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Capitalizing on the Digital Home - Today

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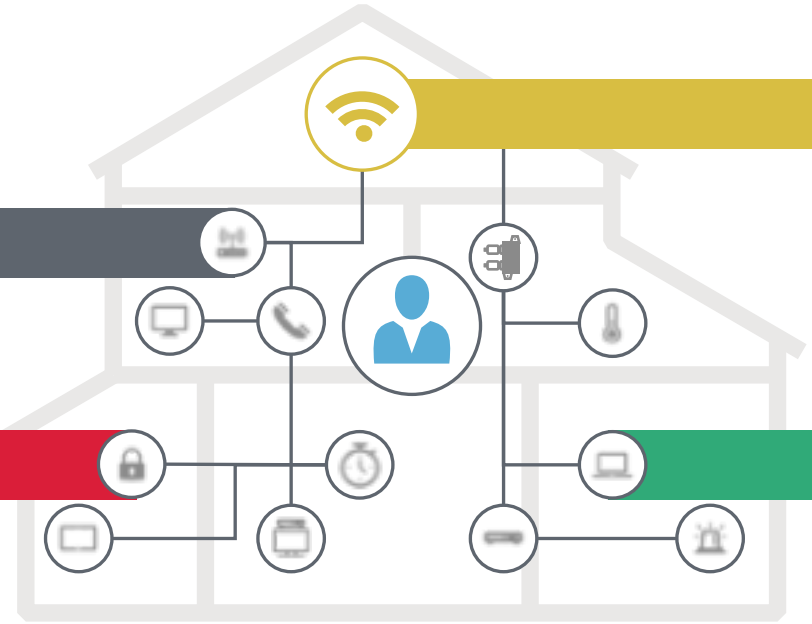
Jeevithan Muttu

incognito

In-home network complexity at all time high

70%+ issues occur inside subscriber premise



Speed Complaints

Operator unable to remotely verify service quality

Home WiFi Settings

WiFi interference, security

Misconfigured equipment

Forget WiFi Password

#1 Customer care inbound call issue related to WiFi

Devices

Outdated firmware—fraud potential

Incorrect security credentials—hacking risk

Inaccurate device configuration—numerous device protocols

21+ devices by 2023 – per home

Network Latency and Outages

Fiber

Cable

Fixed Mobile

Impact on customer experience drives up operational costs

Results in escalating operational costs

Home user

Up to 8% of residential customers call support where Average Handling Time 6-8 min.

Customer care

Up to 80% calls escalated

Network operations—field engineering

Up to 32% calls yield truck roll where Mean Time to Repair in days

Business Impacts

Increased customer frustration; poor experience; risk of churn which impacts Net Promoter Score

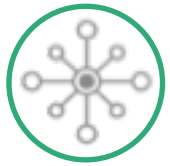
Lengthy Customer Service Representative calls with a lack of immediate resolution; impacts experience and operational costs

High operational costs; extended issue resolution times; home visit inconvenience

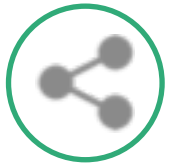
What's needed
Reduce costs and improve experience

Call Center Efficiencies
- Reduce average hold time and increase first call resolutions

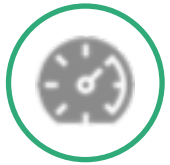
Reduce Technical Truck Rolls
- Resolve more support issues within client care organization



Omni-channel Digital Care
- Empower home user to proactively resolve network issues



