ADVANTECH InnoTalks

InnoTalks, Industrial IoT Insights

Monthly Video On-Demand

Electrical Grid | Economic Infrastructure: Modernization of the Electrical Grid

intel partner Titanium IoT Solutions

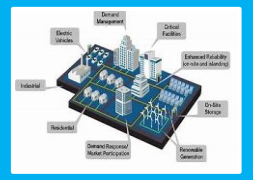
Sustainability and Bi-Directional Grid

Flat Grid – Utility Infrastructure

Solar Farm

Wind Farm

Grid Scale Power Storage



Microgrid's

Data Center's

Rooftop & Parking lot Solar

Power Storage

Electrification of Transportation Sector

Energy Demand Quadruple's

New Problems Require Rethinking in Running Grid Operations

Modernization Required to Seamlessly Integrate

- Solar and Wind
- Power Storage
- Electric Vehicles
- Microgrid's

Integration into the GRID

- Automation and Control Modernization
- Cyber Security Modernization
- Deployment Process Modernization
- Grid Insight with Federated Analytics

Electric Power Grid Architecture

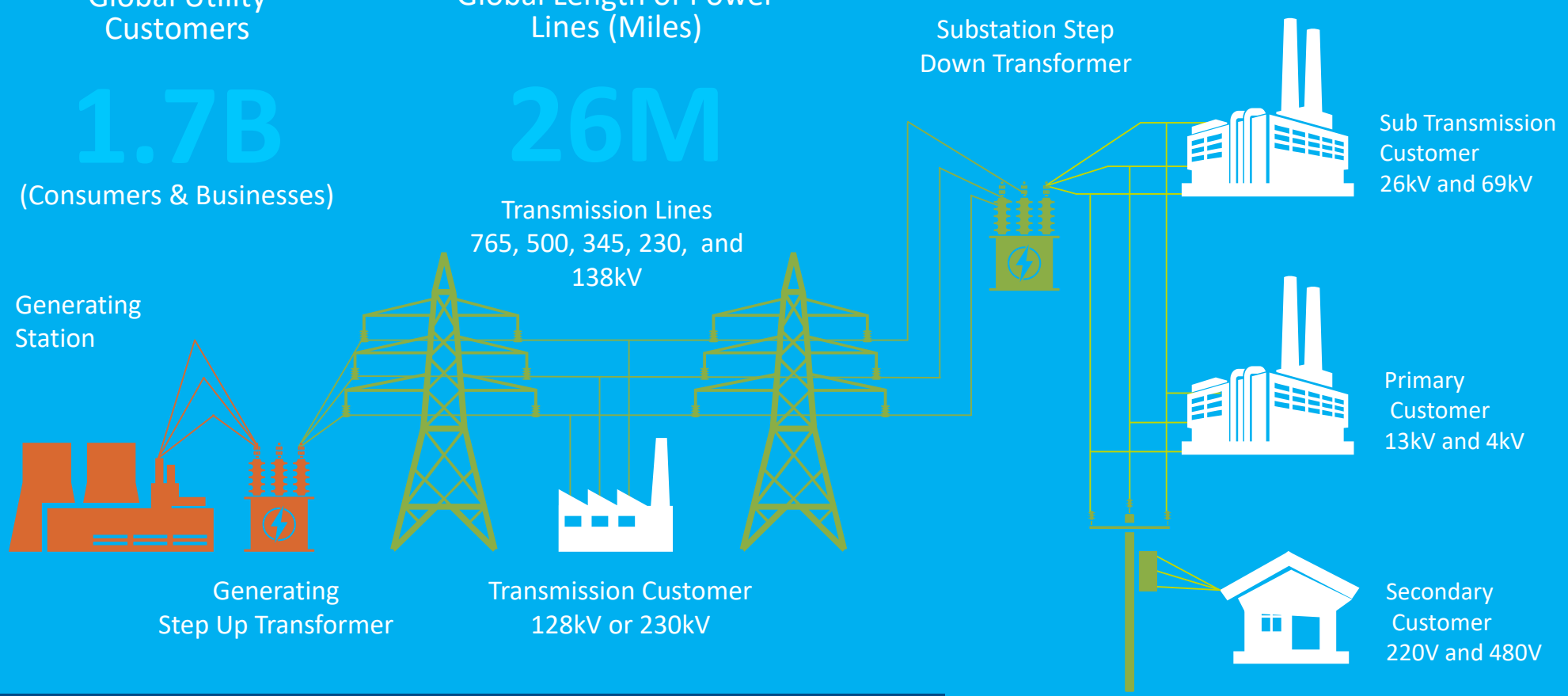
Global Utility Customers

1.7B

(Consumers & Businesses)

Global Length of Power Lines (Miles)

