IoT Large Scale Operations Use of AI & Analytics
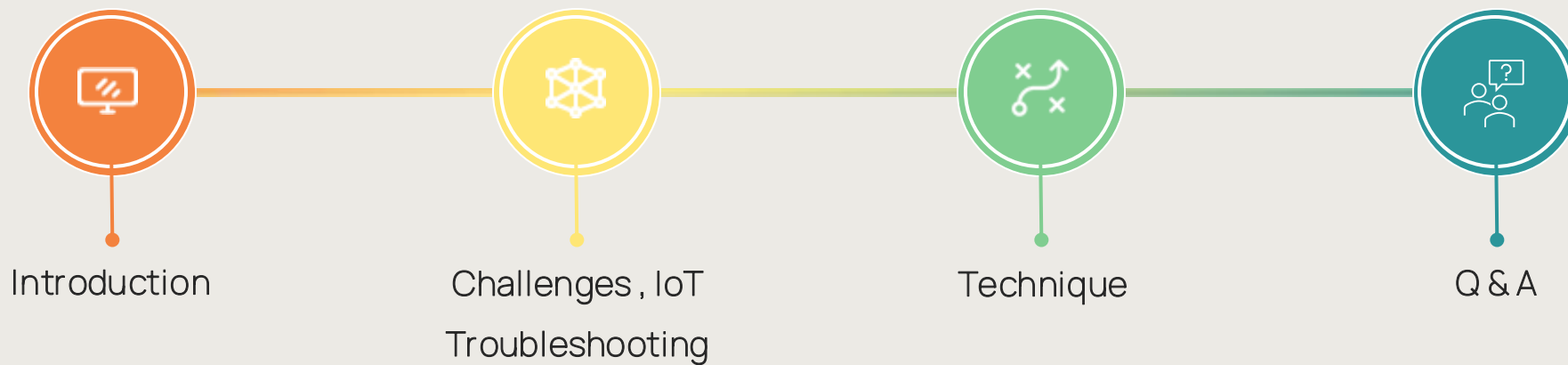
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Broadband Forum, Fall Summit – November 18, 2024

Colin Grealish, Product Director @ Motive

Agenda

Introduction

Challenges , IoT
Troubleshooting

Technique

Q & A

Motive is the industry leader in device and service management

Our Mission: To remove the cost and complexity of managing today's digital services

We serve more than 150 CSP customers around the globe enabling seamless device management, mobile entitlement, and IoT services.

1997 - Motive, founded

1998 - Acquired by Alcatel-Lucent

2016 - Acquired by Nokia

2024 - Spun out of Nokia

>1.8B
DEVICES UNDER MANAGEMENT

>120K
DEVICE MODELS RECOGNIZED

>1M
CUSTOMER SERVICE
REPRESENTATIVE USERS

>10M
SELF-SERVICE SESSIONS
ENABLED PER MONTH

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Sample of our global customers