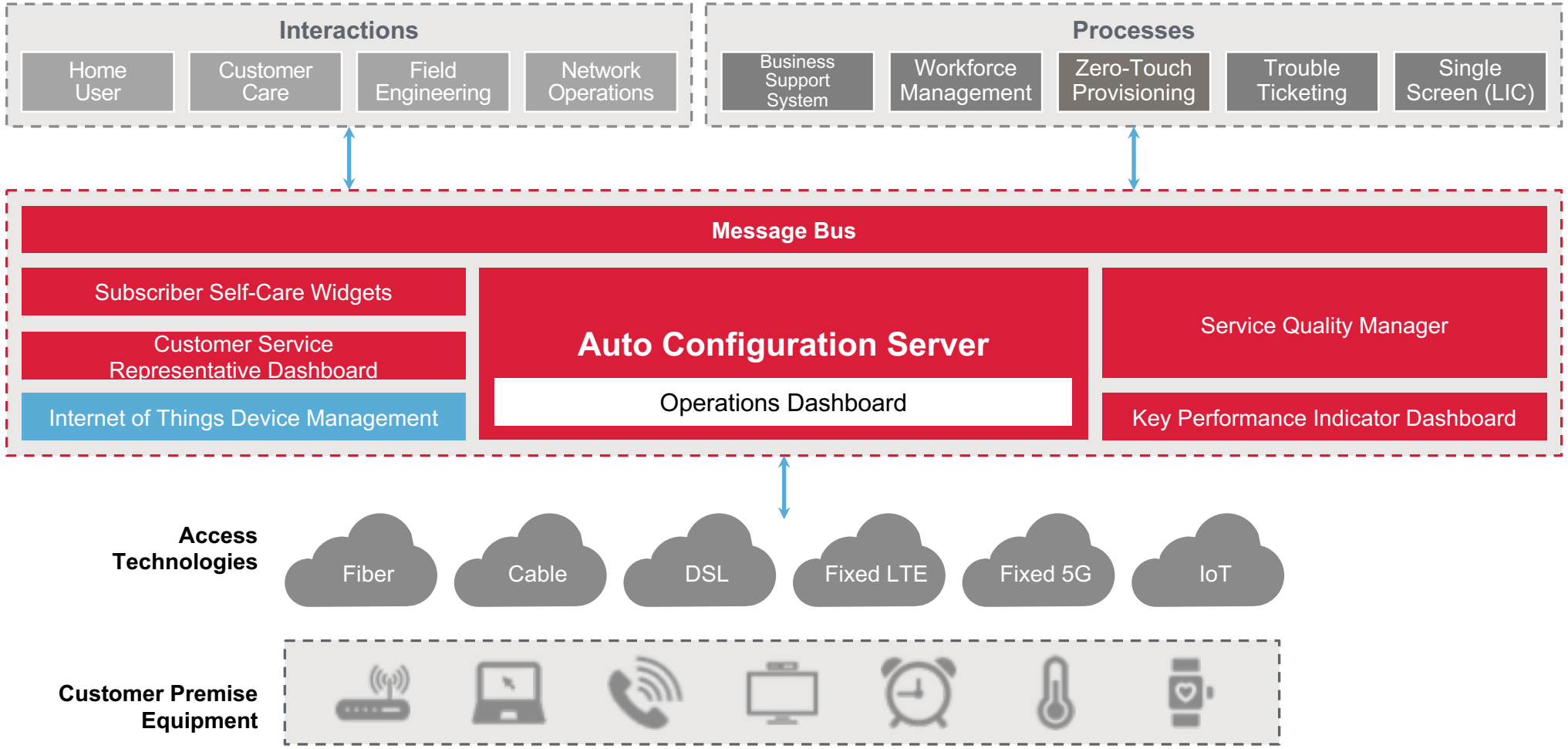
Vendor and Network Neutral
- Manage any device, any service with swift integration - future proof approach

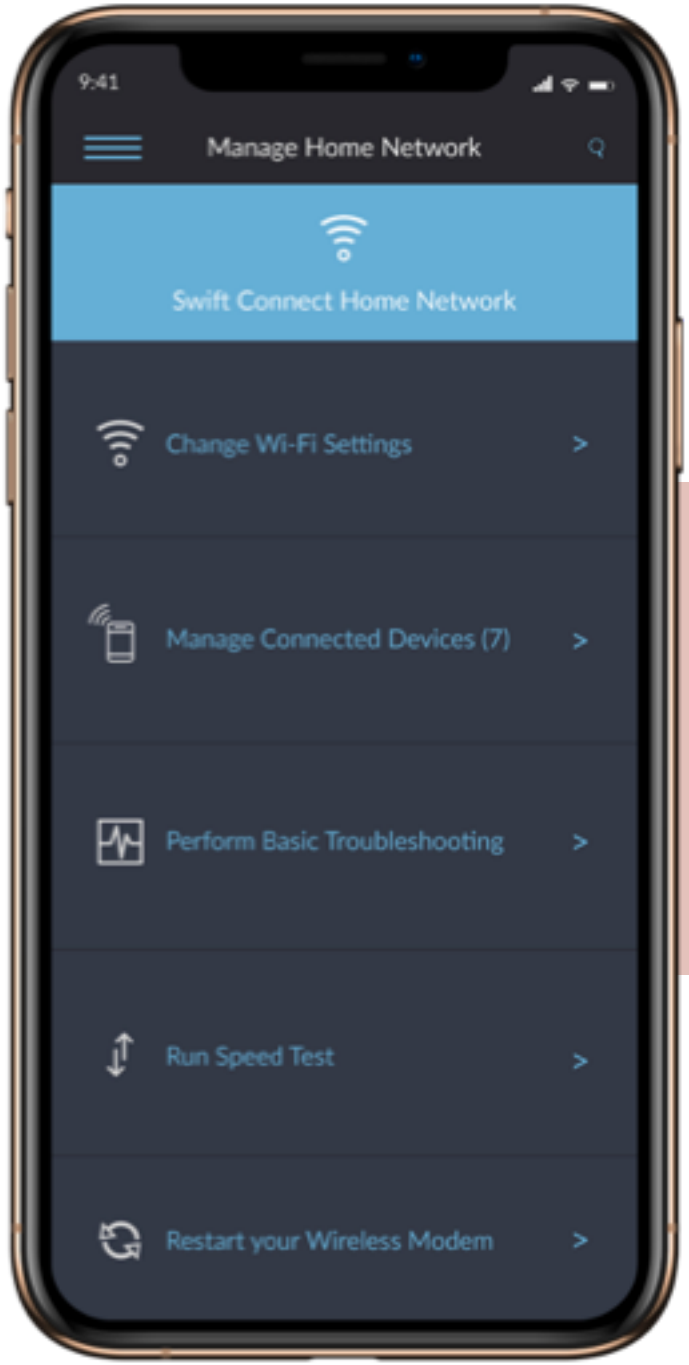


Ensure Customer Experience and Service Level Agreements
- Proactive Service Quality Management