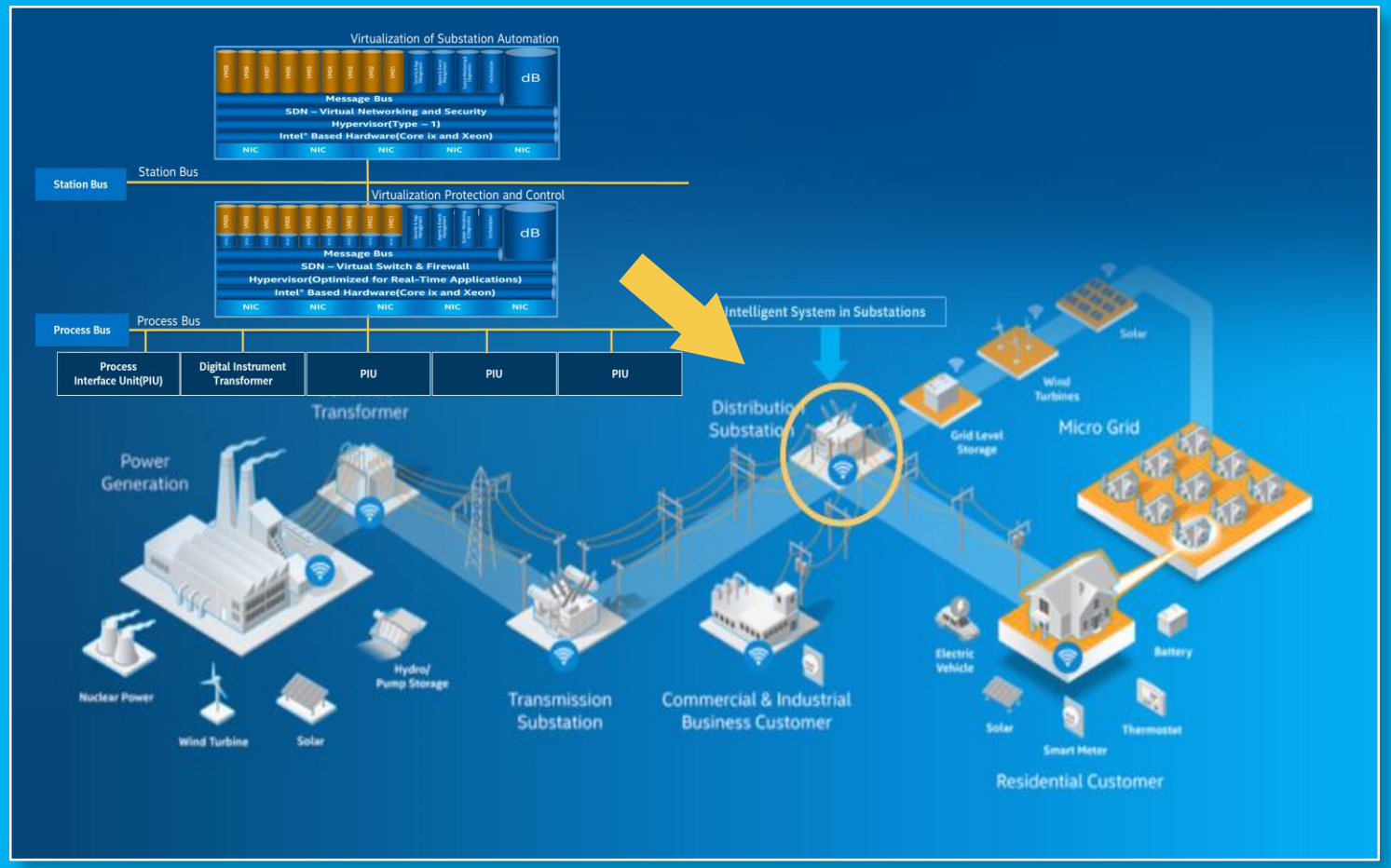
26M



Color Key: Orange: Generation Yellow : Transmission Green : Distribution White : Customer

Grid Modernization & Optimization

Intelligent Edge for Feeder Optimization for Renewables Integration