With decades of experience spanning the largest and most successful service operators, Motive is the proven leader in device and service management solutions. We manage over 1 billion devices across 150+ global deployments in Fixed, Mobile, and IoT networks.
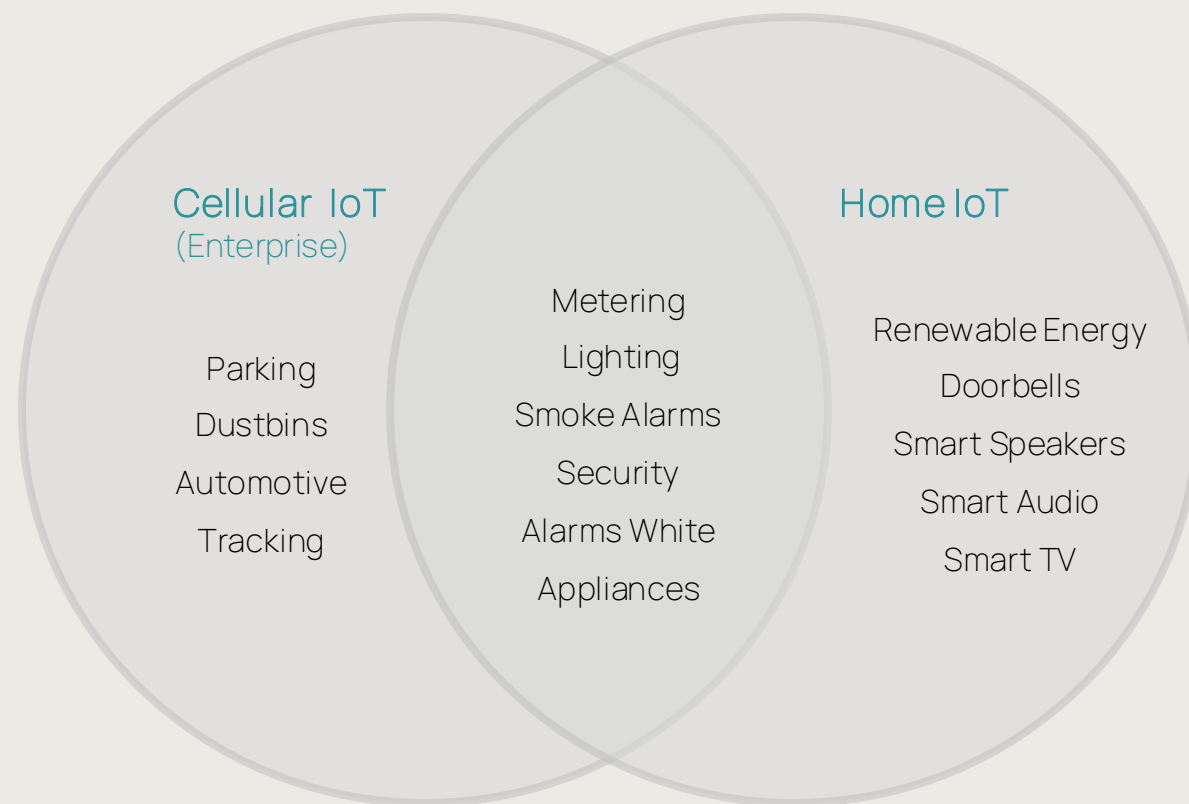
IoT: Cellular vs Home