Foundation is TR-069 Auto Configuration Server
Remote device management platform

Digital Home Reference Architecture

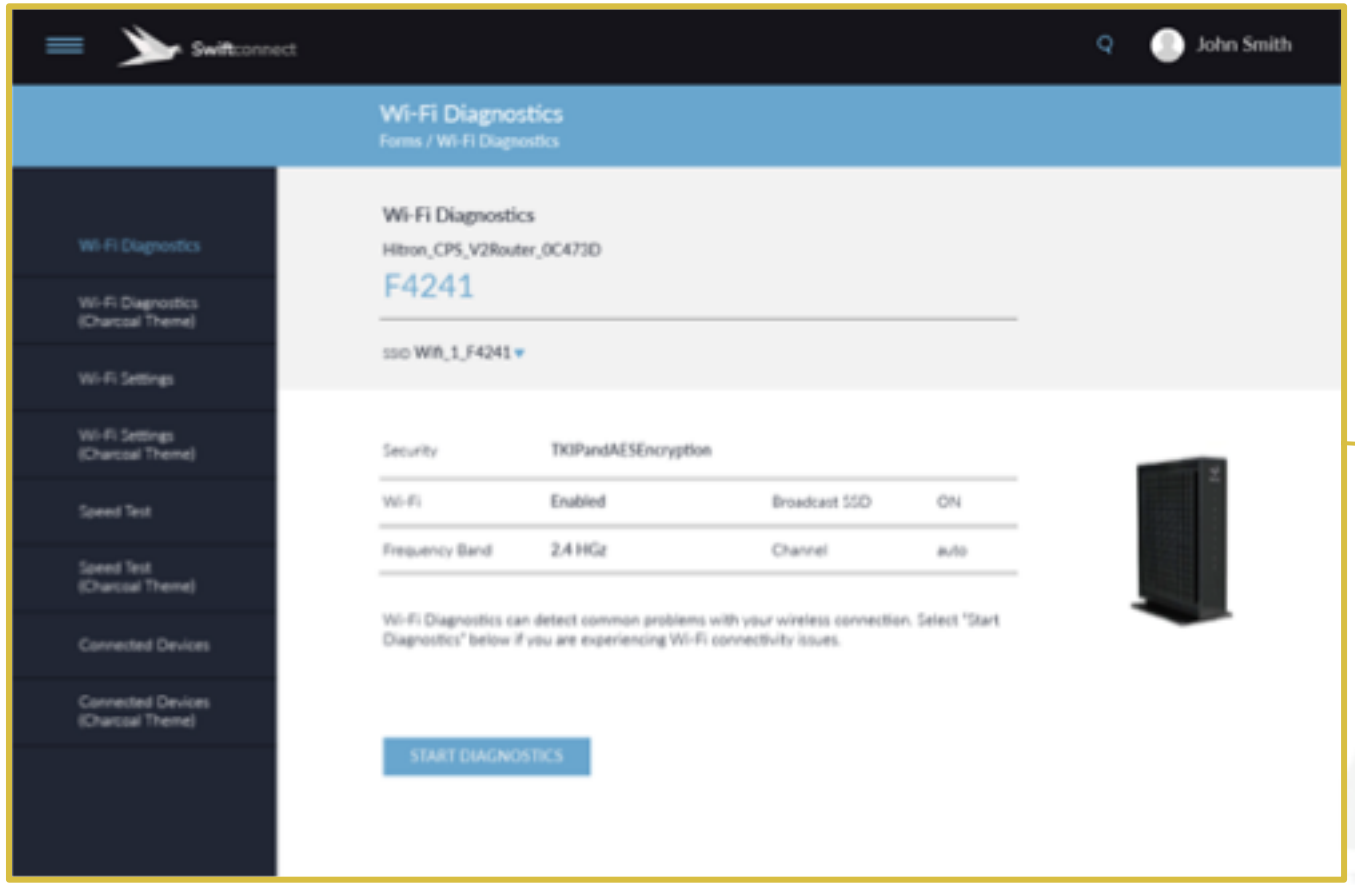


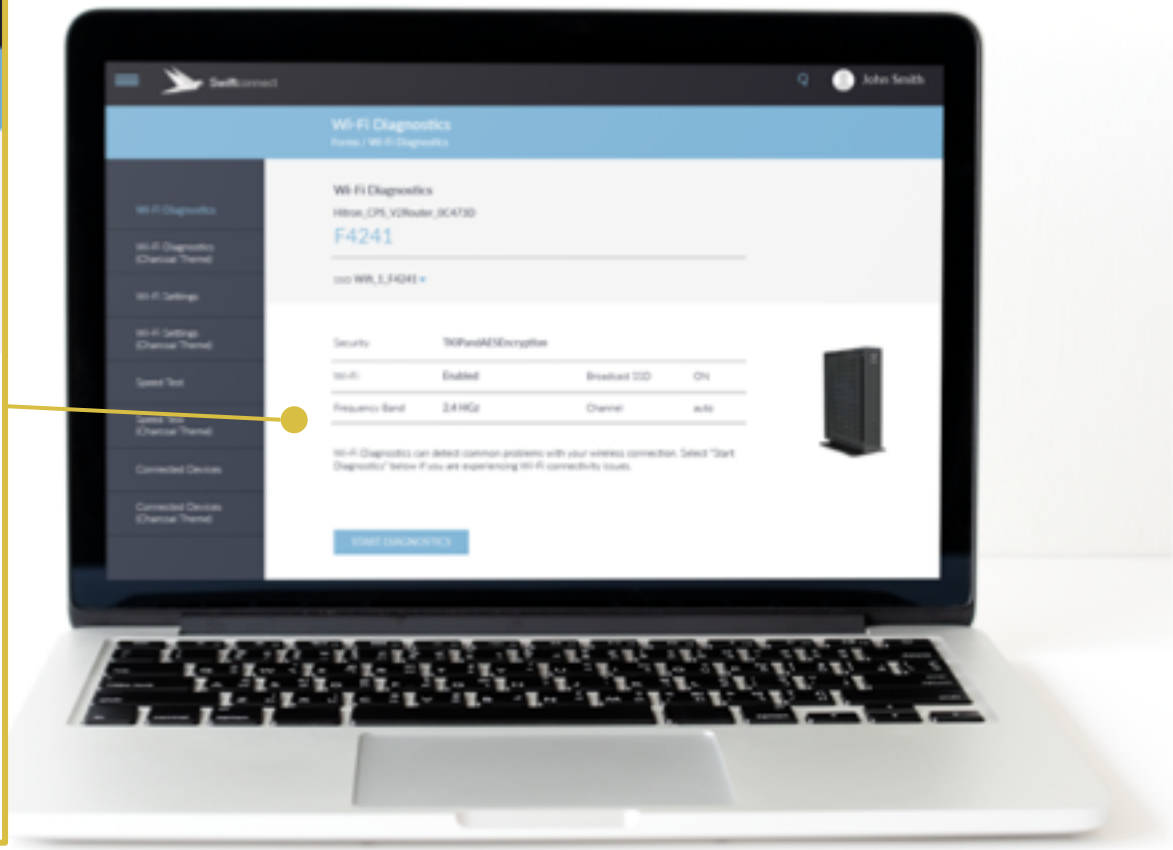


Empower home users to manage home network - with Incognito widgets

Web portal widget example

Manage the in-home network





Global Service Provider Examples

Tier 1 Latin American Operator

Cable + Fiber + Fixed LTE

Poor customer experience—lousy signal strength

DSL + Fiber + Fixed LTE

Call center agent turnover

Tier 1 Asian Operator

South African Operator

Fixed LTE

Time to market pressures for new residential services

DSL + Fiber

Aging end-of-life device management

Caribbean Operator

Tier 1 Latin American Operator

Cable + Fiber + Fixed LTE

Improving customer experience in fixed-wireless

Business Challenges

- #1 service cancellation reason—signal quality and strength
- Field technician escalation–signal and service assurance testing

Incognito Solution

- Multi-technology device management – fixed-wireless, Fiber, Cable
- Dashboard and Key Performance Indicator reporting - signal level, 3G & 4G device modes

CSP Benefits

- Reduced operational costs in customer support and field technicians
- Improved customer satisfaction– remote customer premise equipment visibility
- Extensible to Internet of Things – new business opportunity

South African Mobile Operator

Fixed LTE

Time to market pressures for new residential services

Business Challenges

- Market entry into residential services
- Aggressive launch - competitive pressures

Incognito Solution

- Onboard 200 Huawei and Nokia devices per day, scaling to 250,000
- Customer Service Representative Dashboard to facilitate fast resolution
- Operational dashboard to minimize swivel chair analysis

CSP Benefits

- 7 business day implementation—from project kick-off to go live via productized Auto-Configuration Server

Tier 1 Asian Operator

DSL + Fiber + Fixed LTE

Call center agent turnover

Business Challenges

- Lengthy Customer Service Representative (CSR) calls - 1,400 CSRs
- Need low touch training for CSRs—minimize technical knowledge
- Escalations to costly technical teams

Incognito Solution

- Standards-based approach and Customer Service Representative business process flows
- Globe Customer Relationship Management integration diagnosing and resolving service issues

