Utilities 4.0 – The new Generation of SCADA Systems

Tradition meets Innovation

February, 2019

Background

- European group of companies dedicated to the Transport and Distribution (T&D) Market

- Manufacturing Low, Medium and High Voltage equipment

- Recently launched its 4th generation (IoT) SCADA

- Experienced team for deployment, commissioning and consulting for:

  - Data analytics applications (e.g. Osisoft PI)

  - SCADA EMS/DMS systems

  - Wind and photovoltaic parks

  - Smart Metering

  - Cogeneration and MicroGrids

At a glance

60,000,000 EUR	
50,000,000 EUR	
40,000,000 EUR	
30,000,000 EUR	
20,000,000 EUR	
10,000,000 EUR	
0 EUR	

1995 2000 2005 2010 2011 2012 2013 2014 2015 2016 2017

20 +
years of experience
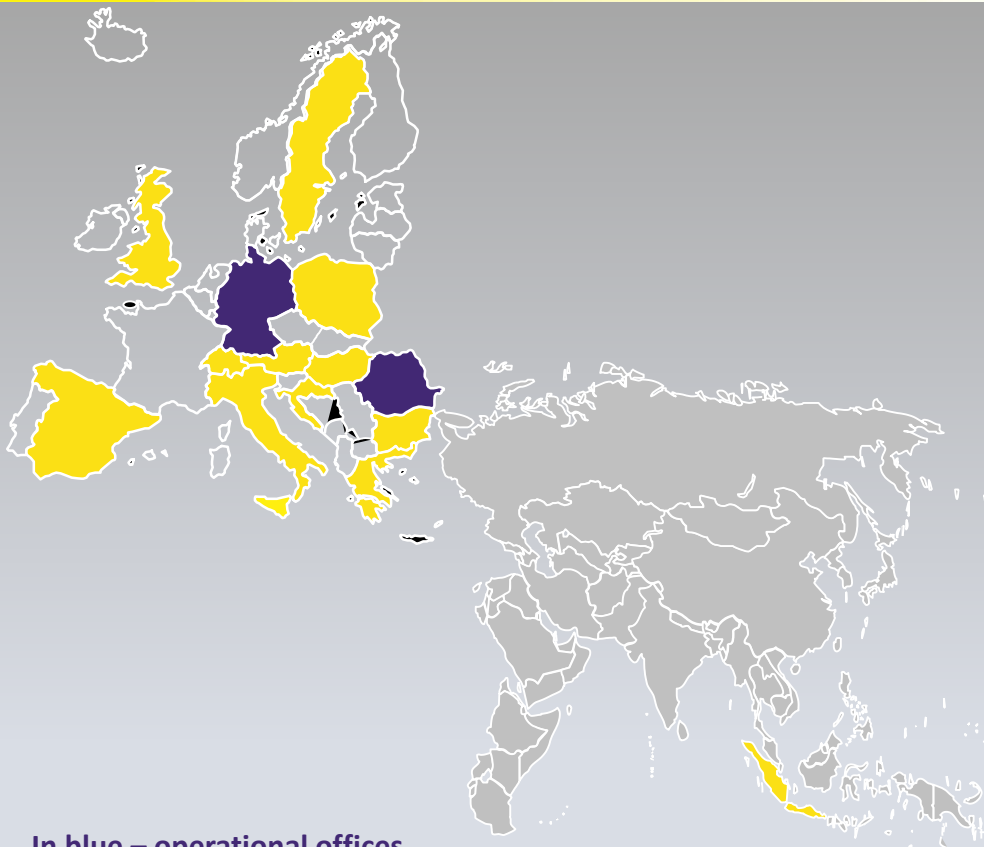
450 +
employees

300 +
T&D products

250 +
EPC, Consulting and
Electrical Design
Projects

25 +
patented
inventions

*consolidated for the Energy T&D Market for Eximprod Grup, Eximprod Power Systems, Inovium Digital Vision and Total Electric Automatizari

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Presence in Europe and Asia

In blue – operational offices

GERMANY - 24 kV station post & railway insulators

ITALY - Medium Voltage Products and Equipment (ENEL International)