How Motive are deploying IoT
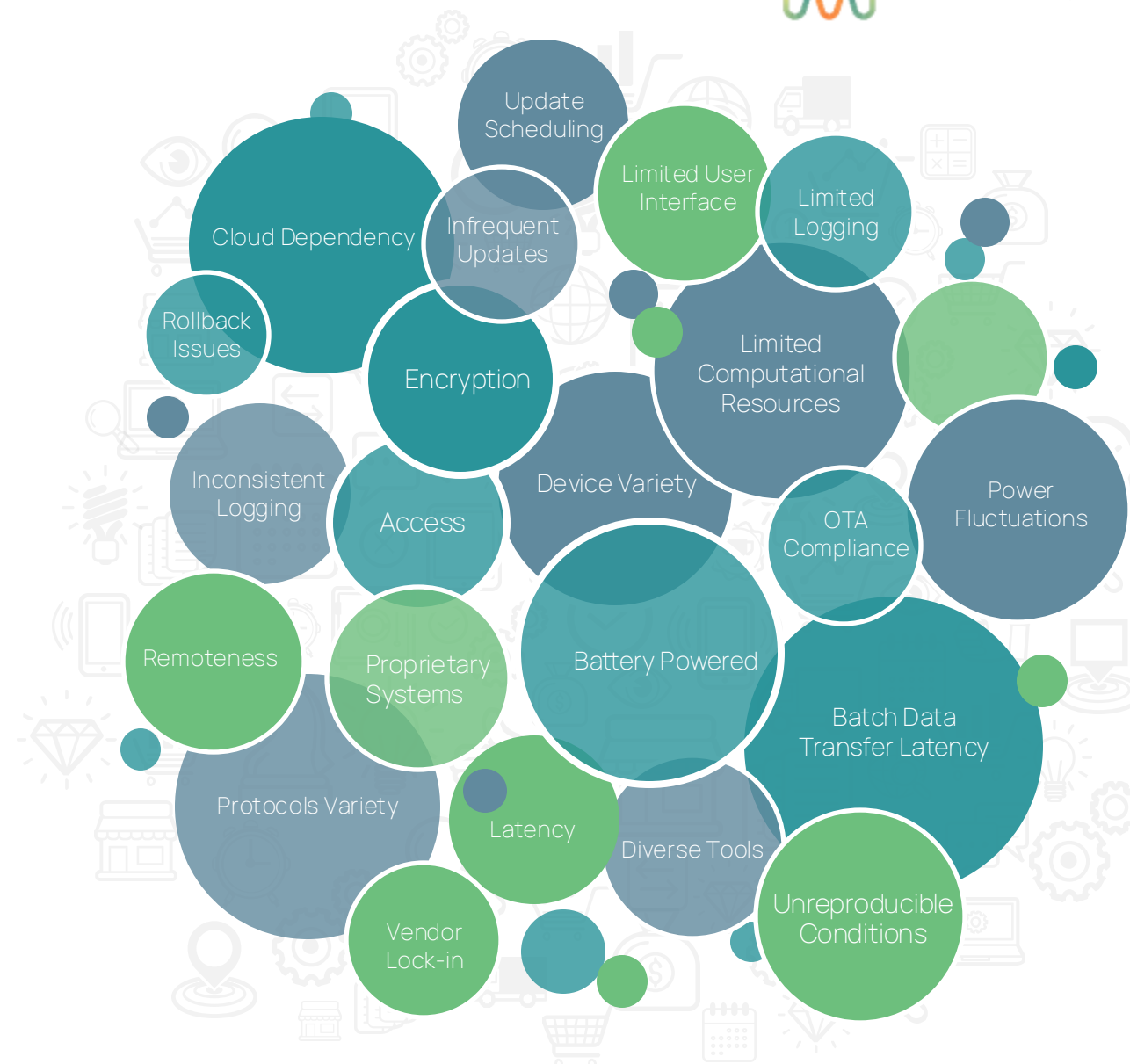
Lessons learned

- Service lives can be long and have high availability expectation

- Use cases + service expectations applicable to both domains

- Device characteristics are similar + constrained with limited UI

Cellular IoT
(Enterprise)

Parking

Dustbins

Automotive

Tracking

Metering

Lighting

Smoke Alarms

Security

Alarms White

Appliances

Home IoT

Renewable Energy

Doorbells

Smart Speakers

Smart Audio

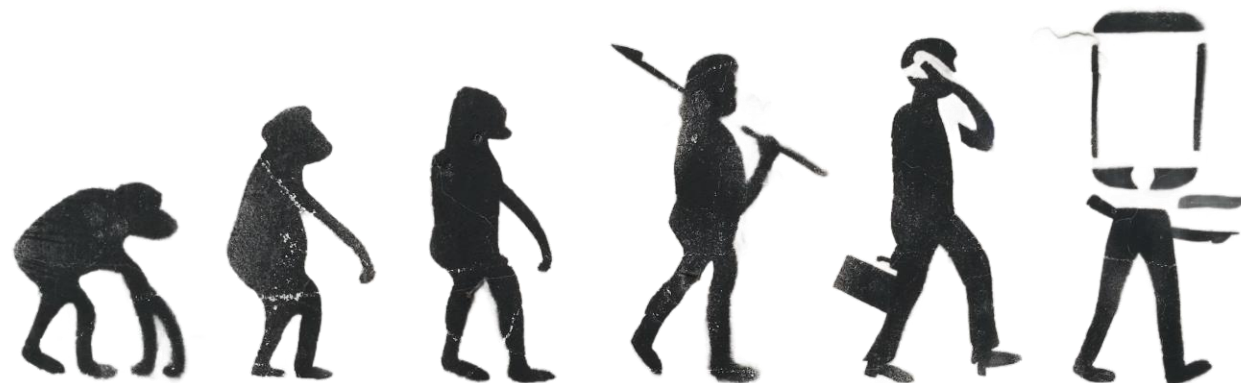Smart TV

Challenges for IoT Operations

Devices that don't have owners tend to be remote

Troubleshooting IoT (Internet of Things) devices can be particularly challenging due to several unique factors associated with their nature, architecture, and operational environment.

