer looks up the data available and the price being charged for the data.

Producer can view subscribers to their data and receive payment.

Consumer subscribes to state changes and/or telemetry data for the thing.

Providers can view users of their service and receive payment.

Apps/Services

External application Authentication and Code Signing

Entitlement enforcement and distribution from ADLink to its customers.
Service Gateway Security Appliance

Issuance backed by TPM / HSM enables devices to be secure at production, applications to be signed, licenses to be enforced.

Locally managed identities reduce network dependencies.

acts as “Head End” to local secure systems.

Sensor Networks
Unified Identity Strategy

ioTrust provides unified Identity Management regardless of your MDM or Analytics

Device Production

Managed credential provides unique provisioning id and attestation services for device
Editorial: a few words re Sensors & Actuators

• Sensors
  – open data, rethink how you approach, collaborate with universities
  – Authenticate producers, but be permissive w consumers
  – Strive to make as open as possible! Think about what can be made open data
  – Be open, be fast! Enable the masses to work on your problems
  – Open on prem, Open via cloud

• Actuators
  – Lock it down, be restrictive
  – Actuators is how equipment gets broken, people get hurt, vehicles are crashed
Join ... today!
why ROS2?

- speed & security
- teams of robots
- small embedded
- real-time
- non-ideal networks
- production use

[Links]
design.ros2.org
github.com/ros2
github.com/Adlink-ROS
#tech4good

if you can ... then you must
transportation for elderly and disabled is broken
MIT Technology Review

Business Impact

A Self-Driving Bus That Can Speak Sign Language
@MIT guide the blind to empty seat

Team Erich hits a home run at MIT AT hack w/Bluetooth app that helps the visually impaired navigate public transportation. #AccessibleOlli

MIT A.T. Hack: Find a seat on the bus! Assistive technology makes public transportation easier to navigate #AccessibleOlli
@Princeton “Don’t forget your …”

Outstanding creativity-solving physical & cognitive challenges for public transport. #accessibleolli, #HackPrinceton

Congrats team Olli Recalli!! Winners of the #accessibleolli #HackPrinceton challenge!! #watsonIoT @IBMAccess #cognitive
#AccessibleOlli join the movement

https://youtu.be/vguPTyT1R08