CSP Benefits

- 30% reduction in CSR call handling time
- 50% truck roll reduction
- Elevated first call resolution rates contributing to increased customer satisfaction

Caribbean Operator

DSL+GPON

Aging end-of -life device management

Business Challenges

- End of life Customer Premise Equipment management platform
- Rising operational and capital costs for device provisioning
- Challenged to support fiber devices

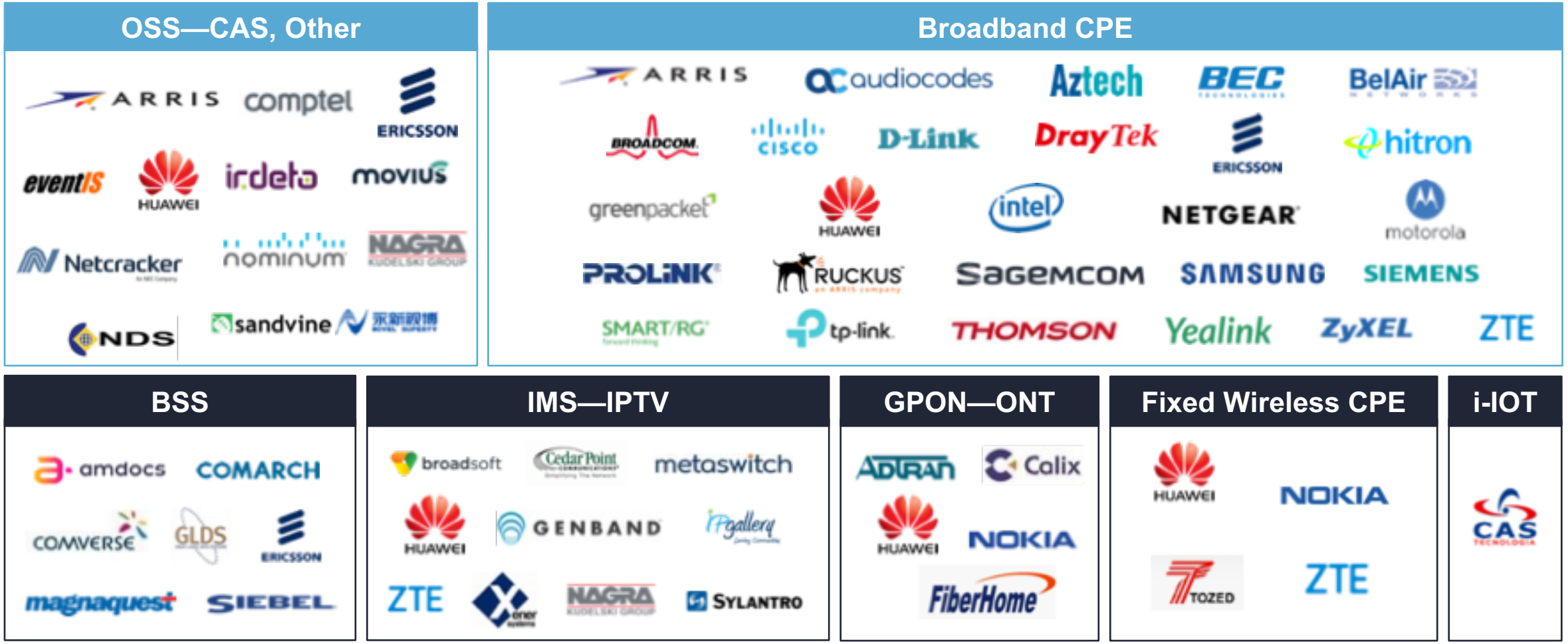
Incognito Solution

- TR-069 Device Management, Customer Service Representative (CSR) Dashboards, Key Performance Indicator Dashboards

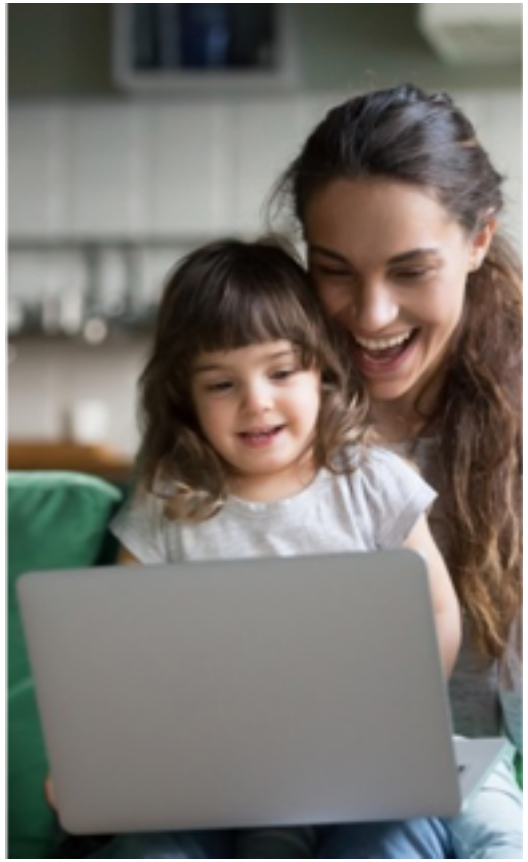
CSP Benefits

- Friction-less device onboarding – over 200,000 devices in 24 hours
- Automated CSR business process flows for remote Customer Premise Equipment management
- Analytics tool for network performance trends analysis, capacity planning

Device and service management Vendor ecosystem



What’s Next?