Update Scheduling

Cloud Dependency

Infrequent Updates

Limited User Interface

Limited Logging

Rollback Issues

Encryption

Limited Computational Resources

Power Fluctuations

Inconsistent Logging

Device Variety

Access

OTA Compliance

Remoteness

Proprietary Systems

Battery Powered

Batch Data Transfer Latency

Protocols Variety

Latency

Diverse Tools

Vendor Lock-in

Unreproducible Conditions

Evolution of IoT Troubleshooting Technique

It's a complex evolution

More automated and faster

Options are increasing inline with complexity of deployments

Traditional

Device Monitoring , Network Diagnostics, Firmware – Verify, Rollback, OTA, Reboot, Reset, Debug tools, Debug Mode, Remote Access e.g. SSH, Control Environment, Battery Check, Configuration Check, Test Interoperability, Security Configuration, Cross-Layer Troubleshooting, Application, Transport, Hardware, User and Configuration Errors, Recheck Installation Process, User Error Diagnosis, Consult Manufacturer Documentation and Support, Check Official Documentation, Contact Technical Support

Analytics

Monitor Real-Time Monitoring and Alerts, Predictive Maintenance, Historical Data Analysis, Correlating Multi-Device Data, Root Cause Analysis (RCA), Automated Troubleshooting and Self-Healing, Network Traffic Analysis, Device Performance Analytics, Security Incident Detection, Data Quality and Integrity Monitoring, Capacity Planning and Scalability, Environmental Monitoring, Dashboarding and Visualization, Failure Mode Analytics

Artificial Intelligence and Machine Learning

Predictive Maintenance and Failure Prediction, Anomaly Detection and Early Warning System, Automated Root Cause Analysis (RCA), Automated Troubleshooting and Self Healing Systems, Machine Learning-Based Diagnostics, Intelligent Data Filtering and Noise Reduction, Natural Language Processing, Adaptive Learning and Continuous Improvement, Network Traffic and Performance Optimization, IoT Security Monitoring and Threat Detection, Digital Twin Technology for Simulated Troubleshooting, Context-Aware Troubleshooting, AI-Based Dashboards and Visualization

More automated and faster

Leverage Multiple Data Streams to reduce time to fix

Utilize Network Exposure for Troubleshooting

Problem
- Error can occur across: Network Device, Device Manager, Application
- Cost to Network Provider for resolution