POLAND – Medium Voltage Fuses, Insulators

SWEDEN - 24 kV station post insulators

SWITZERLAND - 25 kV railway insulators
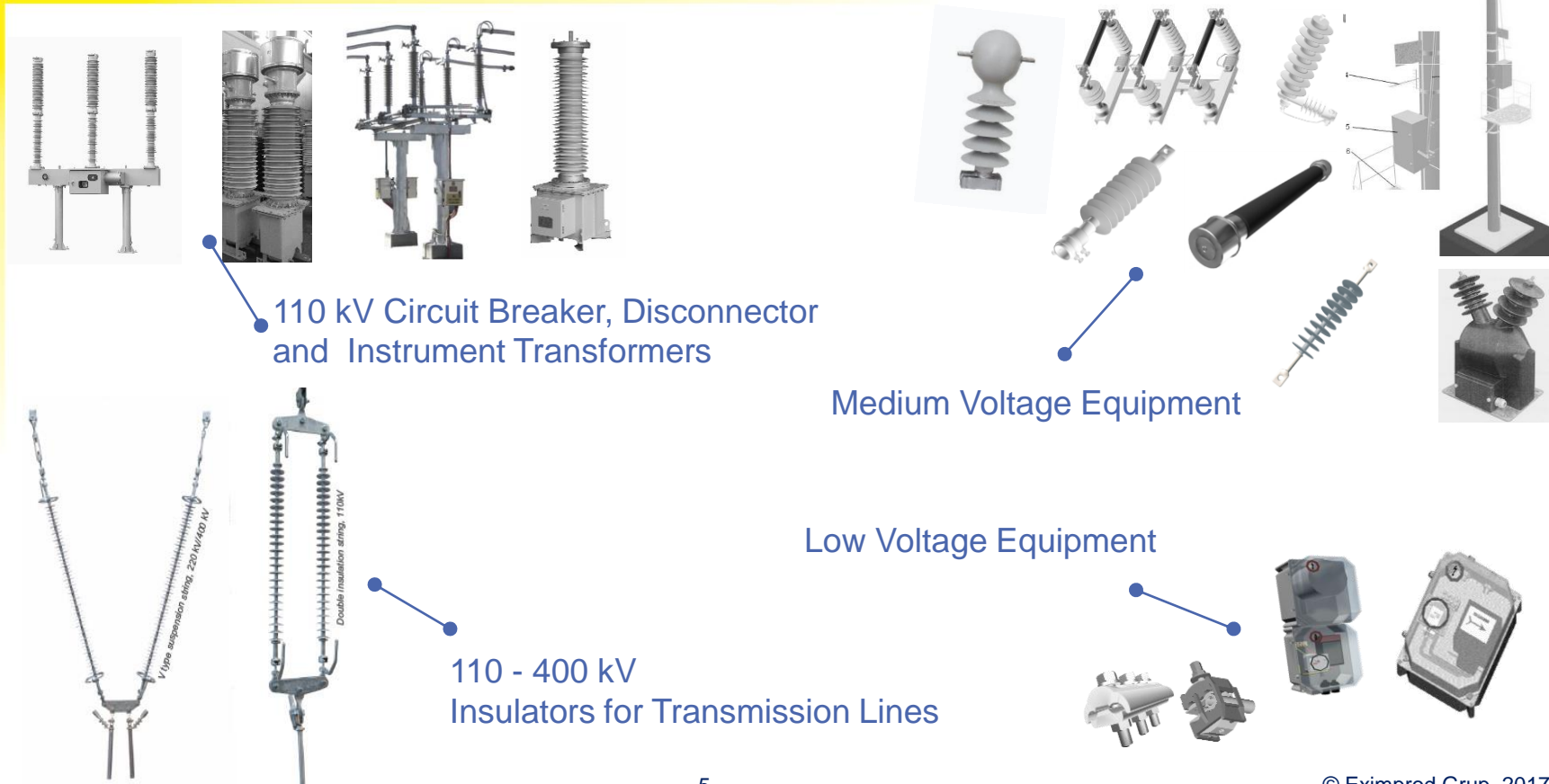
NETHERLANDS – Outdoor sensors for current and voltage