Universal Services Platform

Internet of Things

About Universal Services Platform (USP)

- New device management solution for real-time management and monitoring of Internet of Things devices
- Brings approach to securely deploy, manage, and control network-aware consumer electronics, including home and enterprise WiFi, Internet of Things
- Extends existing TR-69 standard

Business problems solved by USP

Universal Services Platform

Allows for multiple Controllers to manage devices

Internet of Things Proxy

Managed WiFi - data element specs

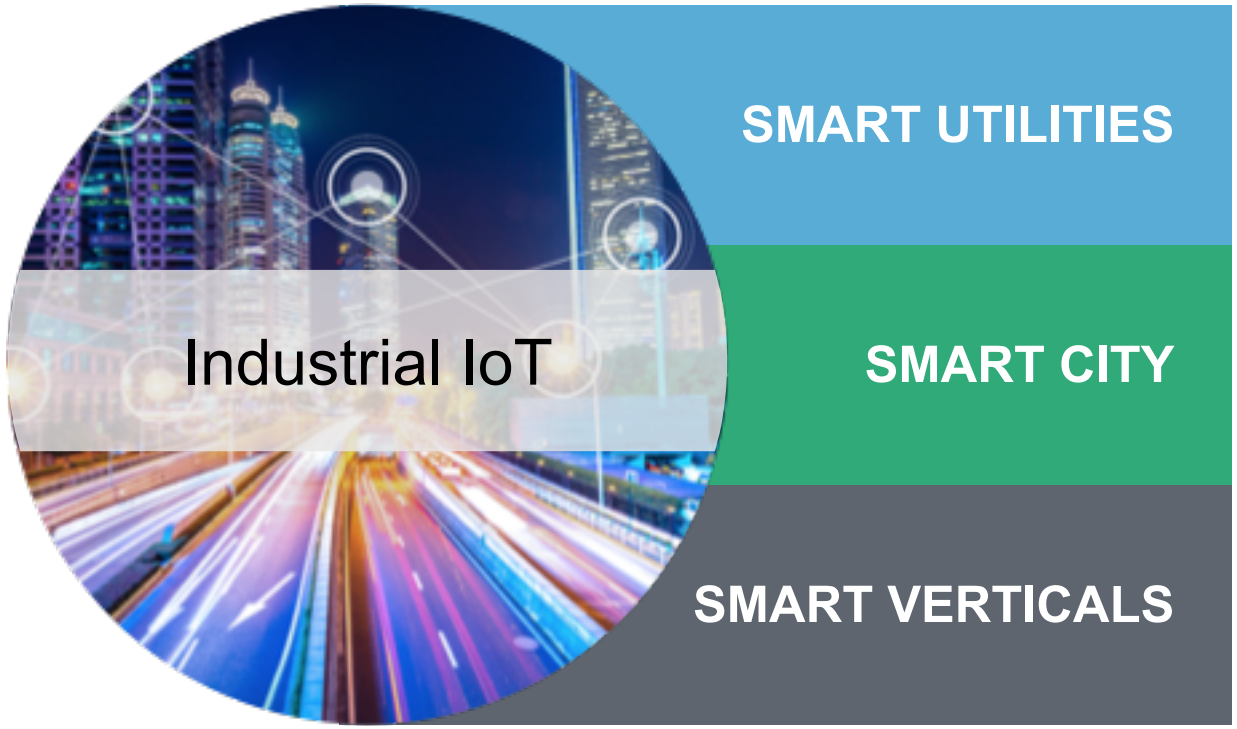
Improved Security and Privacy

Multiple protocols – MQTT, HTTP, CoAP, STOMP

Application-Enabled Smart Gateways

MQTT = message queue telemetry transport, HTTP = hypertext transfer protocol, CoAP = constrained application protocol, STOMP = streaming text oriented messaging protocol

Industrial Internet of Things Opportunity for global CSPs



Flood control sensors
Mission-critical public safety

Video surveillance
Critical for public safety

Parking sensors
Reduce time to park—reduce CO^2

Power meters
Energy efficiency

~4B non-Smart Home M2M connections by 2022 (Cisco)

80% could be manageable by CSPs

Operator Perspectives on IoT Access Technologies

LoRa = Long Range, low-power wide area network technology

- Unlicensed spectrum - attractive to fixed operators
- Battery efficient - useful for sensors, telemetry
- Suited to non-mobile devices - power meters

- Extends existing LTE specifications
- Attractive to mobile operators with LTE spectrum
- Higher bandwidth
- Suited to “mobility” services - fleet management, connected cars

