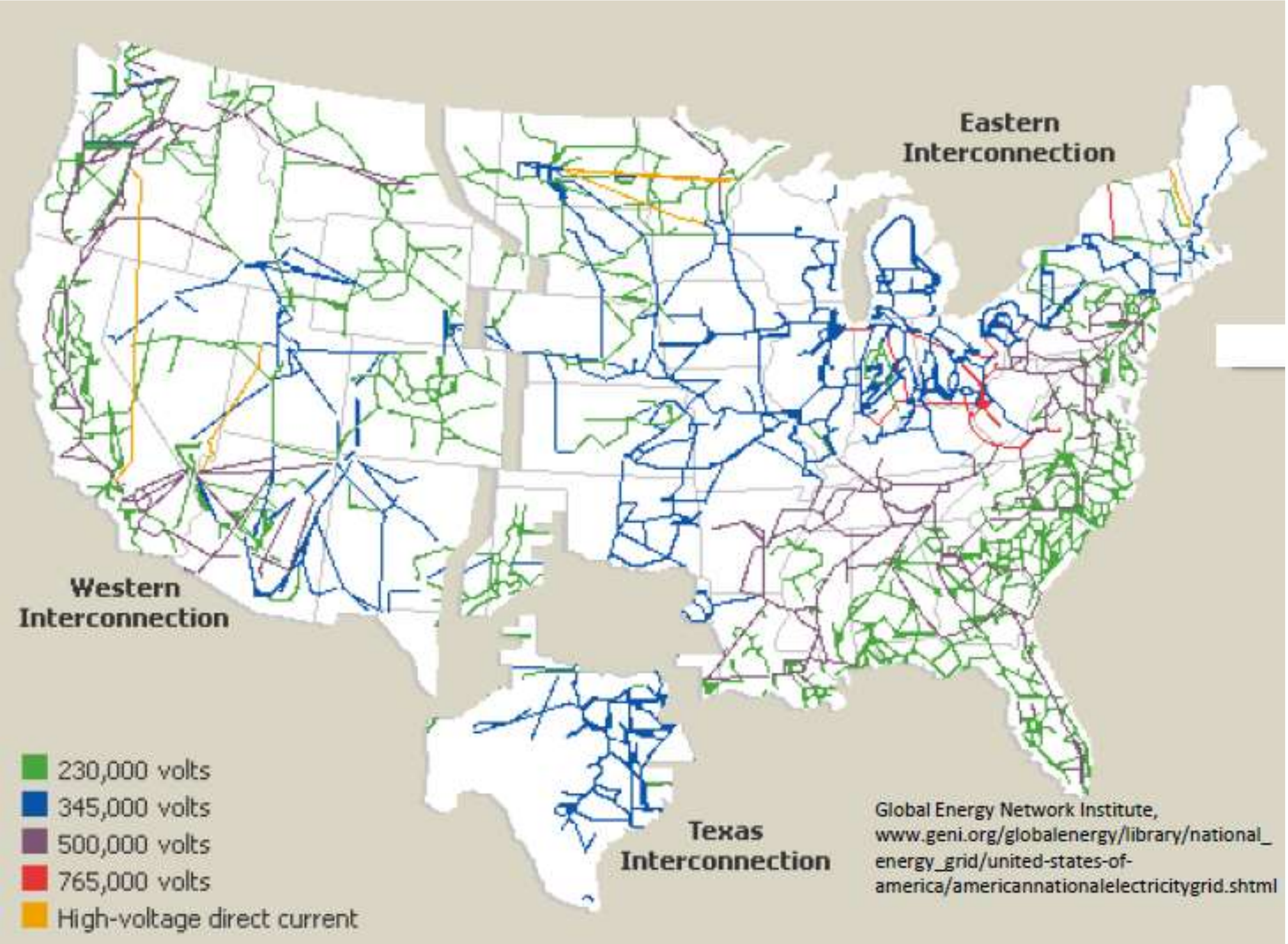
intel Look Inside.™

NATIONAL INSTRUMENTS™

Security Connected for Critical Infrastructure

The Future for Secure Embedded Devices

Securing the Electric Grid



Global Energy Network Institute, www.geni.org/globalenergy/library/national_energy_grid/united-states-of-america/americannationalelectricitygrid.shtml

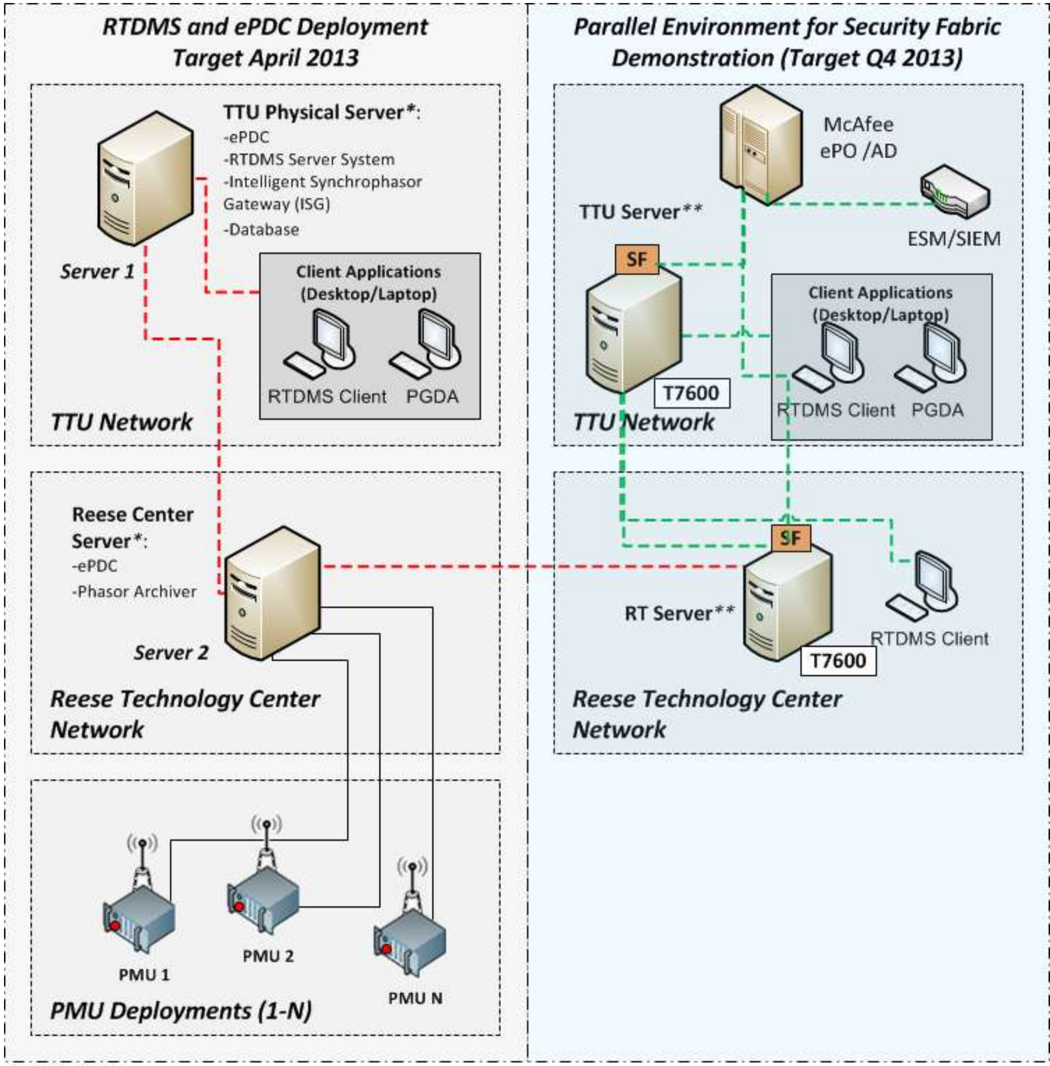
Texas Smart Grid Security Deployment

Electric Power Group (EPG) is adding the security fabric to their synchrophasor products and deploying them via CCET