BULGARIA - 25 kV railway insulators and Medium Voltage Fuses

INDONESIA - Medium Voltage Fuses

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Eximprod T&D product highlights

110 kV Circuit Breaker, Disconnector and Instrument Transformers

Medium Voltage Equipment

Low Voltage Equipment

110 - 400 kV Insulators for Transmission Lines

Major clients in T&D and Renewables

SCADA/IoT and Software Development Team

Eximprod in the Smart Grid Market

- Extensive High, Medium and Low Voltage equipment portfolio, including combined Current and Voltage Sensors for MV networks;

- State of the Art 4th generation IoT SCADA platform software development;

- Experienced Team for deployment, commissioning and consulting for :

  - Data analytics applications (e.g Osisoft PI);

  - SCADA EMS/DMS systems;

  - Wind and photovoltaic parks;

  - Smart Metering;

  - Smart Lighting;

  - Water treatment;

  - Cogeneration and MicroGrids;

Eximprod SCADA/IT Business Unit

- Business Unit founded in 2005;

- Consolidated Turnover in 2016: 13.000.000 USD

- Headquarters: Bucharest, Romania; Engineering branches: Iasi, Bacau, Buzau;

- Employees: 82 ;

  - Software development: 10;

  - Control Center and Commissioning: 24;

  - Electrical design: 15

  - Project Management: 7

*including the affiliated Inovium Digital Vision

Reference Highlight – SCADA for Utilities

- Integrated SCADA DMS System:
    - 3,000+ MV Switches and Reclosers,
    - 80 Primary Substations
    - 500+ Secondary Substations.
- Osisoft PI system for data management.

- Integrated SCADA EMS/DMS
    - 1,500+ MV Switches and Reclosers,
    - 90 Primary Substations
    - 100+ Secondary Substations.
- SCADA Training Center (2007)
- SCADA DMS – External OMS integration (2015-2016)

- Automation for secondary distribution substations;
- Remote-controlled MV Switches

Reference Highlight – other

- Private Dispatch Center for Renewable Energies
- Integration of multiple locations/plants

- Cogeneration Plant Dispatch which integrates the data from:
    - 20 kV / 6 kV Substation Automation
    - Local Energy Distribution Operator Integration
    - GE Jenbacher Generator
    - Local DCS System
    - Water Treatment System
    - Security / Outdoor Lighting System

- Consulting Services for Smart Meter Network Deployment

- EPC for wind HV/MV Electrical Substation and Grid Connection
    - Corni 70 MW Wind Park (Vestas, 2012)
    - Baleni 50 MW Wind Park (GDF/Engie, 2013)

Experience in multi-vendor environments

IEDs and Protection Relays	RTU/PLC/DCS Systems	Communication Protocols
PolarR (Whipp and Bourne)	ControlWave (Emerson)	IEC 60870-5-101 / 104
VisionR *(Whipp and Bourne)	microURR (Efacec)	IEC 60870-5-103
SEL351 * (SEL)	Arctic Control (Viola Systems)	DNP3
ADVC Controller Nulec * (Schneider)	Arctic GW 104 I/O (Viola Systems)	Modbus TCP/serial
Tavrida REF 541, 542+, 543, 545, (ABB)	Arctic GW 104 I/O ES100 (EPG – Viola)	Profibus
REL 511, 670 (ABB)	CLP500 (Efacec)	IEC 61850
RET 543, 670 (ABB)	BCU 500 (Efacec)	Proprietary protocols
P139, P141 (Areva/Schneider)	UAC 420 (Efacec)	
SIPROTEC (Siemens)	Saitel (Telvent)	
M line (Microelecttrica)	D400 (GE)	
D050 (Efacec)	ZIV (Ziv)	
TPU (Efacec)	Sicam (Siemens)	
VAMP (Vamp/Schneider)	Talus (Schneider)	
SEPAM (Schneider)	ES200 (Eximprod)	
ERBS, DSLPP (Telecomm)	Specific clients RTU	
Power Quality Monitoring Units		