Data Driven Power Grid

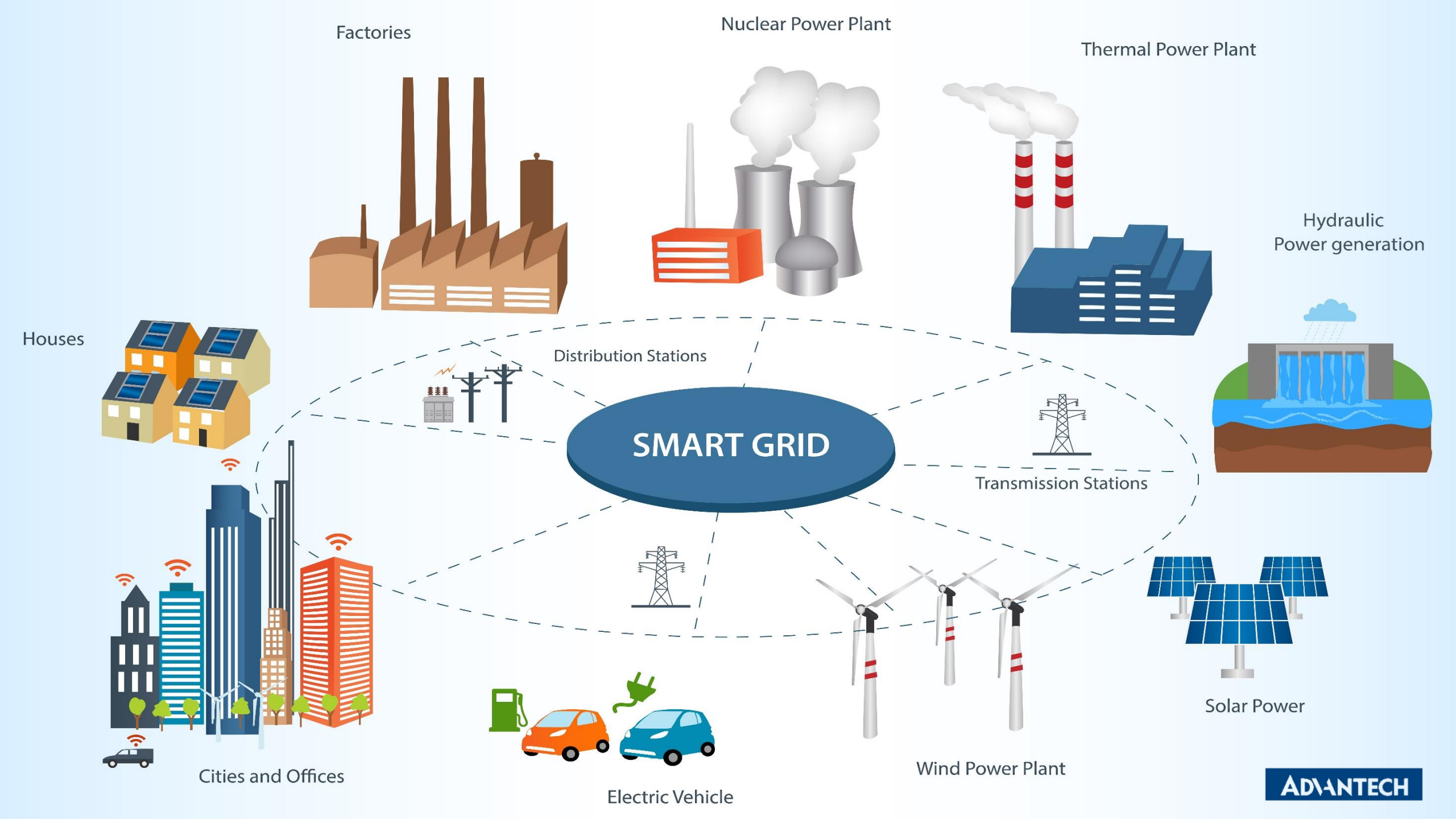
- Grid of Microgrids
- Feeder Load Balancing
- DER impact on feeders
- Demand & Generation flexibility
- Feeder storage management
- Localized weather impact

