



**ANY GRID PROJECT.
ONE INTEGRATION
SOLUTION.**





All in this Together: Integrating Data across Disciplines & Functions

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Overview

Diversity in Grid applications

Some things are standardized

Everything can work together

There is benefit in integrating everything

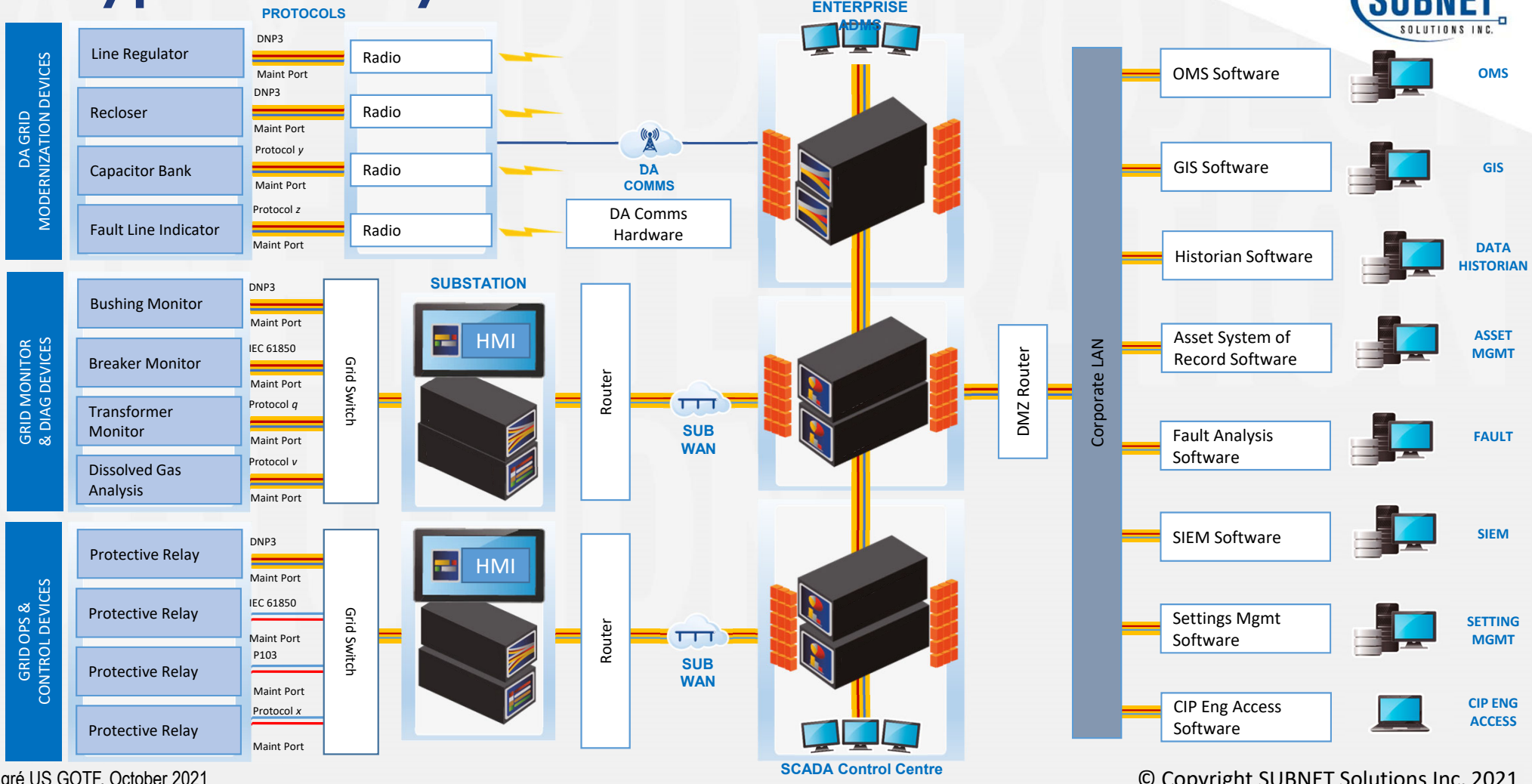
- What? Data sharing between devices and functions
- Why? Improved decision making, new business practices
- How? Engineer for integration from the start

Grid Applications

SCADA / real-time operations	Asset management
EMS / DMS / ADMS / GIS	Historian
Monitoring / Diagnostics	Cybersecurity
Protection / Fault analysis	Configuration management
System engineering & maintenance	System design
	... etc.

Sometimes applications are each managed individually and have evolved processes and protocols in isolation

Typical Utility Communication Architecture



Data Flow

Multiple applications make use of data

Data from a device might be used by multiple applications

- Some is operational/SCADA “real time” data
- Some data is only used by other centralized applications
 - Inbound, e.g.: History, asset management, fault analysis, etc.
 - Bidirectional, e.g.: Engineering access, device configuration, etc.