Center for the Commercialization of Electric Technologies (CCET) is a DOE grant recipient working on a synchrophasor demonstration project in Texas

ERCOT (Electric Reliability Council of Texas), **ONCOR**, **Sharyland** and **AEP** are Transmission Operators (TOs) participating in the demonstration project

Texas Tech University (TTU) is the site of the field trial. Turbines, substation, 2-level control center



RTDMS and ePDC Deployment Target April 2013

TTU Physical Server*:
-ePDC
-RTDMS Server System
-Intelligent Synchrophasor Gateway (ISG)
-Database

Server 1

Client Applications (Desktop/Laptop)
RTDMS Client
PGDA

TTU Network

Reese Center Server*:
-ePDC
-Phasor Archiver

Server 2

Reese Technology Center Network

PMU 1
PMU 2
PMU N

PMU Deployments (1-N)

Parallel Environment for Security Fabric Demonstration (Target Q4 2013)

McAfee ePO /AD

ESM/SIEM

TTU Server**

SF

T7600

Client Applications (Desktop/Laptop)
RTDMS Client
PGDA

TTU Network

SF

RT Server**

T7600

RTDMS Client

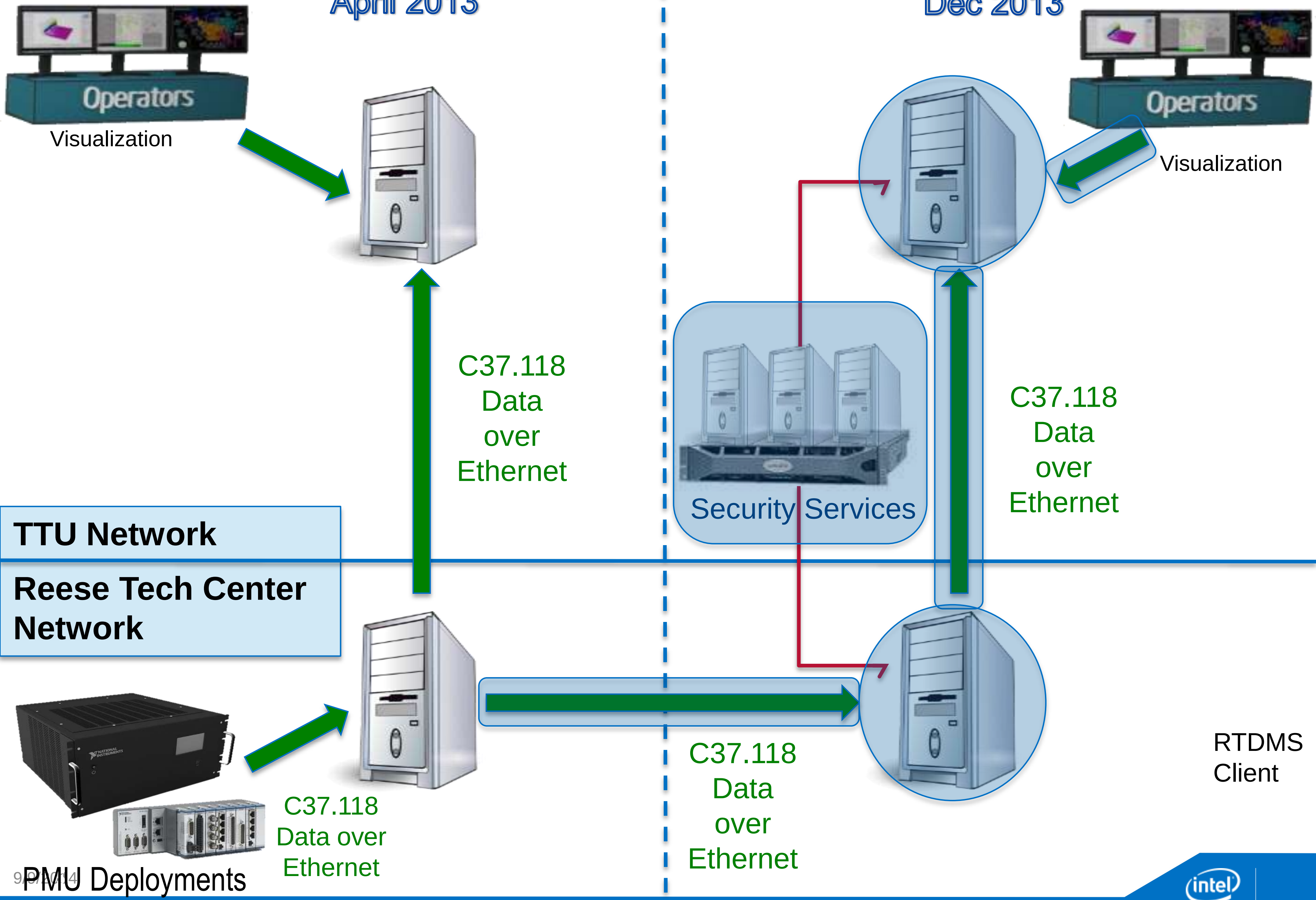
Reese Technology Center Network

** Provided by TTU*
*** Provided by SF Project*

In Moments Hostile Traffic Was Detected

RTDMS and ePDC
April 2013

Security Connected RTDMS and ePDC
Dec 2013



Visualization

C37.118 Data over Ethernet

TTU Network

Reese Tech Center Network

PMU Deployments

C37.118 Data over Ethernet

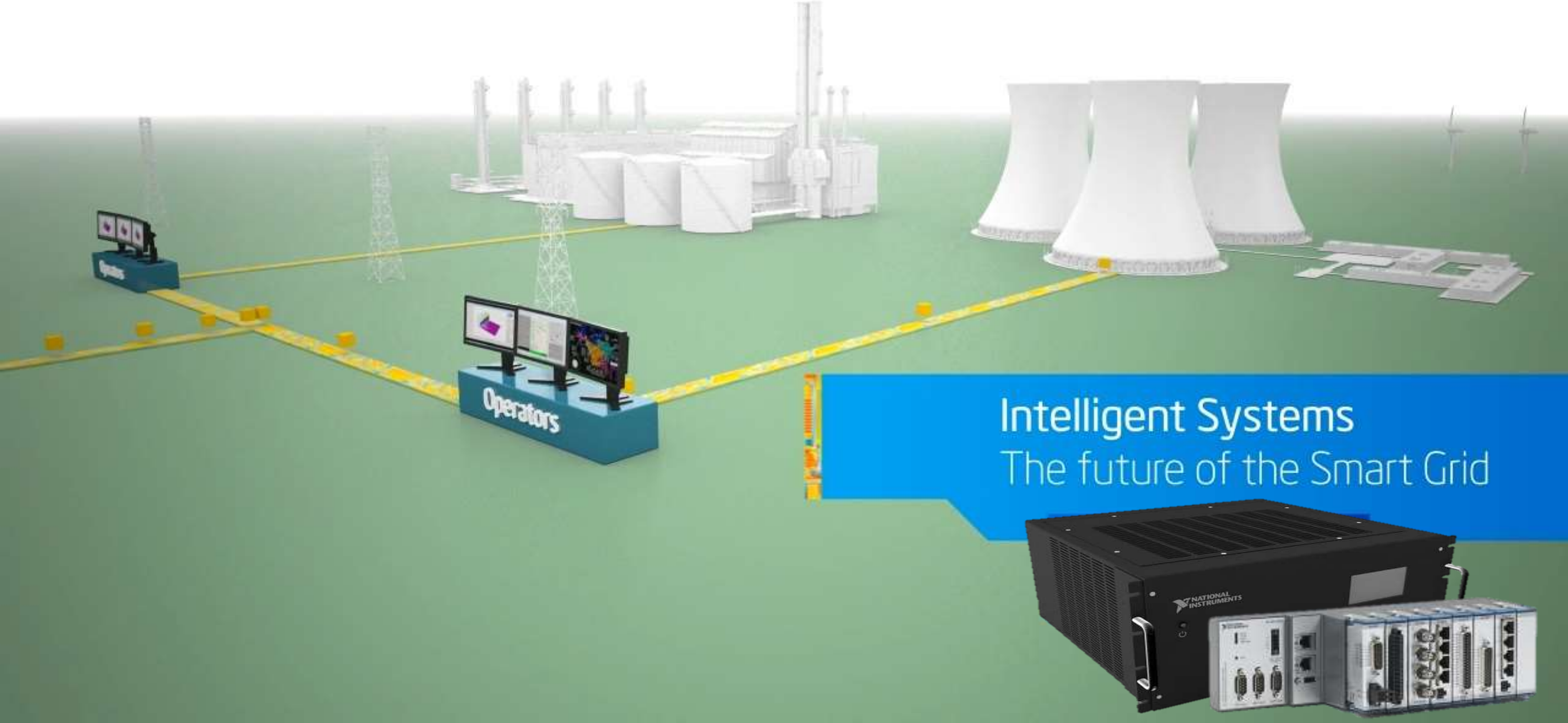
Security Services

Visualization

C37.118 Data over Ethernet

C37.118 Data over Ethernet

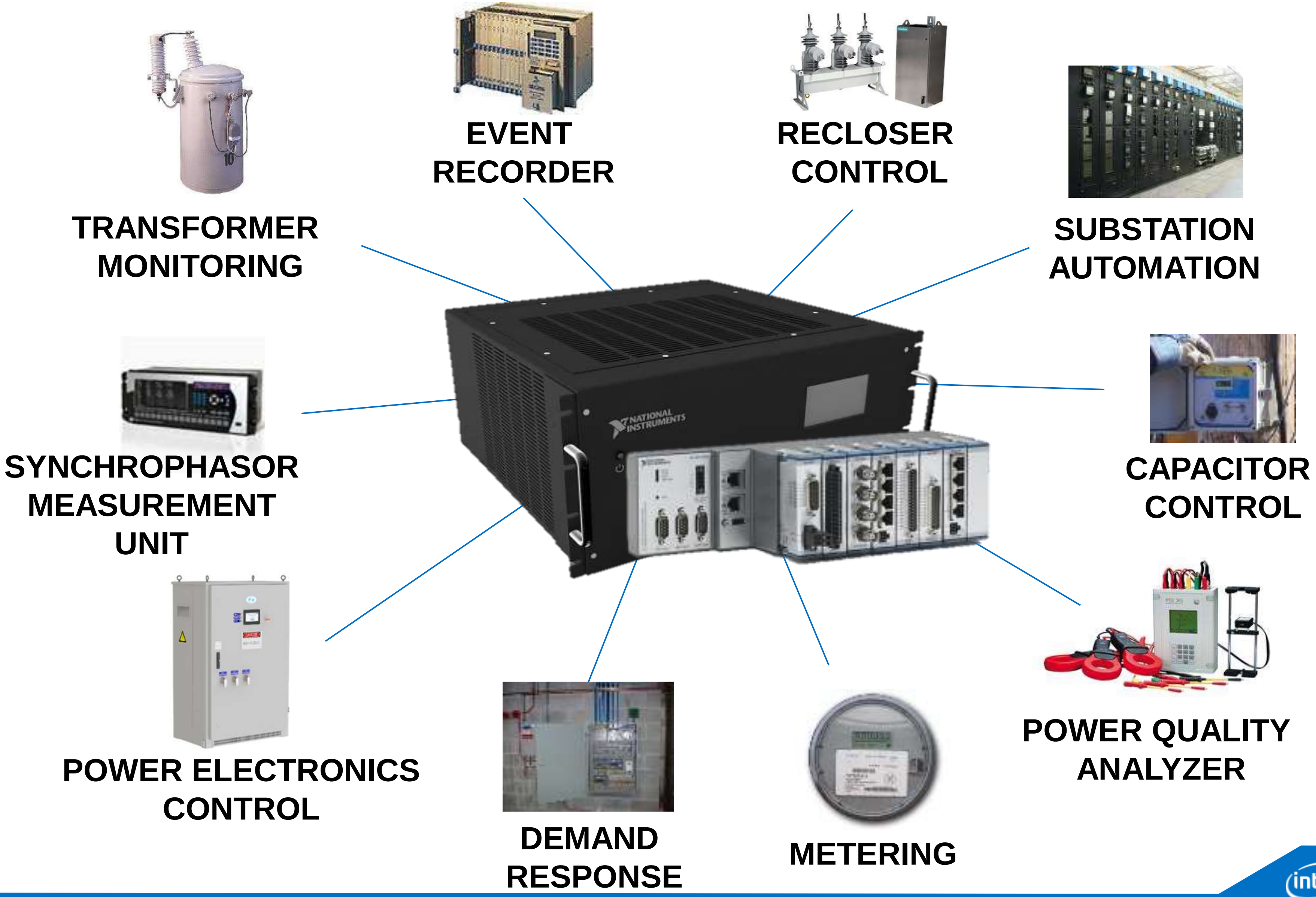
RTDMS Client



Intelligent Systems
The future of the Smart Grid

PMU
PMU
PMU
PMU
PMU
PMU
The next step forward
Synchrophasor solutions
Synchrophasor
PMU
NATIONAL INSTRUMENTS