Security & Manageability

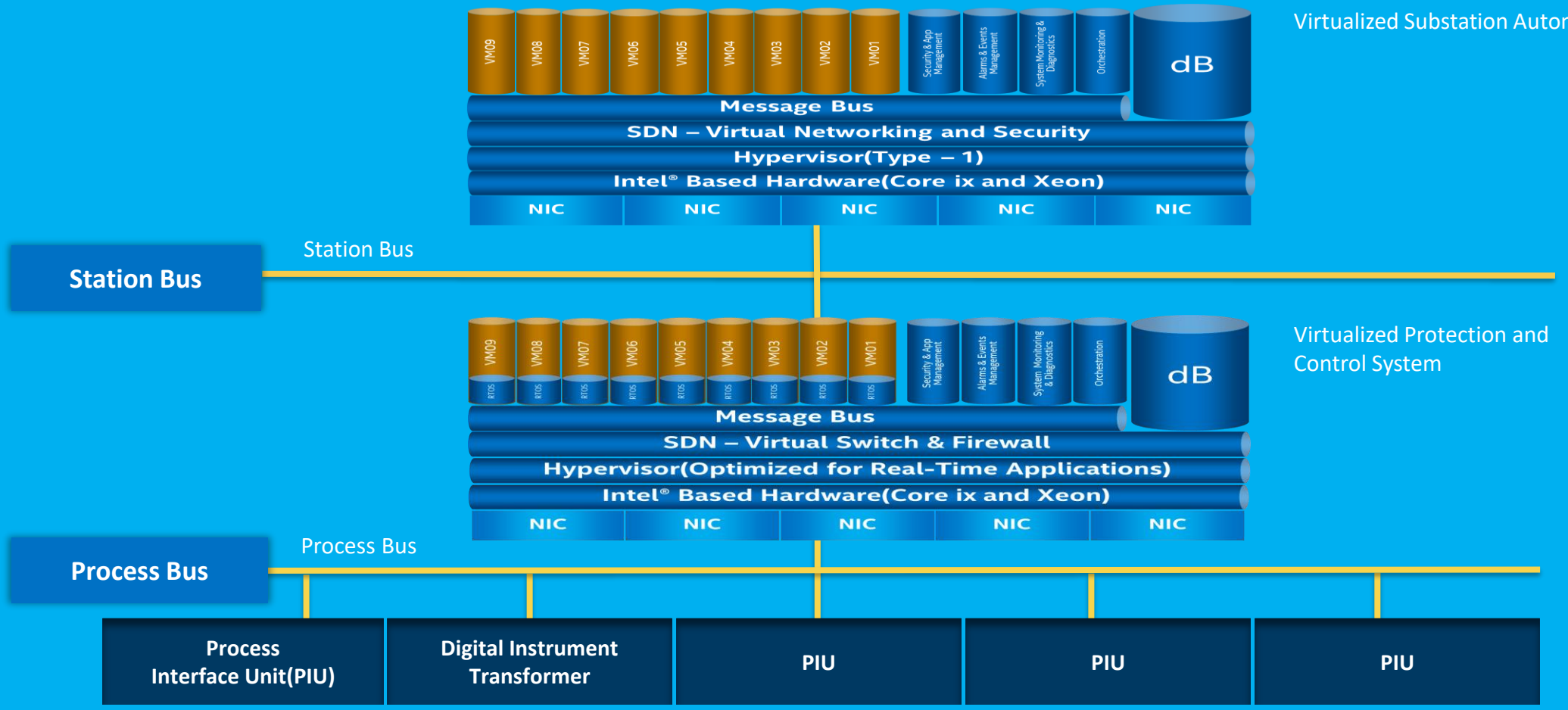
- Multilayer security availability
- Software defined networking
- Secure remote upgrades