Network Exposure
- Provides info on device from mobile network perspective
- 5G NEF – Network Exposure Function
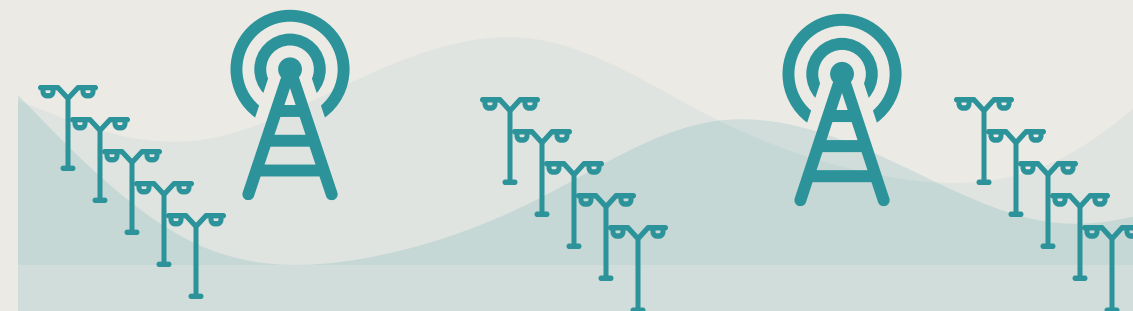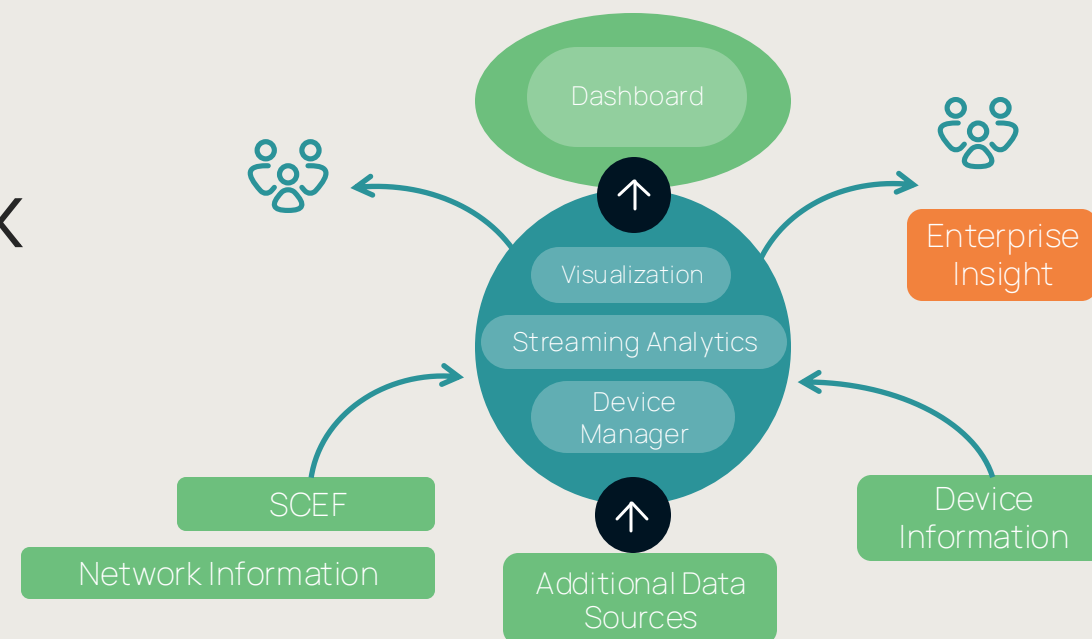- 4G SCEF – Service Capability Exposure Function

Solution
- Utilize streaming analytics
- Stream issues from device & network, stream other data sources as location
- Identify insights & issues. Cluster issues with network problems

Benefit
- Save time and cost by identifying issues quickly

Dashboard
Visualization
Streaming Analytics
Device Manager
Enterprise Insight
SCEF
Network Information
Device Information
Additional Data Sources