CONVERGENCE



TRANSFORMER MONITORING

EVENT RECORDER

RECLOSER CONTROL

SUBSTATION AUTOMATION

SYNCHROPHASOR MEASUREMENT UNIT

CAPACITOR CONTROL

POWER ELECTRONICS CONTROL

DEMAND RESPONSE

METERING

POWER QUALITY ANALYZER

Operators
Servers
Operators
PMU

PMUs from National Instruments*

Field programmable, scalable, interoperable

NATIONAL INSTRUMENTS™

PMUs from National Instruments*

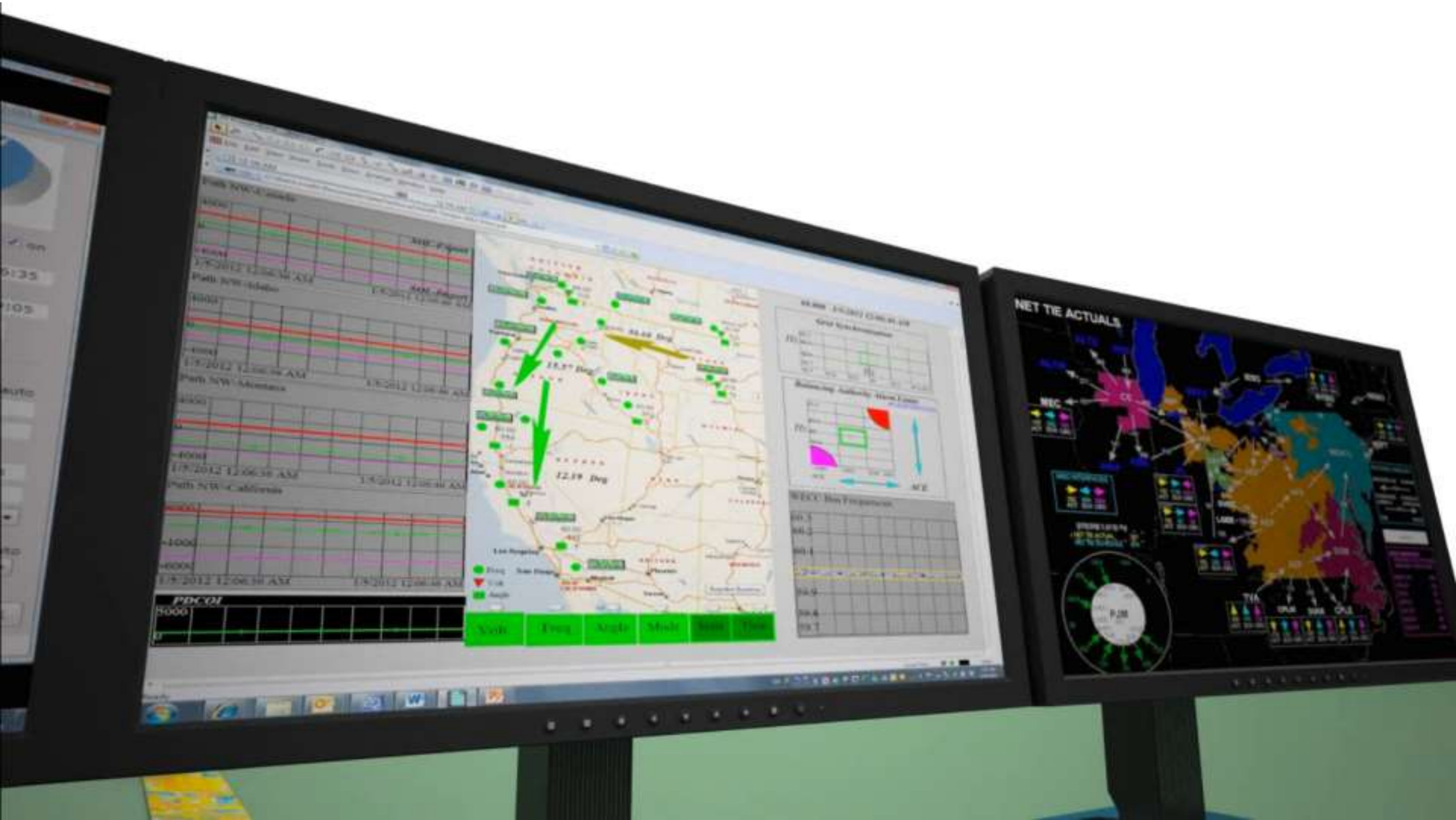
Remote Manageability