Benefits to Society

- Integrate more renewables
- Reduce Energy Cost
- Reduce spinning reserves


Factories
Nuclear Power Plant
Thermal Power Plant
Hydraulic
Power generation
Houses
Distribution Stations
SMART GRID
Transmission Stations
Cities and Offices
Electric Vehicle
Wind Power Plant
Solar Power
ADVANTECH

Virtualization of Substation Automation & Control Systems



IEC-61850-3 compliant High-reliability Embedded Industrial PC/ Gateway

ECU-4000/1000

- *IEC-61850-3 Compliant*
- *Double EMC test standard*
- *Different Processor platform*
- *Redundancy design*
- *Multiple PCI/PCIe expansion cards*
- *Rich communication interfaces*
- *Wide temperature range*

Central Computing Server

ECU-579

- ✓ Intel® Xeon® Processor Scalable Family
- ✓ Scalable CPU 20/14/8 Core (125W/85W/70W)
- ✓ 12 x DIMM sockets support up to 768GB DDR4
- ✓ Up to 2 x PCIe x16 Gen3 slots, PCIe x8 Gen3 slots, PCIe x4 Gen3 slots
- ✓ IPMI 2.0-compliant management

SCADA Server

ECU-4784 Xeon E3/Core i7

- ✓ Intel Hasewell Core i7/ Skylake Xeon E3 processor
- ✓ Up to 16GB RAM, 8LAN, 10COM
- ✓ 2xPCI/PCIe expansion slots

Workstation IPC

ECU-4784 i3/Celeron

- ✓ Intel Hasewell Core i3/ Celeron processor
- ✓ 8GB RAM, 8LAN, 10COM
- ✓ 2xPCI/PCIe expansion slots

Workstation Gateway

ECU-4574/ ECU-4685

- ✓ Intel Atom N2600 processor, 1.6GHz
- ✓ Intel Skylake Celeron 3955U, 2.0GHz
- ✓ Up to 8xEthernet ports/ 10xSerial ports
- ✓ 2U & 1U for selection

RISC-based Comm. Gateway

ECU-1152/1251,/1051/1050, ECU-4553

- ✓ TI Cortex A8 processor, 800MHz
- ✓ Support rich Ethernet ports/ Serial ports
- ✓ Support Modbus/ IEC-60870 protocol

The Distributed Edge Solves Myriad Business Problems

(several are already ZEDEDA customers)