Assess Status of IoT Service Instantly

View outstanding issues clustered by Cell, EnodeB and geographical location

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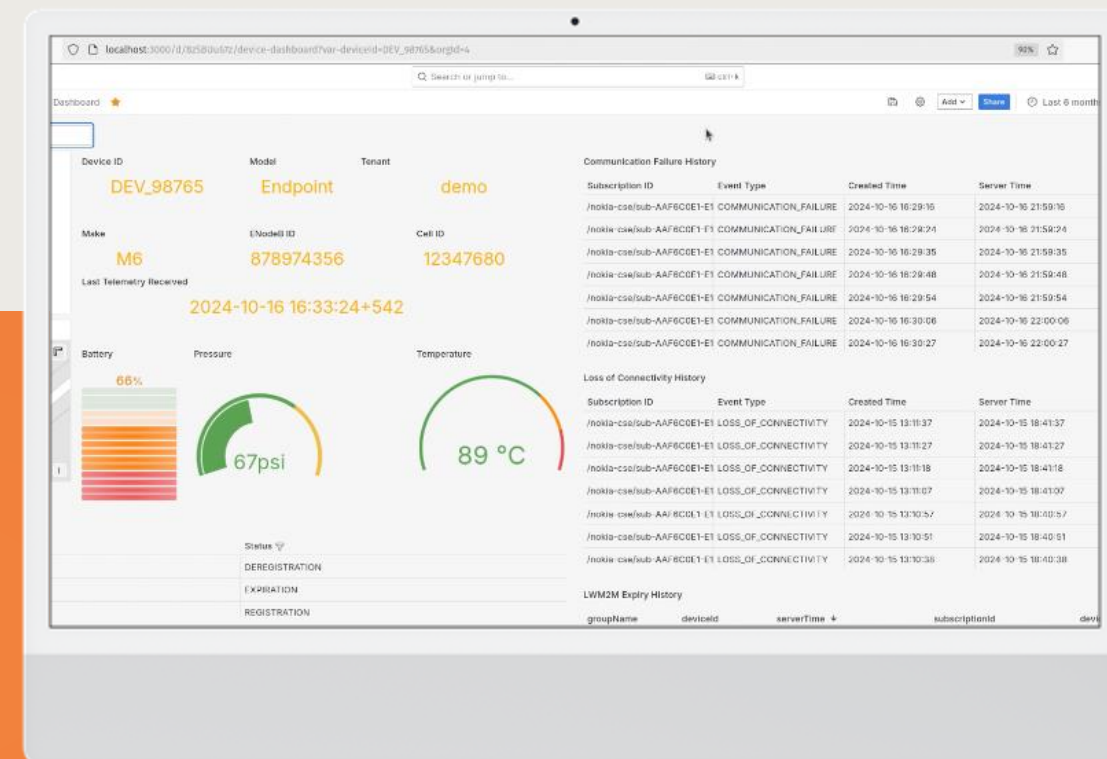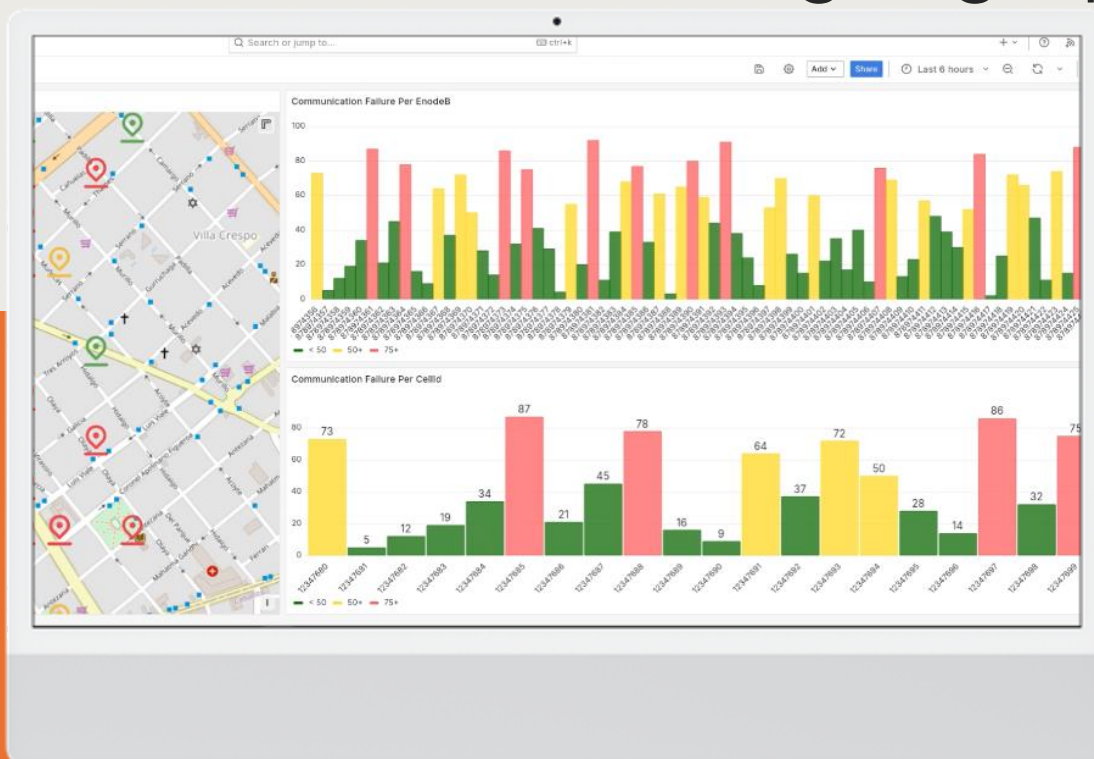
Automated Protocol Analysis using Open AI