- URLLC - Ultra Reliable, Low Latency Communication
- Higher bandwidth – mission critical applications

- Good example is Smart Farms
- Higher bandwidth within point to point locations - ie. buildings on a farm or within a specific “campus”

Farm Operations	**Asset Tracking - Fleet Management**	**Autonomous Vehicles**	**Farm Operations**
Asset Tracking Warehouse/ indoor		**Critical Internet of Things**	

CSP IoT Business Models

Connectivity
Logical starting point

- Optimize pipe
- Offer only Subscriber Identity Modules (SIMs)
- Other players Over the Top (OTT) offer solutions that ride the pipe

Application Enablement

- Connectivity ++
- Platform to manage devices
- Platform to manage and streamline data
- Environment to build business-specific applications

End to End Solution

- Purpose built solution with vertical focus
- Requires deep domain knowledge
- Connected Car, Fleet Management

How operators are approaching “verticalization”

Operators Packaging

Reporting Provisioning SLA	Reporting Provisioning SLA	Reporting Provisioning SLA	Reporting Provisioning SLA

Multi-tenant Infrastructure and UI Builder

UI Customization	UI Customization	UI Customization	UI Customization

User Interface Layer - supports mass customization

Device Management	Customer Care Digital Channel	Data Telemetry and Normalization

Multi-tenant device management infrastructure

Can be shared with multiple 3rd party Internet of Things enterprise customers

UI = user interface, SLA = service level agreement

Industrial IoT Needs

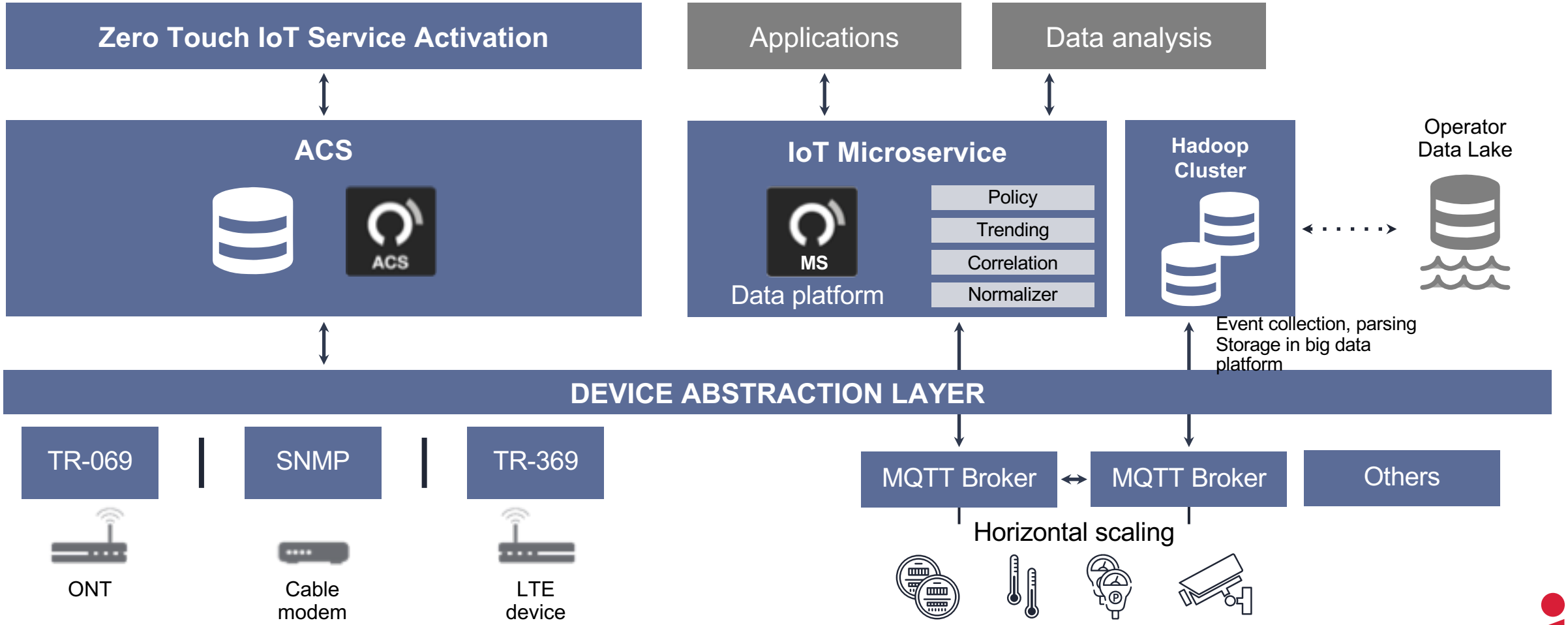
DEVICE MANAGEMENT

BIG DATA TELEMETRY

BUSINESS APPLICATIONS SUPPORT

Reference IoT Architecture

Unified device management model—residential, IoT



ONT = optical network terminal, SNMP = simple network management protocol, MQTT = message queue telemetry transport, MS = microservice, ACS = auto configuration server