Predictive Analytics

Wireline Analytics

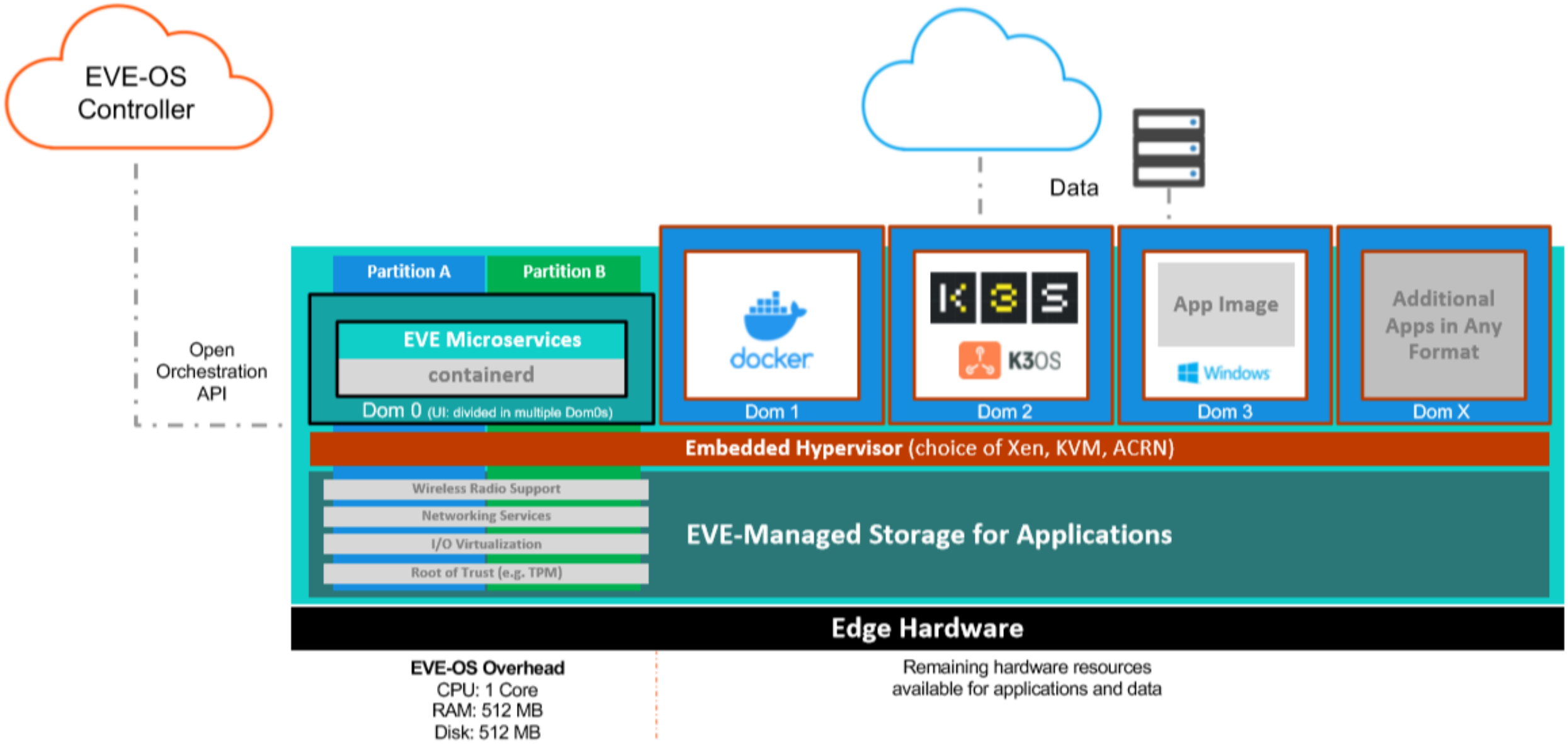
Industrial Network Threat Detection

Smart Industrial Machines

AGV & Autonomous Drones

Tactical Edge

EVE-OS Architecture



The Distributed Edge has unique challenges…

- Diversity of hardware, software and skill sets
  - New edge infrastructure deployed into legacy environments
  - Lack of autonomous and remote orchestration
  - Mix of skill sets (OT and IT) in the field
- New security threat vectors
  - Remote non-trustable networks
  - No physical or cyber security perimeter in the edge
  - No centralized pane of glass for visibility & remediation
- Unprecedented scale of nodes
  - Geographically-disperse locations
  - High cost for field deployment and maintenance
  - DC solutions are resource-intensive and not priced for this scale

The Distributed Edge Needs Orchestration

ZEDEDA's Open Edge Ecosystem

Launched Aug 19, 2020 at ZEDEDA Transform
https://zededa.com/transform

Cloud and Application Enablement

Azure · aws · Google Cloud · Ambyint · ptc

Channel (OEMs, SIs and Distis)

Rockwell Automation · accenture · mbx systems · Arrow

DevOps

SUSE · RANCHER

Analytics and Data Management

sas · crosser · LatentAI · TensorFlow · OpenVINO · OSIsoft.