Diagnose interoperability issues in real time

Problem
- Complex & time-consuming
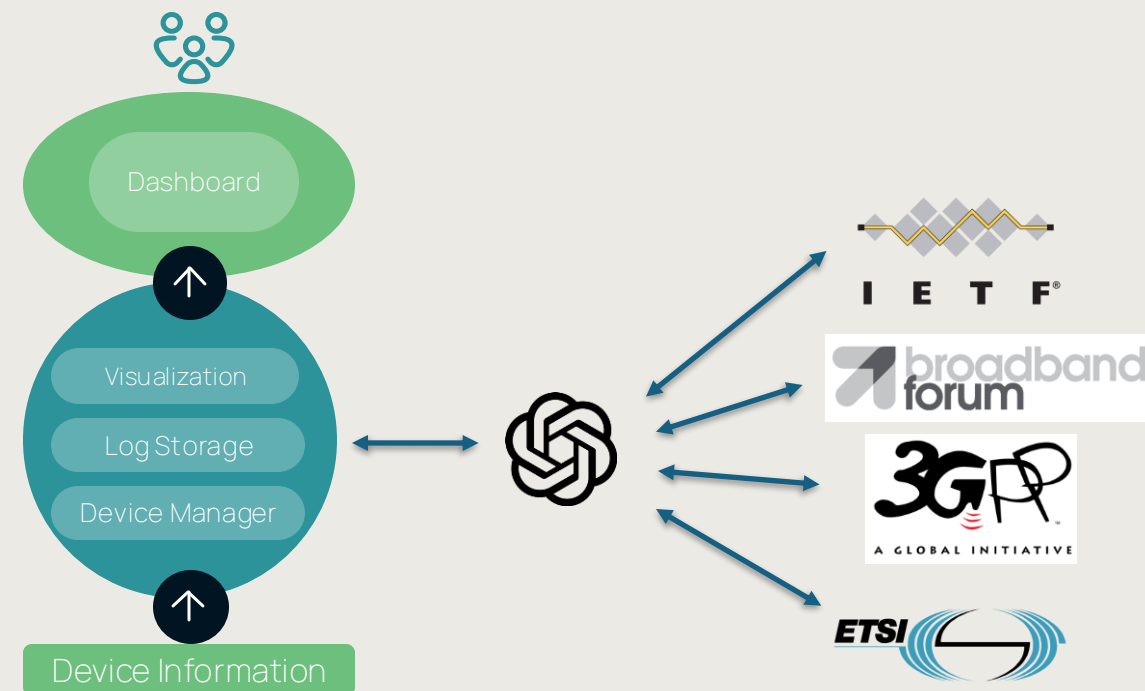- Result of upgrades or new devices
- Complexity

Solution
- Apply Open AI to Protocol Stream
- Prompt with applicable specifications, known anomalies, agreed deviations
- Solution identifies where the protocol deviates from specification

Benefit
- Save time and cost when interoperability issues are identified quickly

Dashboard

Visualization

Log Storage

Device Manager

Device Information

IETF

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3GPP
A GLOBAL INITIATIVE

ETSI

Smart Home also brings service level expectations

BBF Vision is driven by obligation for high service levels

Typical solutions: Wi-Fi
- Wi-Fi Network and Repeater
- Set top box
- Bundled TV & Music
- etc

Typical solutions: Smart Home
- Lighting, security, smoke alarms, white appliances, renewable energy
- Tools for on-boarding, diagnosing & continuity
- More challenging given constrained lack of UI

Obligation to maintain service levels depends on route to market of application. Consumers will soon expect home network resolution for IoT.

Our company

A relentless drive to remove the cost and complexity of managing today's digital services.

Trusted
The proven leader in device and service management solutions with decades of experience spanning the largest and most successful service operators.