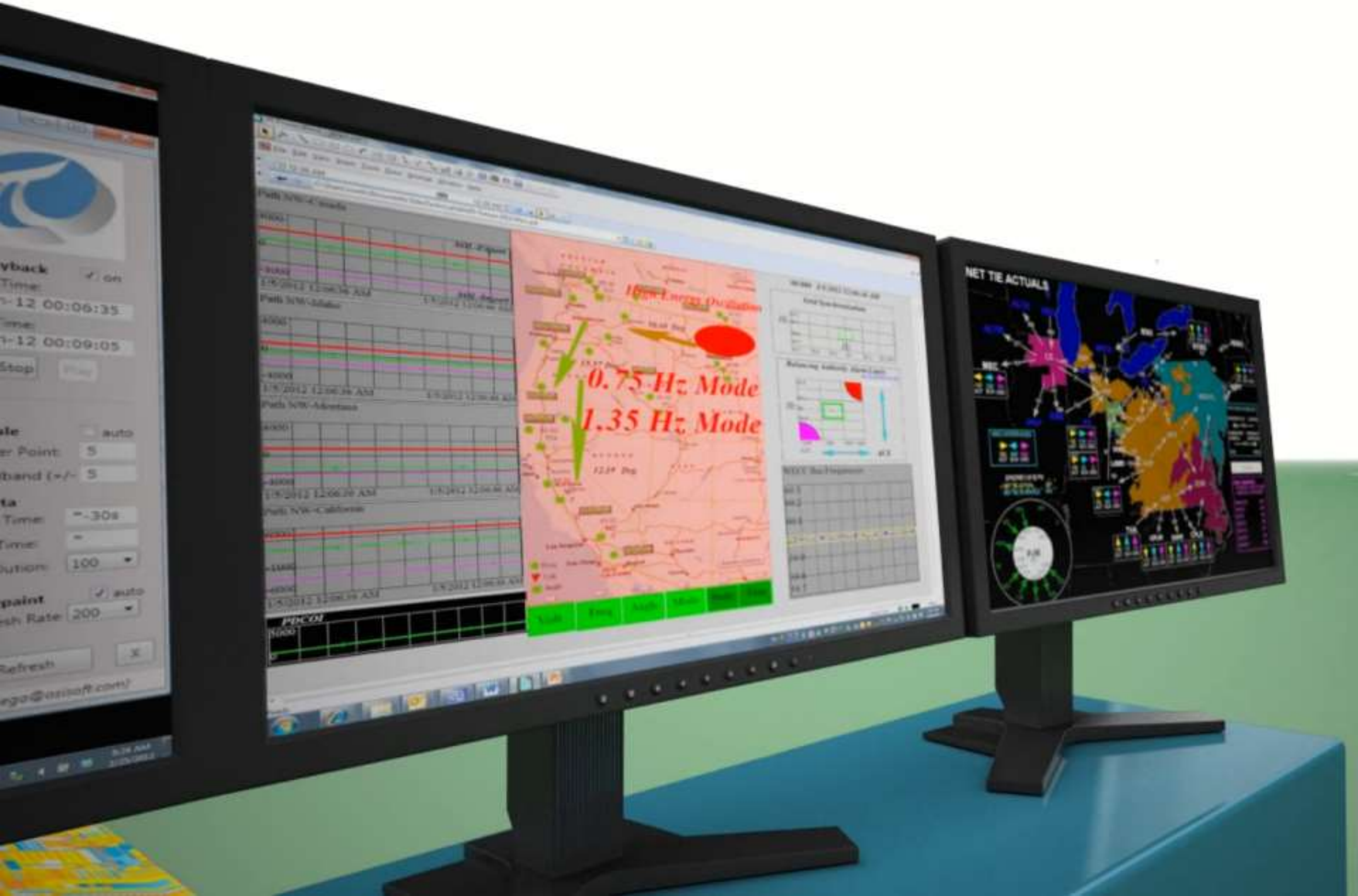
PMUs from National Instruments*

IEEE C37.118-2011, C37.90 compliant

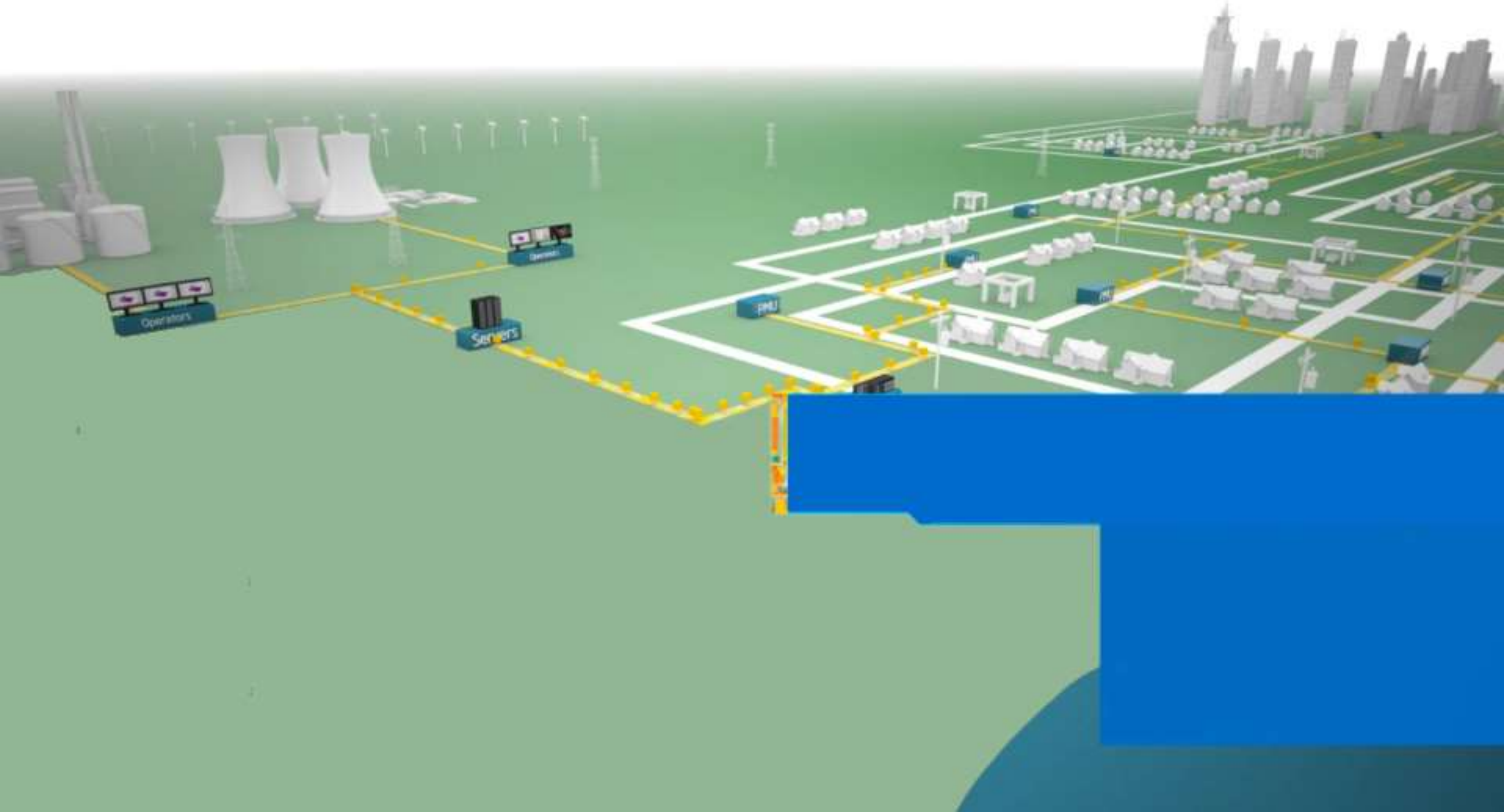
PMUs from National Instruments*

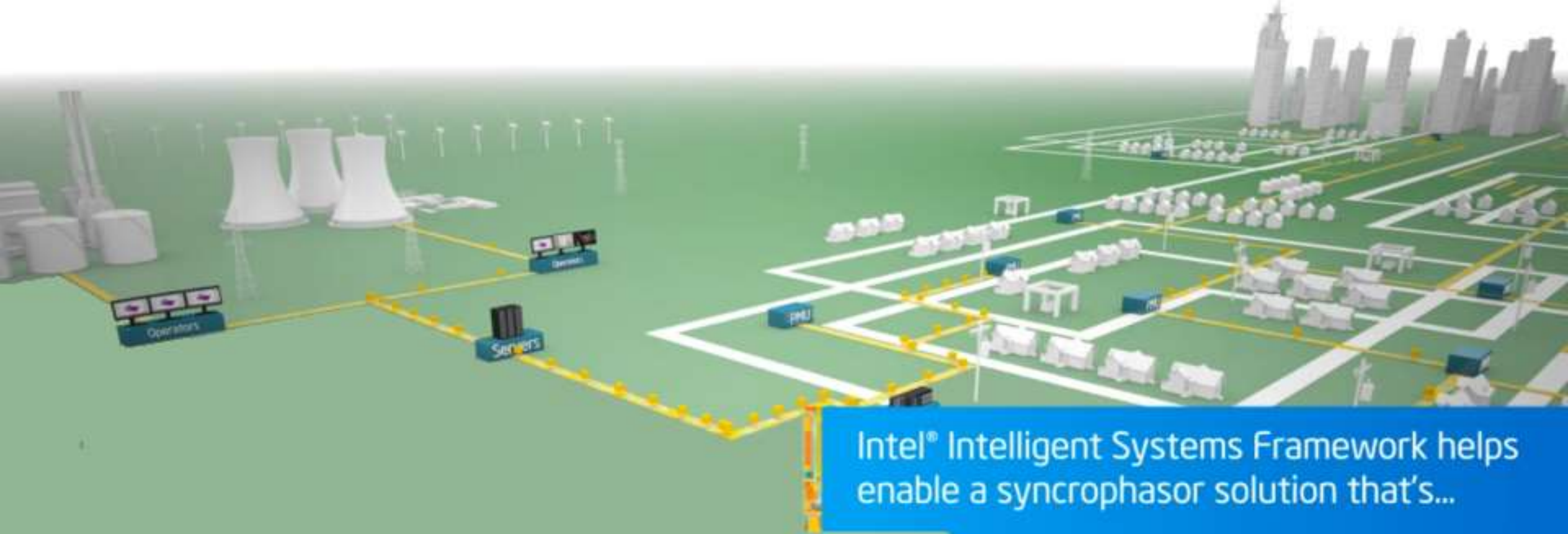
Powered by Intel® Core™ i7 processors


Path NW-Canada
Path NW-Idaho
Path NW-Montana
Path NW-California
1/5/2012 12:06:56 AM
PDCOI
Volt
Freq
Angle
Mode
43.48 Deg
15.57 Deg
12.19 Deg
WECC Bus Frequencies
NET TIE ACTUALS