Cooperation with CISCO

Current areas of partnership

- State of the Art 4th generation IoT SCADA platform software development;

- Complex LoRaWAN software development for Utilities and Oil&Gas;

- Industrial Switch and Routers for Energy Utilities;

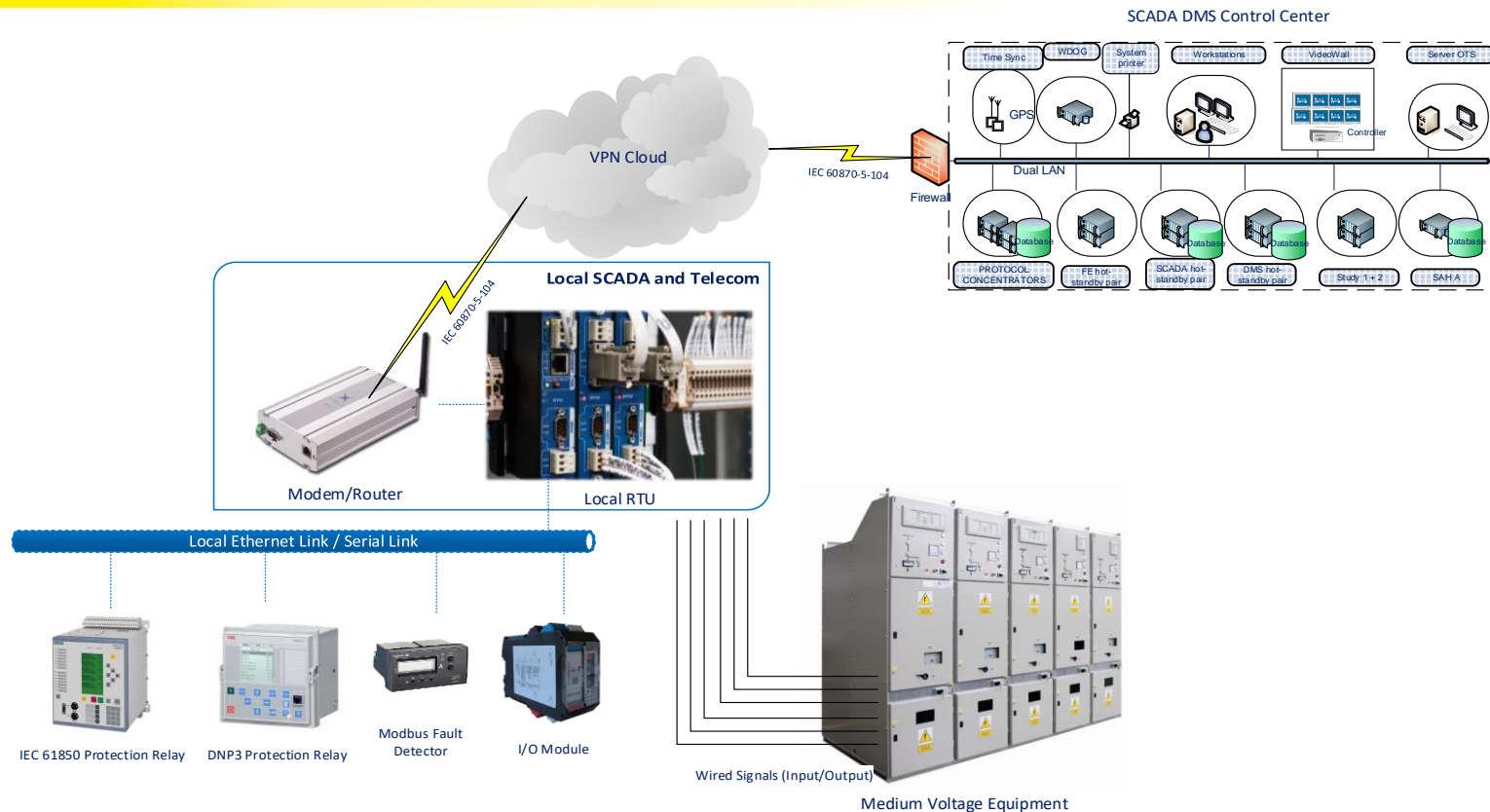- SCADA DMS/EMS Cybersecurity;