Traditional approach sends all data to control center

- Control center forwards data to other applications

Operations system is often first data user

- Other applications access data opportunistically

Interfacing

Real-time / SCADA data protocols are well standardized

- IEEE 1815 (DNP3), IEC 60870-5, IEC 61850, Modbus, etc.
- Migration from proprietary protocols to standards through 1990's-2000's

Some standardization in other areas

- E.g.: COMTRADE file format for fault records

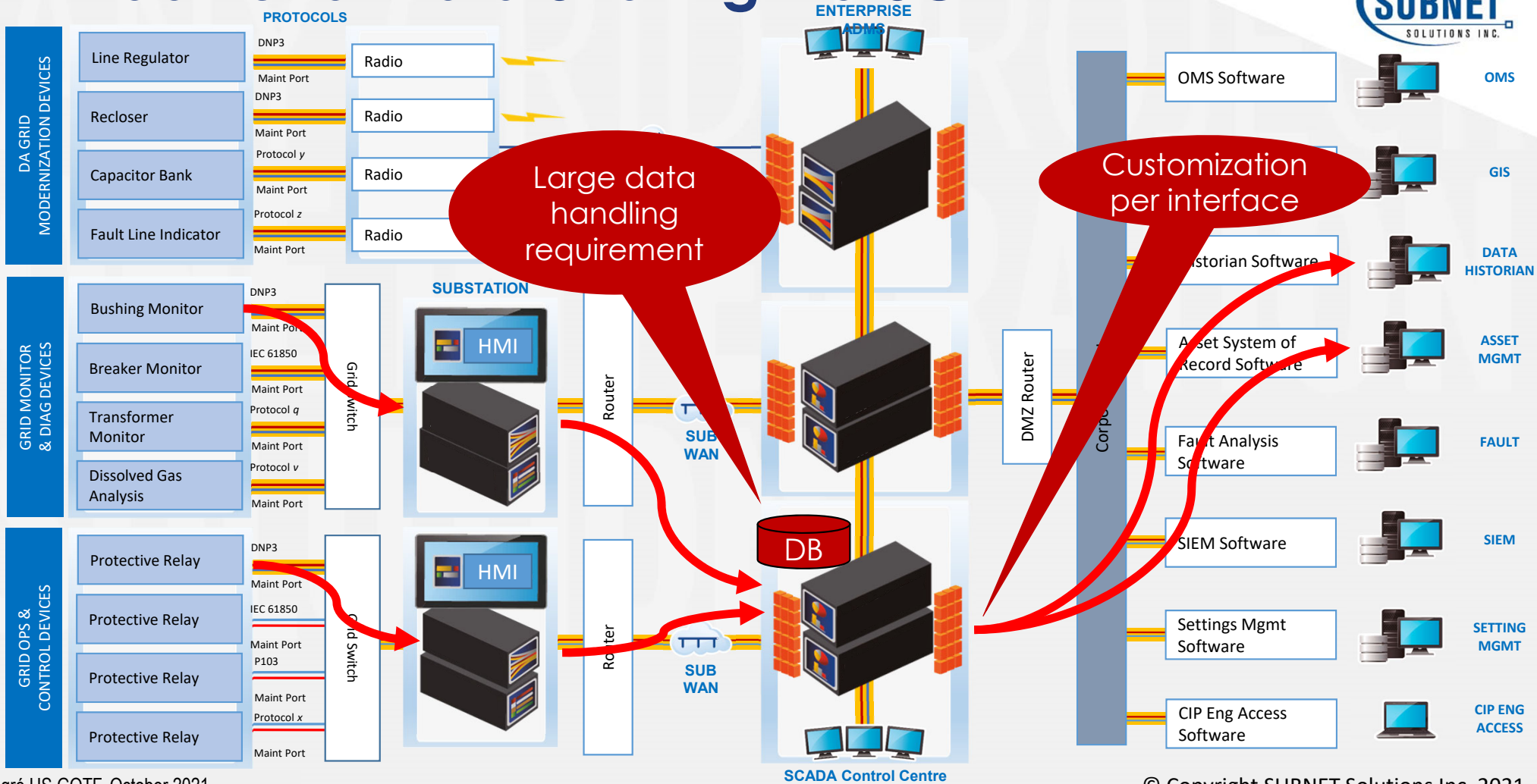
(Very) limited standardization of configuration management