Case study: Energy Efficiency

Monetize connectivity and transform business

Industrial IoT

Tier 1 Galaxy Latin American Operator

Business Challenges

- Efficiency project—capture electrical meter power consumption and voltage
- Operational costs & complexity—Internet of Things devices country-wide

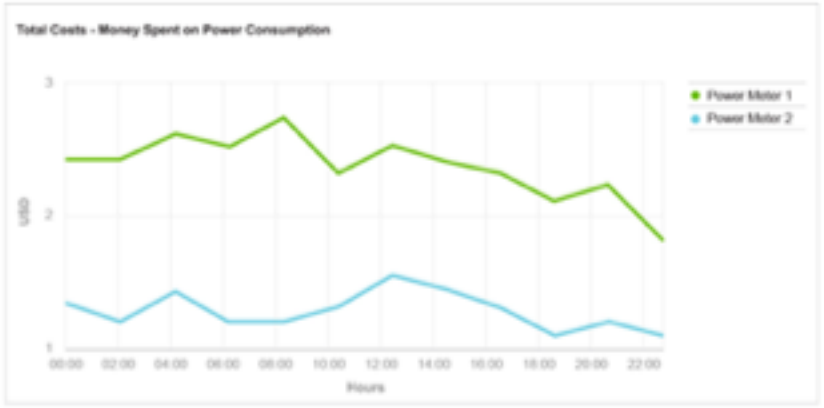
Incognito Solution

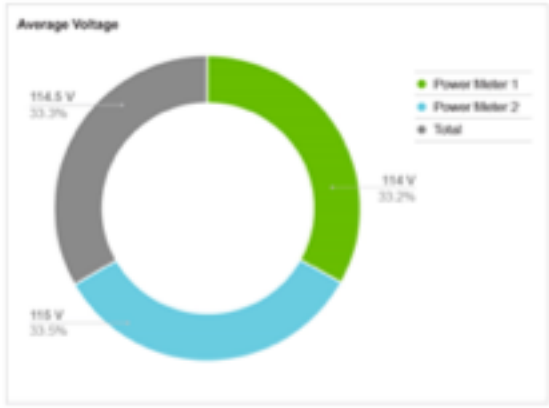
- Leveraged existing device management
- Pro-active device diagnostics and closed-loop automation
- Message Queue Telemetry Transport and device management integration

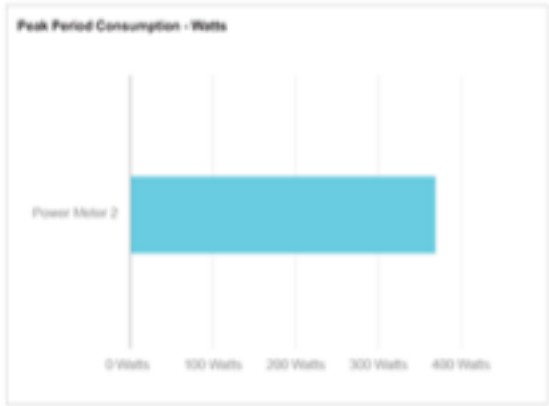
CSP Benefits

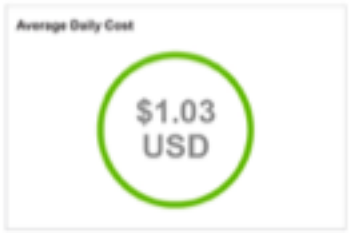
- Unified device management: connectivity; IoT
- Auto-Configuration Server re-use, rapid Internet of Things deployment, device scaling
- Flexible big-data and business application northbound integration

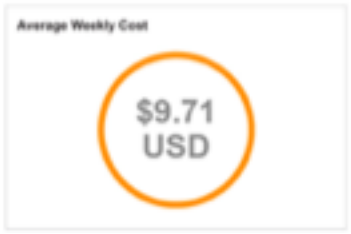
Dashboard
Power Meter Telemetry

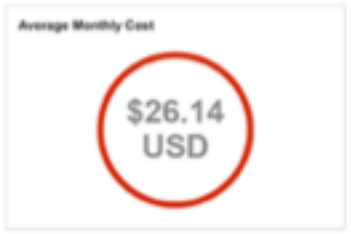












Device Management *Best Practices*

1. **Intuitive User Interface central to Customer Service Representative (CSR) efficiency**
   Improve first call resolution

2. **Integration of CSR dashboard to master Customer Relationship Management**
   Seamless call handling

3. **Service Quality Management critical for Customer Experience Key Performance Indicators** Get proactive—add value to Net Promoter Score

4. **Focus on automated bulk operations**
   Improve operational agility

5. **Leverage device management across Internet of Things services**
   Efficiencies of scale

6. **Device vendor neutrality key to future-proofed operations**
   Derisk changes in vendor strategy

Gracias

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