A Smart New World
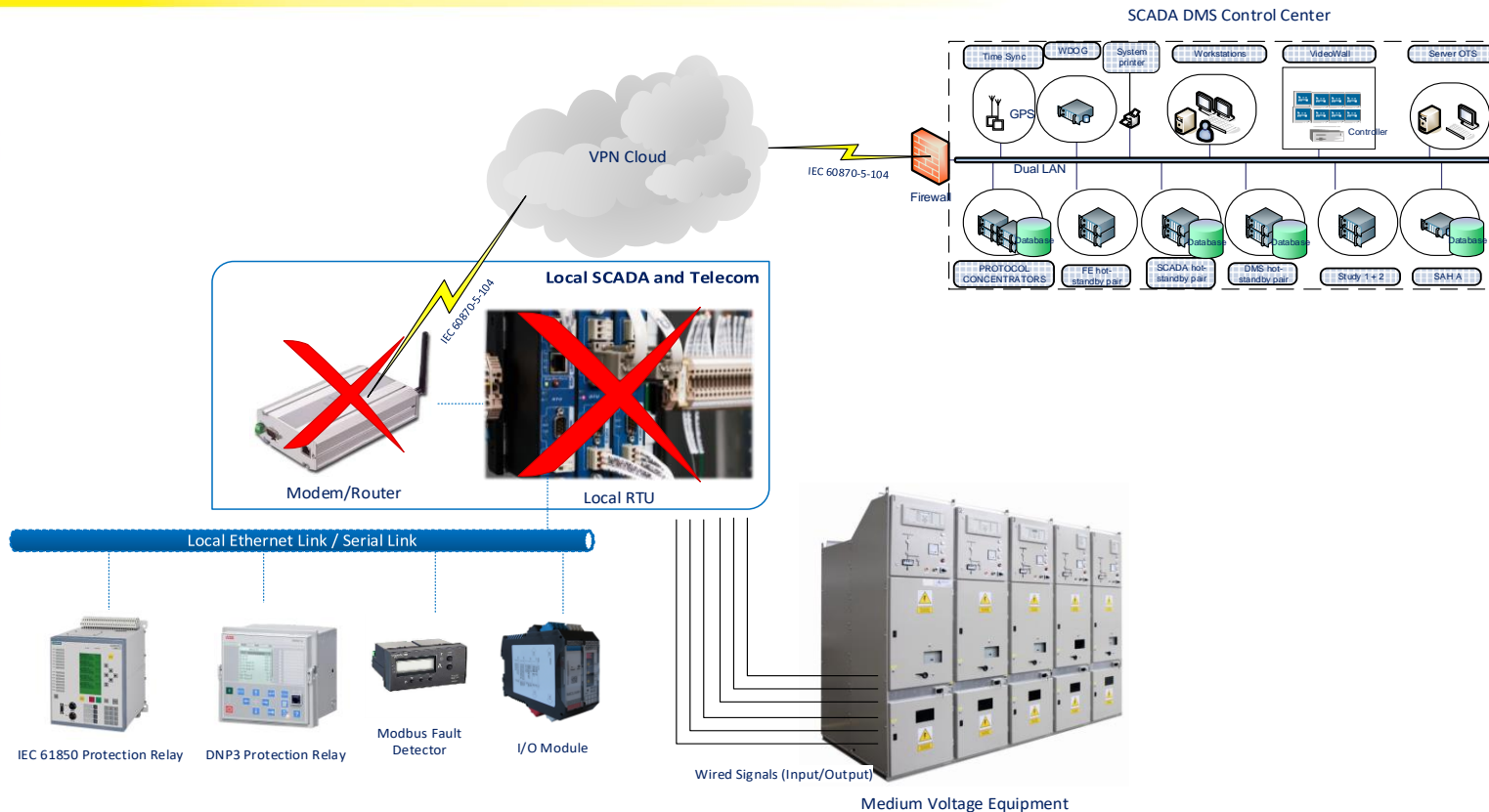
Current SCADA Environment