Global
Deployed at well over 150 customers, spanning more that 65 countries.
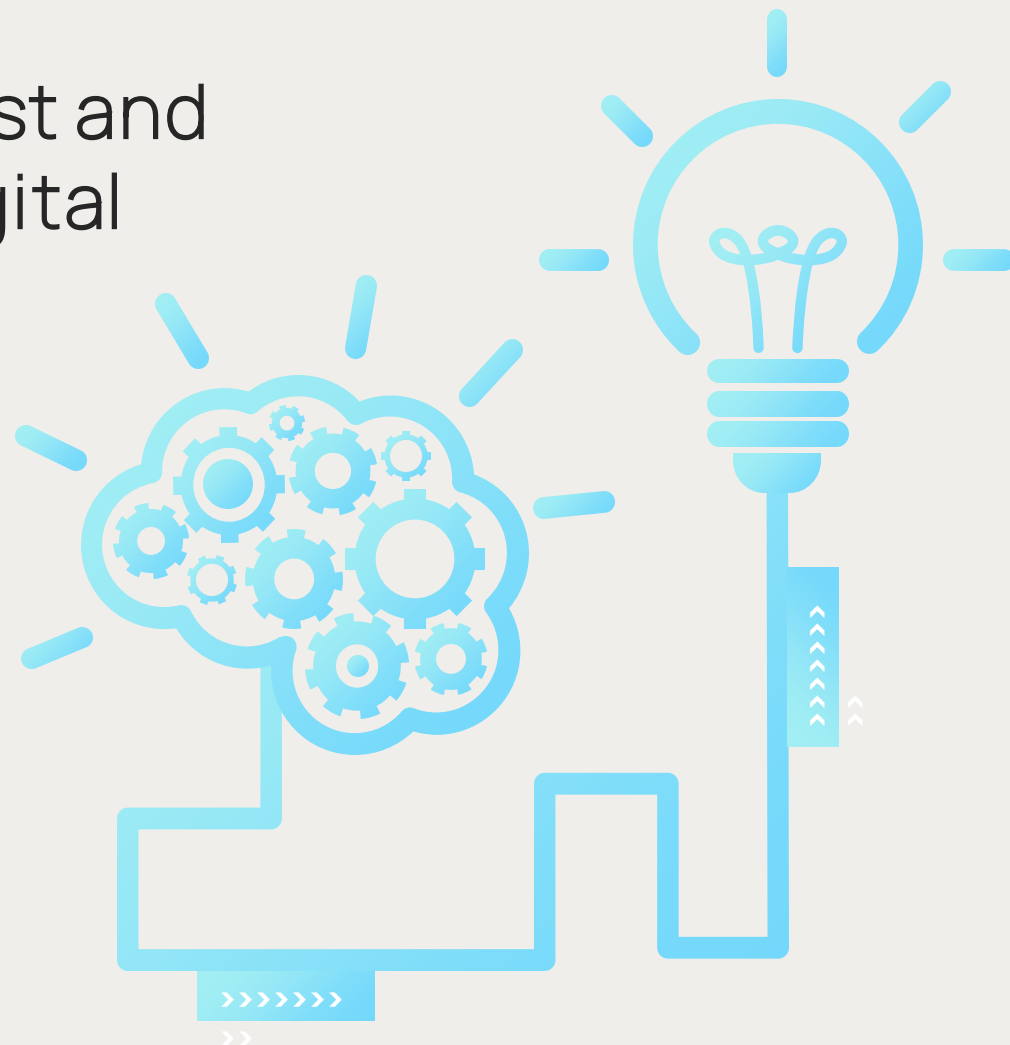
Roadmap
Consistently reinventing the products and portfolio in line with the changing market.

Flexible
Software-as-a-service models, private & public cloud deployment, or on-premises technology to support the customer needs.

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Services
World-class services teams providing Device Certification, Integration, Training, Installation, Support, and more.

Scalable
100s of millions on end points managing billions on devices.

Secure
All solutions are built with rigorous security from the ground up, in line with customer security policies.

Features
Hugely innovated and rated product with many millions of man years in development.

Our product

Mobile, Home, IoT, Consumer & Enterprise Solutions covering all Device Management Segments.

Best Value

Thank you!

Let's connect on Linkedin:

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