Security

NOZOMI NETWORKS · CYBERX

Networking (e.g. SD-WAN, switching, mesh)

JUNIPER networks · aviatrix · VyOS · NETFOUNDRY

Edge Application Frameworks

DIANOMIC · IOTech

Industrial Connectivity

Ignition · kepware · omnio

Edge Compute Hardware

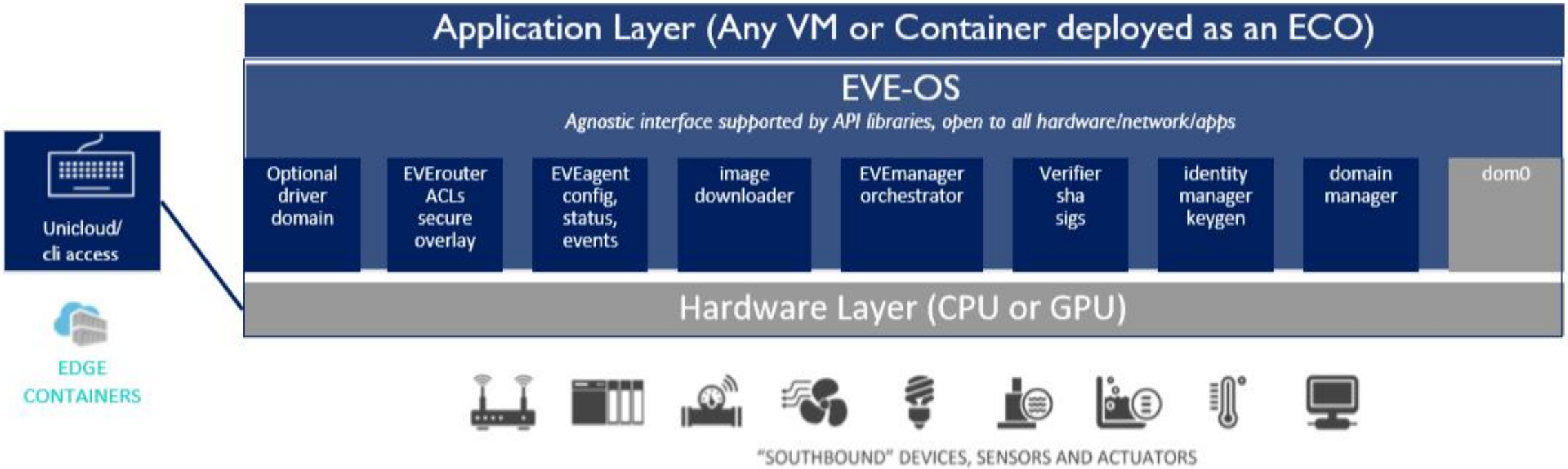
ADVANTECH · DELL · Hewlett Packard Enterprise · Lanner · Lenovo · SUPERMICRO

Silicon

intel · NVIDIA · arm

ZEDEDA

EVE-OS Architecture



Project Scope

- Establish standardized Edge Compute Object (ECO) format
- Build EVE edge computing engine and controller interface
- API + CLI reference implementation

Software-Defined Automation & Control Systems for Utilities

enhance Reliability, Safety, Security, manageability and Edge Analytics

Substation in 2020

RTU
Firewll
Router
Switch
PMU
SCADA
Security
IED's

Rugged Server's
(IEC – 61850 – 3 class 2
& ANSI 1613)