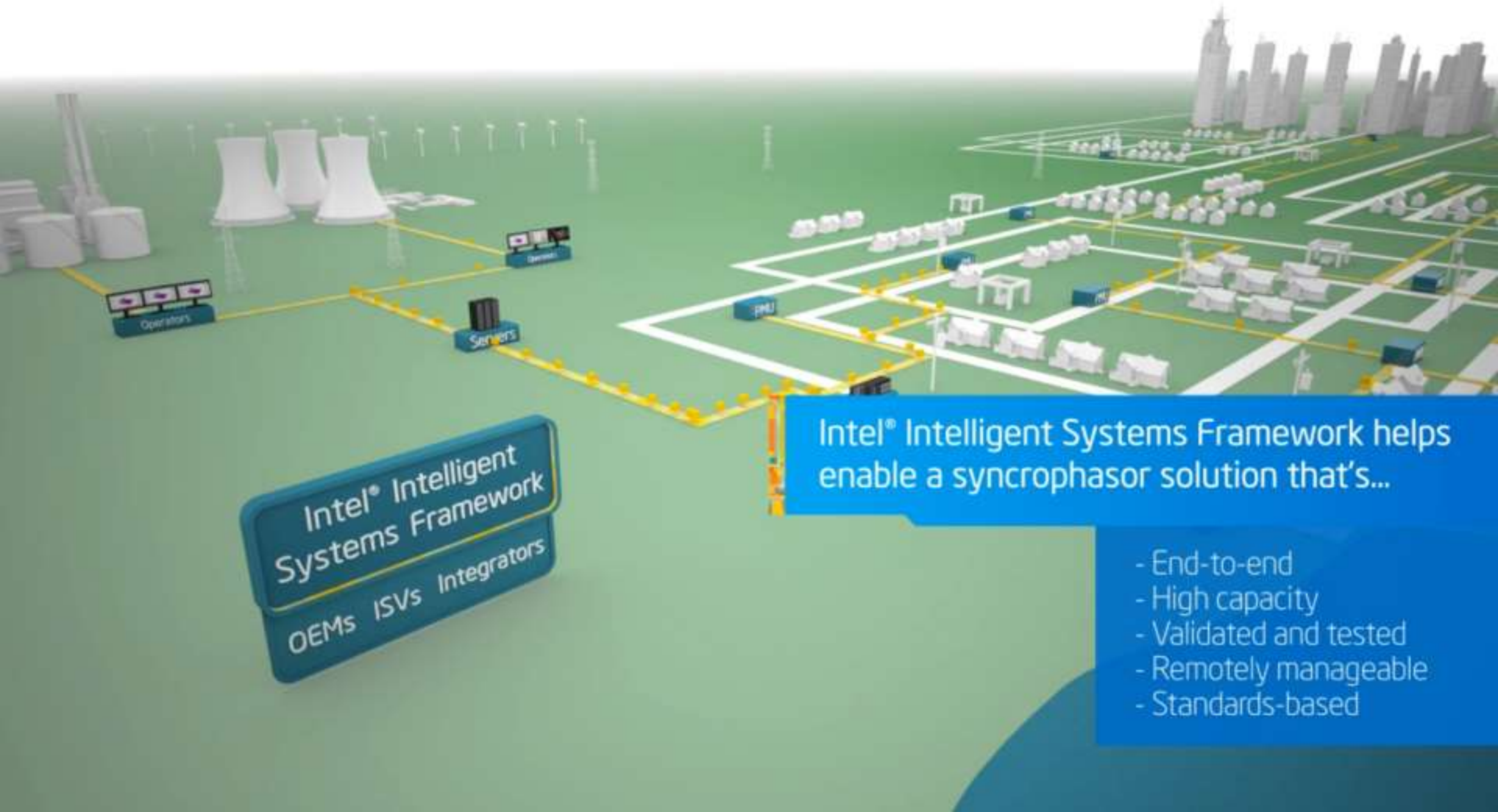

High Energy Oscillation
0.75 Hz Mode
1.35 Hz Mode
NET TIE ACTUALS
yback ✓ on
Time:
n-12 00:06:35
Time:
n-12 00:09:05
Stop
Play
le auto
er Point: 5
band (+/- 5
ta
Time: *-30s
Time: *
ution: 100
paint ✓ auto
sh Rate: 200
Refresh
PDC01

Operators
Servers
PMU


Operators
Operators
Servers
PMU



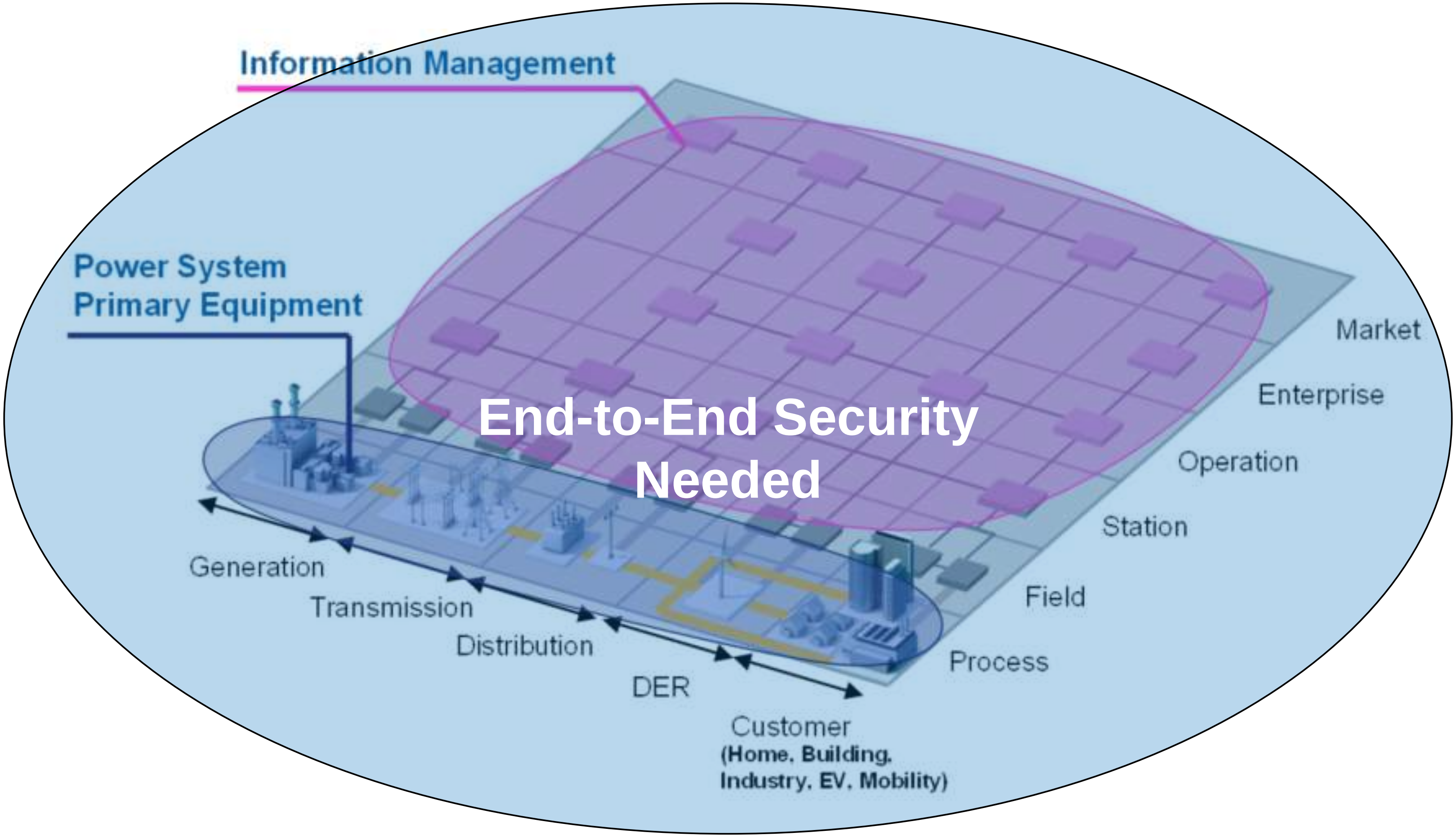
Intel® Intelligent Systems Framework helps enable a syncrophasor solution that's...



Intel® Intelligent Systems Framework helps enable a syncrophasor solution that's...