- Multiple vendors and equipment of various age in the installation

- Software embedded on specific hardware

- Dedicated Hardware for each function

- Software solutions depended on vendors

- Low Security on existing equipment/protocols

- Difficult/manual updates

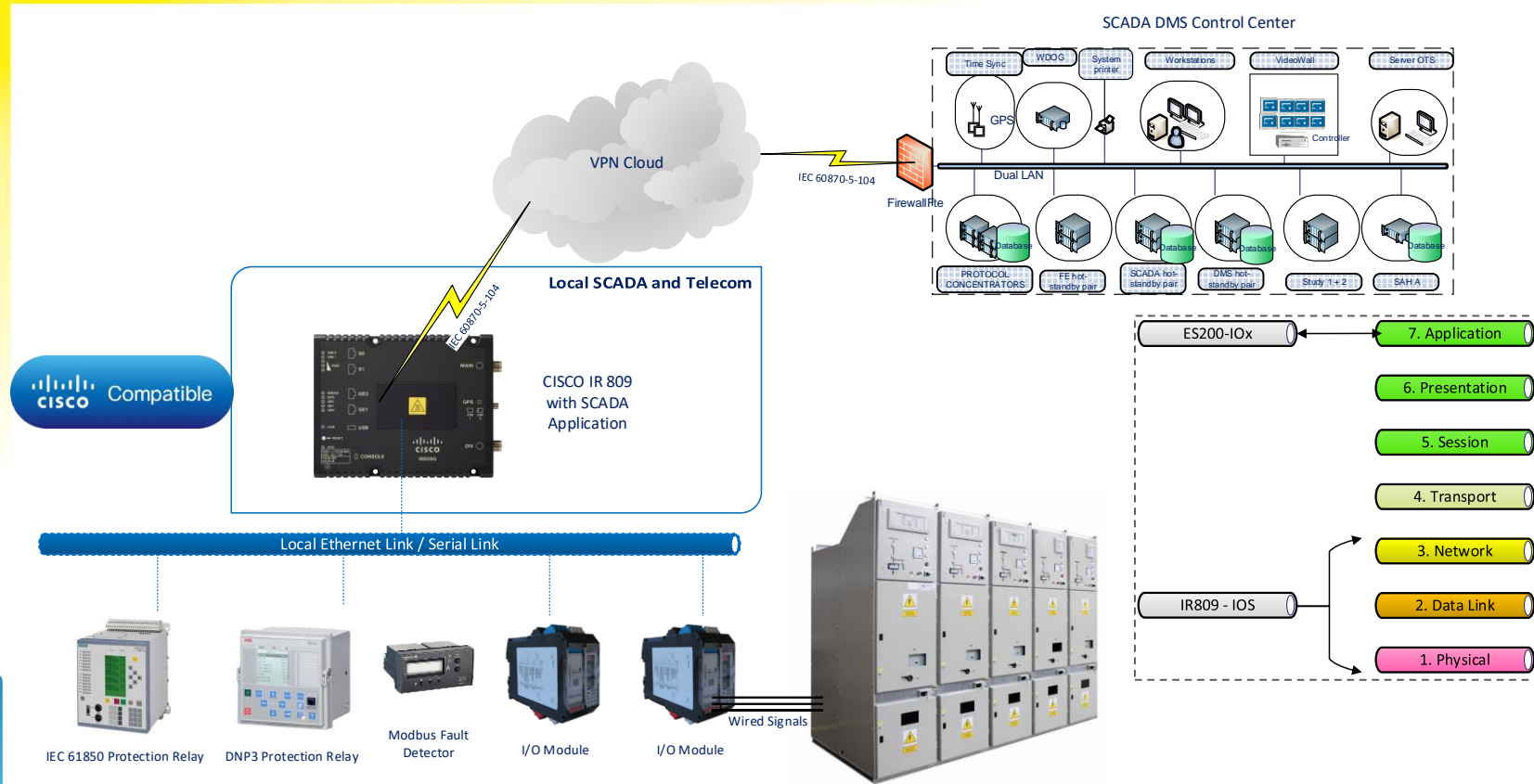- Long Life Span for equipment – over 10 years