- IEC 61850-90-16:2021 addresses firmware & configuration updates

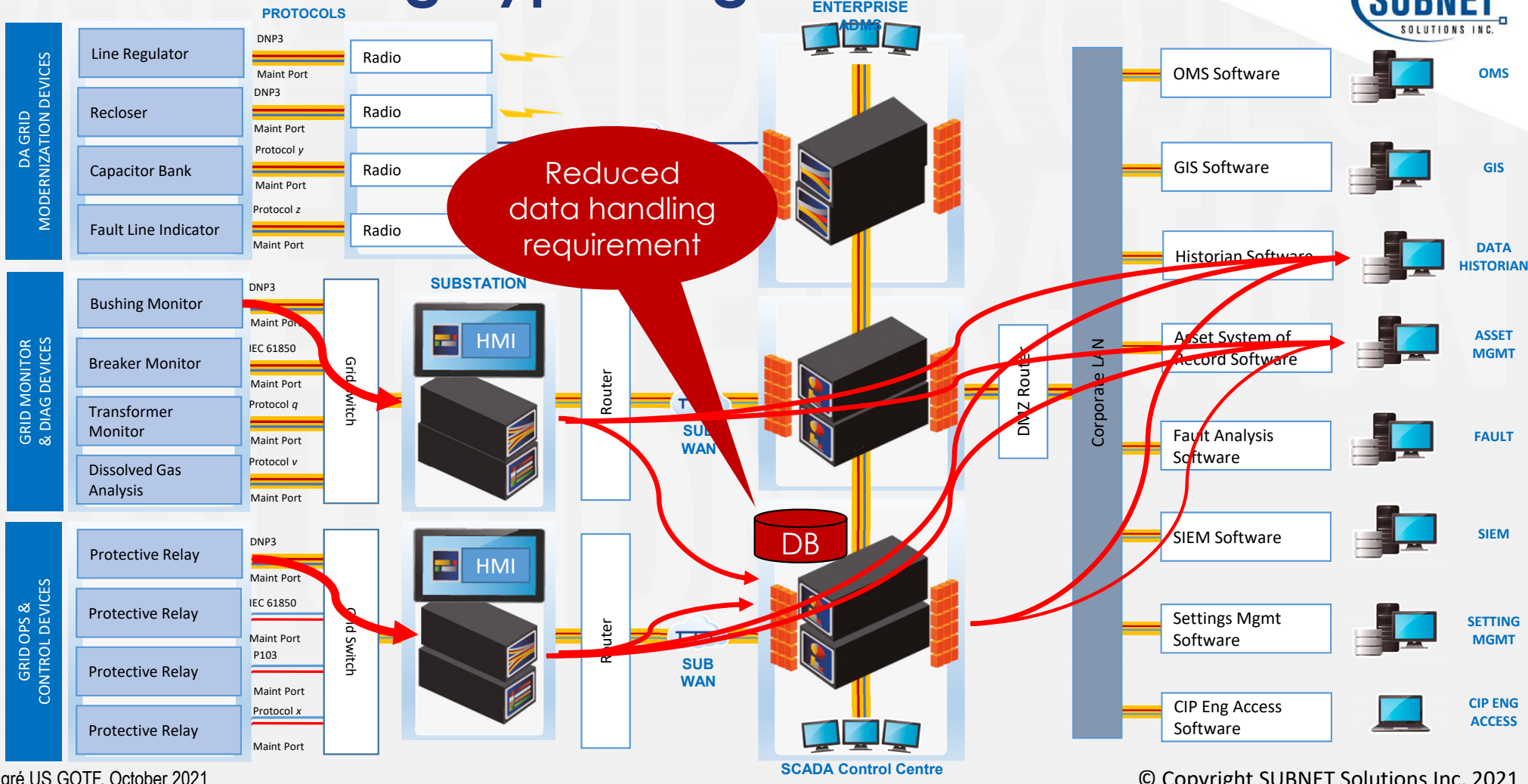
Mostly proprietary access for engineering, configuration

- Many devices have proprietary configuration tools, proprietary diagnostic protocols, proprietary configuration data formats

Traditional Data Sharing via SCADA



Data Sharing Bypassing SCADA



Cybersecurity

Multiple applications use system data

- Most applications or users need only a limited range of data
 - Typically, applications need the same kinds of data from a fleet of different devices, e.g. Fault information
 - Needing to know how to access different kinds of devices is a hinderance
 - Users benefit from tools that present data consistently without needing knowledge of device types or proprietary differences
- Typically only configuration management or engineering access need knowledge of device configuration

Cybersecurity

Role Based Access Control

- Each application or user is given access to data they need
- Data not required by a user may be hidden
 - Protected from inadvertent (or deliberate) manipulation
- Device passwords may be managed automatically
 - Users do not need to remember device passwords
 - Access may be revoked by managing user access, not by changing passwords on a fleet of devices

New device management workflows enabled

- Check/verify authorized configurations, firmware versions, etc.
 - Alert on unauthorized change, log audit trails of all actions, etc.

System Expansion

System extension is usually triggered by operational needs

As the system is extended...

- Consider what data could be required for all applications, not only for operational/real-time SCADA, but also for maintenance, asset management, integration with corporate applications, etc.
- Involve stakeholders to determine data uses
- Provide appropriate access to data for all users who need it
- Minimize costs by considering this as part of the design process, not as an afterthought

Gain the maximum benefit of data available in the system!

Architecture

Managing all data by role

- Controls distribution of data to authorized users & applications
- Reduces loading on SCADA and operational systems
- Simplifies the view of the system seen by each user
 - Improves staff efficiency
 - Reduces training costs
- Remote engineering access
 - Expedites fault rectification
 - Reduces maintenance costs by reducing truck rolls/site work
- New workflows, improved system monitoring, improved cybersecurity

Summary

Multiple applications use system data

When adding any new function or device

- Consider all stakeholders / data users
- Design-in support to provide data for all authorized users
- Consider whole-of-life costs

Ensure appropriate RBAC isolation of functions / access



감사합니다

Danke

谢谢

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado

Questions?

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