- End-to-end
- High capacity
- Validated and tested
- Remotely manageable
- Standards-based

Smart Grid Security Needs



Security Connected Platform for Hardening Critical Infrastructure

★ **Embedded Security**

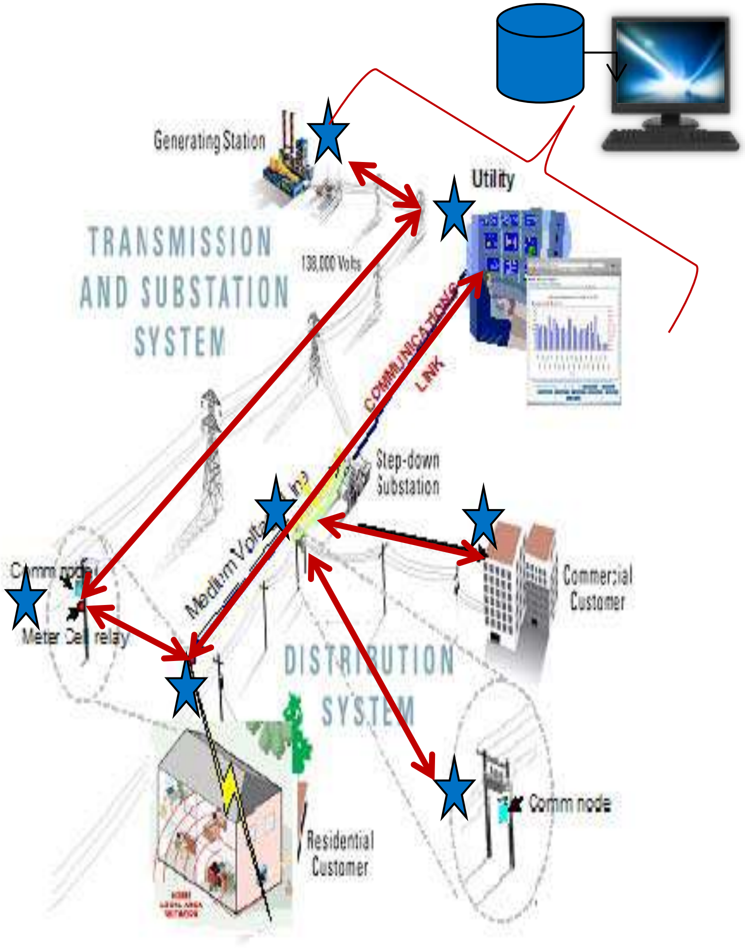
- Physical Security
- Endpoint Protection

↕ **Secure Communication**

- Attack Surface Management
- Machine-to-Machine AAA

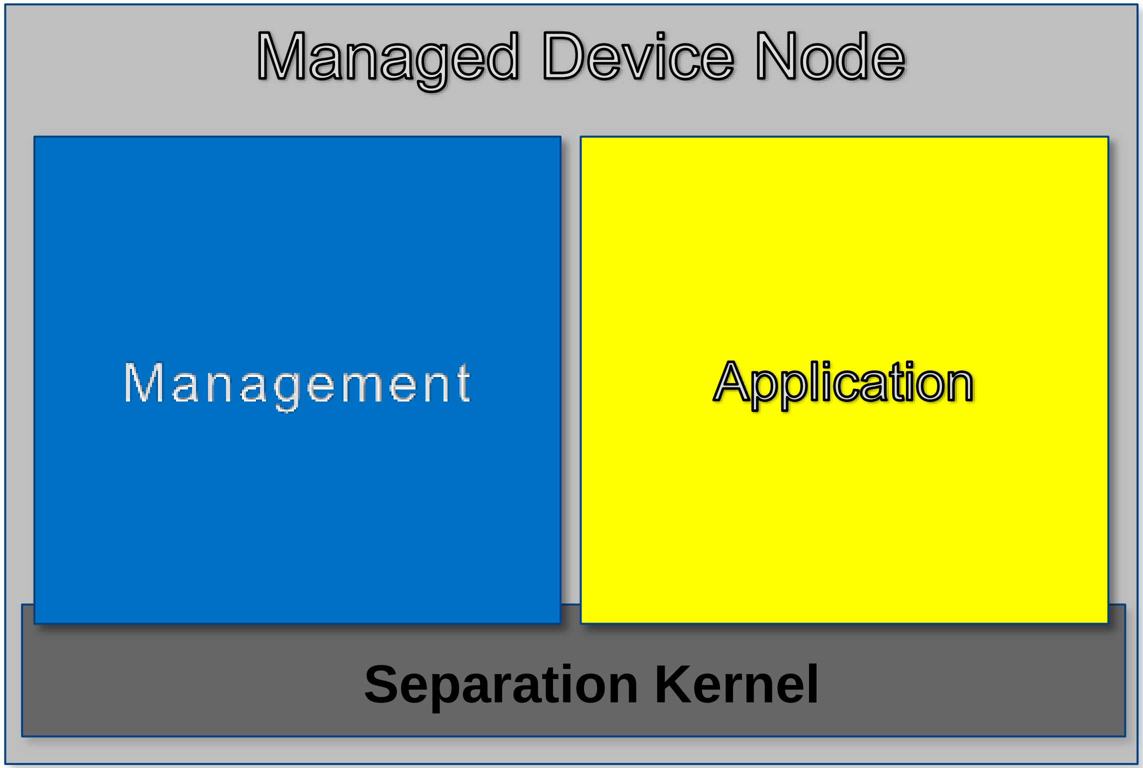
🖥 **Security Monitoring & Management**

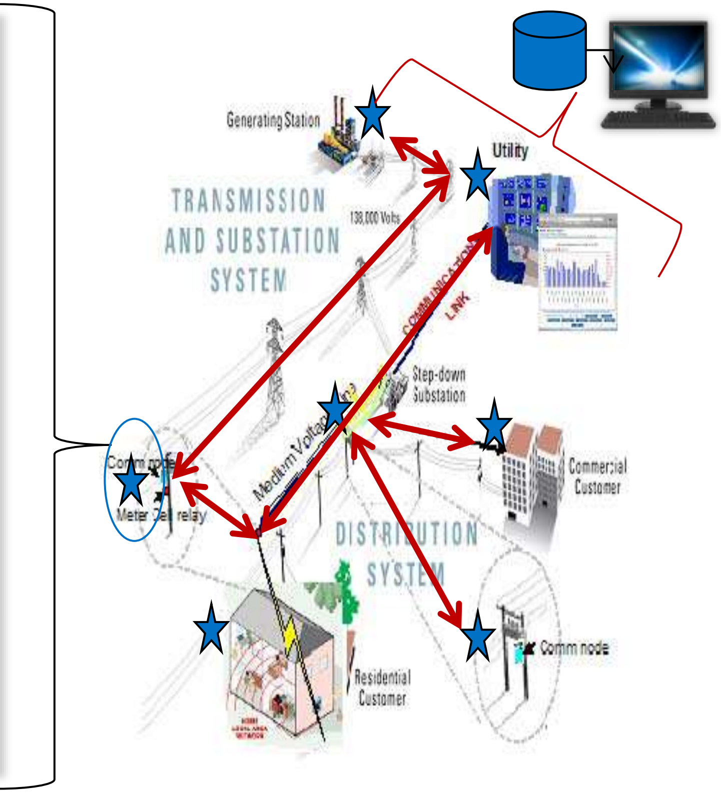
- Security Policy Management
- Security Event Monitoring