Standard Distribution Automation

SCADA DMS Control Center

Time Sync | WDOG | System printer | Workstations | VideoWall | Server OTS

GPS

Controller

Dual LAN

IEC 60870-5-104

Firewall

VPN Cloud

PROTOCOL CONCENTRATORS | FE hot-standby pair | SCADA hot-standby pair | DMS hot-standby pair | Study 1 + 2 | SAH A

Database

Local SCADA and Telecom

IEC 60870-5-104

Modem/Router

Local RTU

Local Ethernet Link / Serial Link

IEC 61850 Protection Relay | DNP3 Protection Relay | Modbus Fault Detector | I/O Module

Wired Signals (Input/Output)

Medium Voltage Equipment

Standard Distribution Automation(2)

SCADA DMS Control Center

Time Sync | WDO G | System printer | Workstations | VideoWall | Server OTS

GPS

Controller

Dual LAN

IEC 60870-5-104

Firewall

VPN Cloud

Database | Database | Database | Database

PROTOCOL CONCENTRATORS | FE hot-standby pair | SCADA hot-standby pair | DMS hot-standby pair | Study 1 + 2 | SAH A

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Our Digital Approach

SCADA DMS Control Center

VPN Cloud

IEC 60870-5-104

Firewall

Dual LAN

Time Sync | WDOG | System printer | Workstations | VideoWall | Server OTS

GPS

Controller

PROTOCOL CONCENTRATORS | FE hot-standby pair | SCADA hot-standby pair | DMS hot-standby pair | Study 1 + 2 | SAH A

Database

Local SCADA and Telecom

IEC 60870-5-104

Compatible

CISCO IR 809
with SCADA
Application

ES200-IOx

7. Application

6. Presentation

5. Session

4. Transport

3. Network

IR809 - IOS

2. Data Link

1. Physical

Local Ethernet Link / Serial Link

IEC 61850 Protection Relay | DNP3 Protection Relay | Modbus Fault Detector | I/O Module | I/O Module

Wired Signals

Medium Voltage Equipment

Preferred
Solution
Partner

ES200 – A new perspective

- Upgrade instead of Replace

- Software Defined Infrastructure in OT

- State of the art CISCO Security for SCADA

- Versatility - new functions available on a single device with multiple 3rd party apps

- Less hardware deployed (2-in-1 solution);