Future Substation

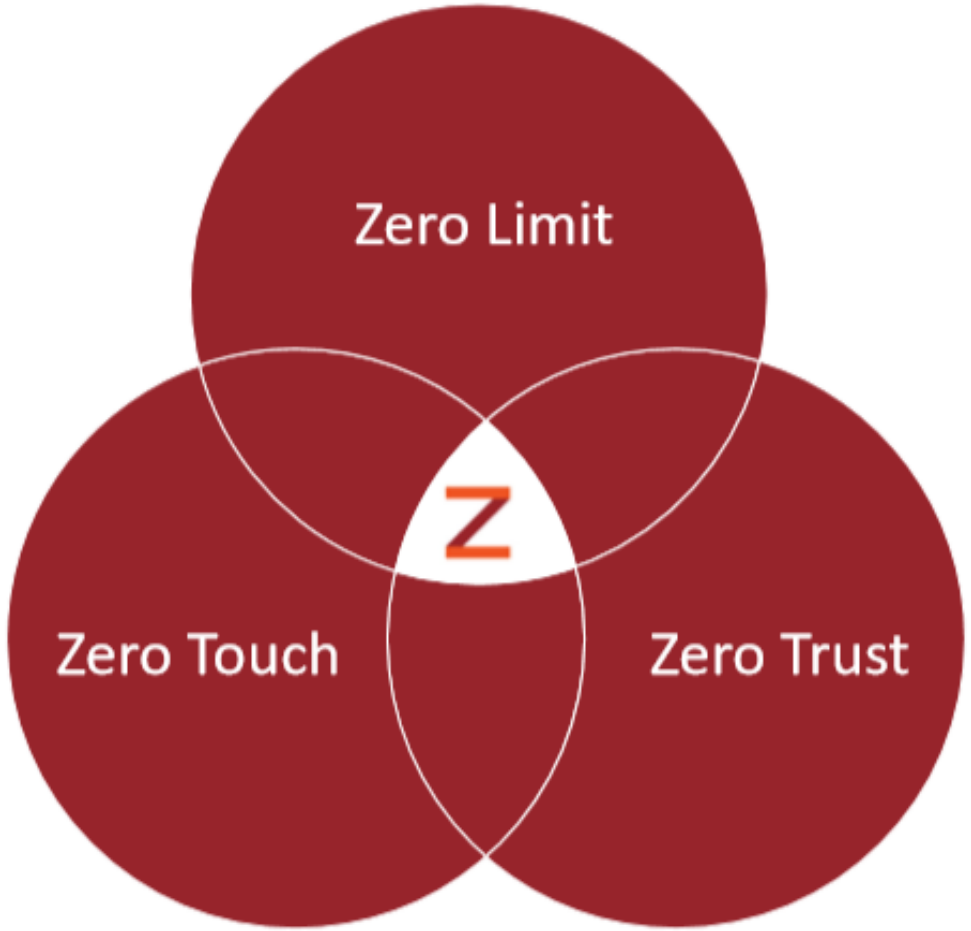
Partition	Isolation	Encapsulation	Hardware Independence

Standardize Hardware Platform	Improve Reliability, Safety and Security	Reduce Capital Investment	Reduce Operation and Maintenance Cost

50% Reduction in Devices

76% Reduction in O&M Cost

Purpose-built Architecture for the Distributed Edge – Core Principles



- Zero Limits
  - No vendor lock-in, any hardware or cloud
  - Any app deployment model, legacy & cloud-native
  - Hyperscale – cloud powered scale-out orchestration
- Zero Touch
  - Automated provisioning and deployment, no device CLI
  - Remote and centralized full-stack orchestration
  - Roll-forward and roll-back any changes at scale
- Zero Trust
  - Crypto-based identification – no device username concept
  - Data encryption at rest and in-flight based on crypto-ID
  - Device integrity, attestation and anomaly detection

For more information, please visit

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