Business Process Node Management

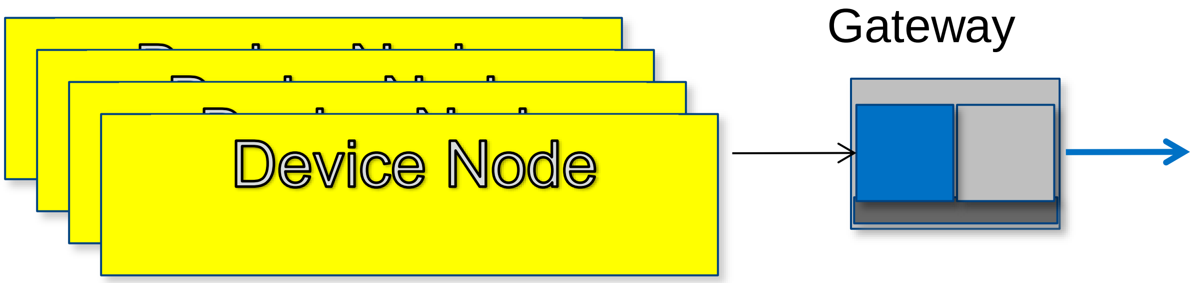
Embedded Security Design Pattern

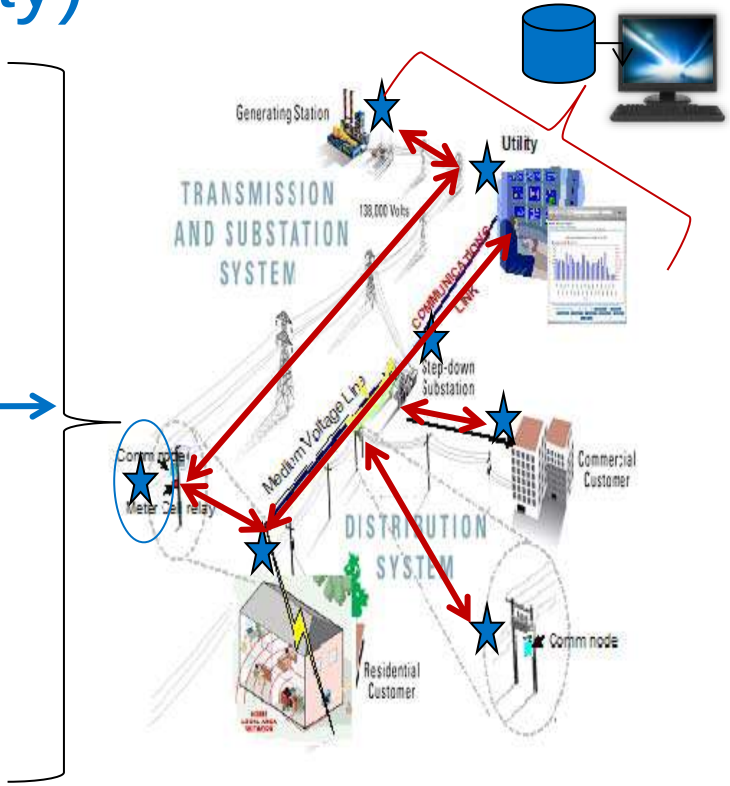




- Green Field scenarios
- Virtual instance secures network for device
- Physical access protected
- Device-level security provided

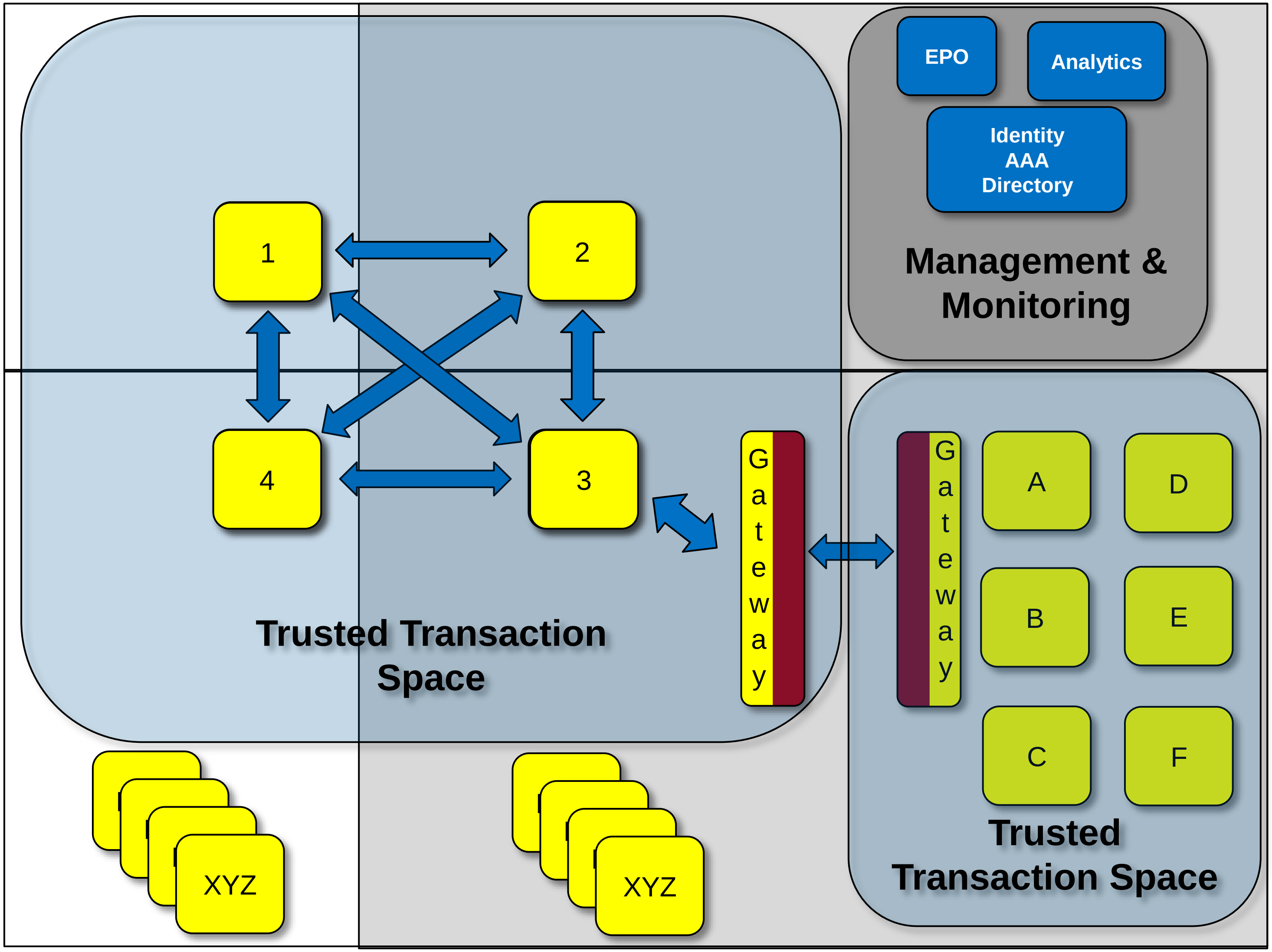
Secured Communication Physical Separation (Gateway)





- Brown Field scenarios
- Gateway secures network for device
- Attack surface reduced to physical access
- No device-level security provided
- Device nodes untouched

Security Connected-Enabled Communication



Partnerships

CCET

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Electric Power Group

ONCOR

AEP
AMERICAN
ELECTRIC
POWER

ERCOT

Sharyland
Utilities

Security Connected for Critical Infrastructure

Security Connected for Critical Infrastructure is a platform

Designed to encapsulate existing business processes

Securing applications without requiring refactoring for security

Enabling applications to collaborate within the Security Fabric

Security Connected for Critical Infrastructure: Comprehensive End-to-End Protection