- Zero-touch installation and update management with FogDirector

- Multipoint data delivery

ES200 Multi-purpose Use case

SCADA Edge Computing ES200 on Cisco IOx

Enterprise IT

Enterprise OT

LoRaWAN App Server

LoRaWAN Gateway

LoRa WAN

IEC 61850 DNP3 MQTT Modbus OPC-UA

Field equipment

Cisco Kinetic — MindSphere — Microsoft Azure — IBM Bluemix

DNP3 IEC 104

SCADA Command Center
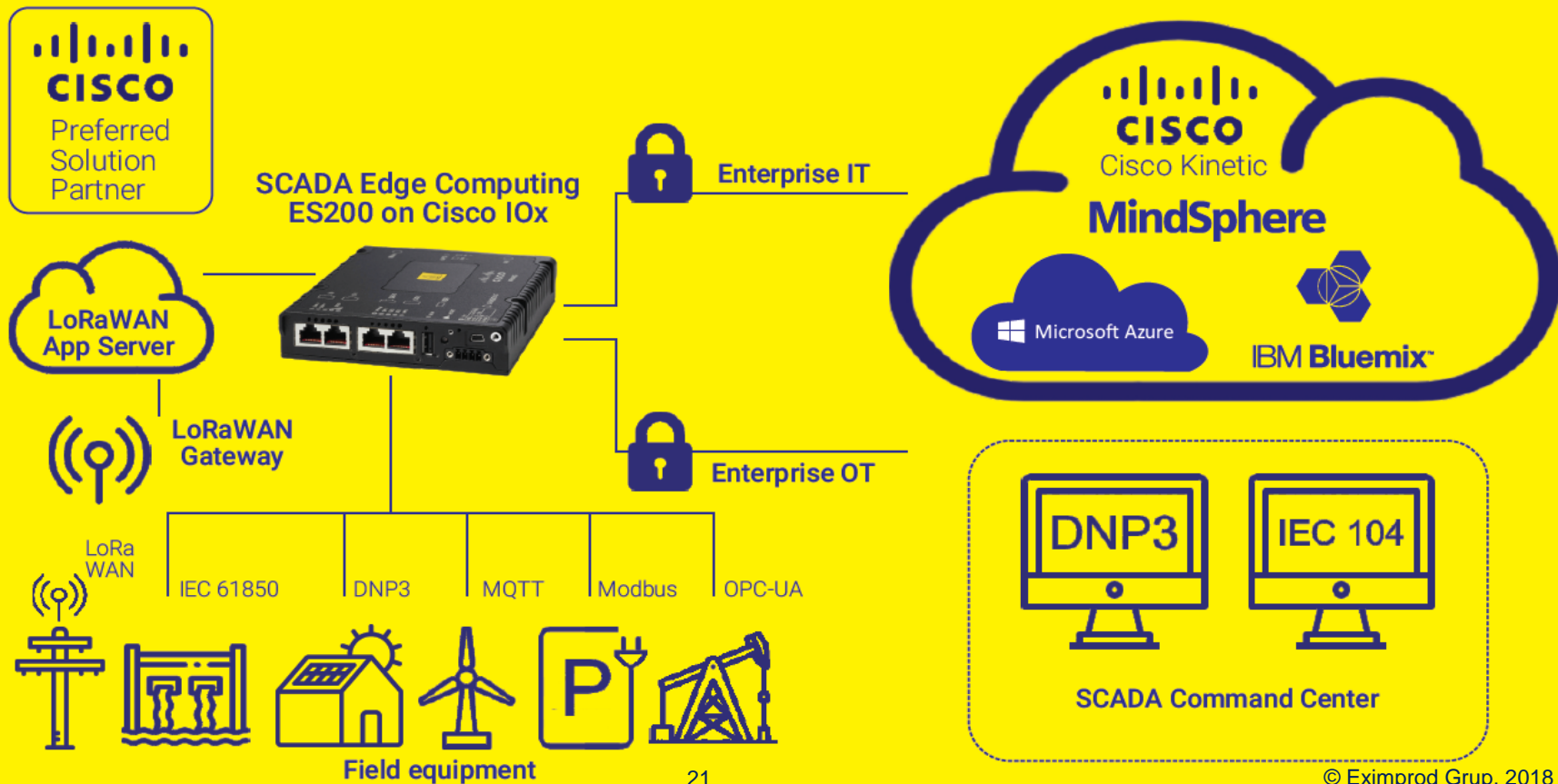
ES200 Fog Director Integration

ES200 runs integrated with the Cisco Fog Director environment which allows state of the art manageability and integration with 3rd party Applications

ES200 Reference Highlight

- Main ES200 End-Users

electrica s.a.	Main Distribution System Operator in Romania. ES200 deployed on Cisco IR809 since 2017 , using Field Network Director and Fog Director for Distribution Automation management
e·on	Adopted ES200 in Cisco IR 809 in 2018. 47 secondary substations du to be commissioned until January 2019.
monsson	Main private dispatching center for Renewables in Romania. ES200 is deployed to manage different local configurations, including OPC UA communication

- Ongoing PoC in : Latvia, Germany, Norway.

- Detailed Reference list is attached

ES200 Development Roadmap

- LORA Connectivity

  - Rapid Fault Restoration based on LoRaWAN Sensors

- Osisoft PI integration

  - COMTRADE files extraction and subscription along with traditional SCADA functionalities

- New Smart Grid functions

  - Data HUB for Smart Grid

  - Microgrid Automatic Management

  - FDRR – Fault Detection and Rapid Restoration

Conclusions

- SCADA Systems are data sources to drive Business Value

- Security is foundational for SCADA

- New technologies enable new use-cases

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