IoT INFRASTRUCTURE
2019 Conference and Expo

Digital energy for the digital age

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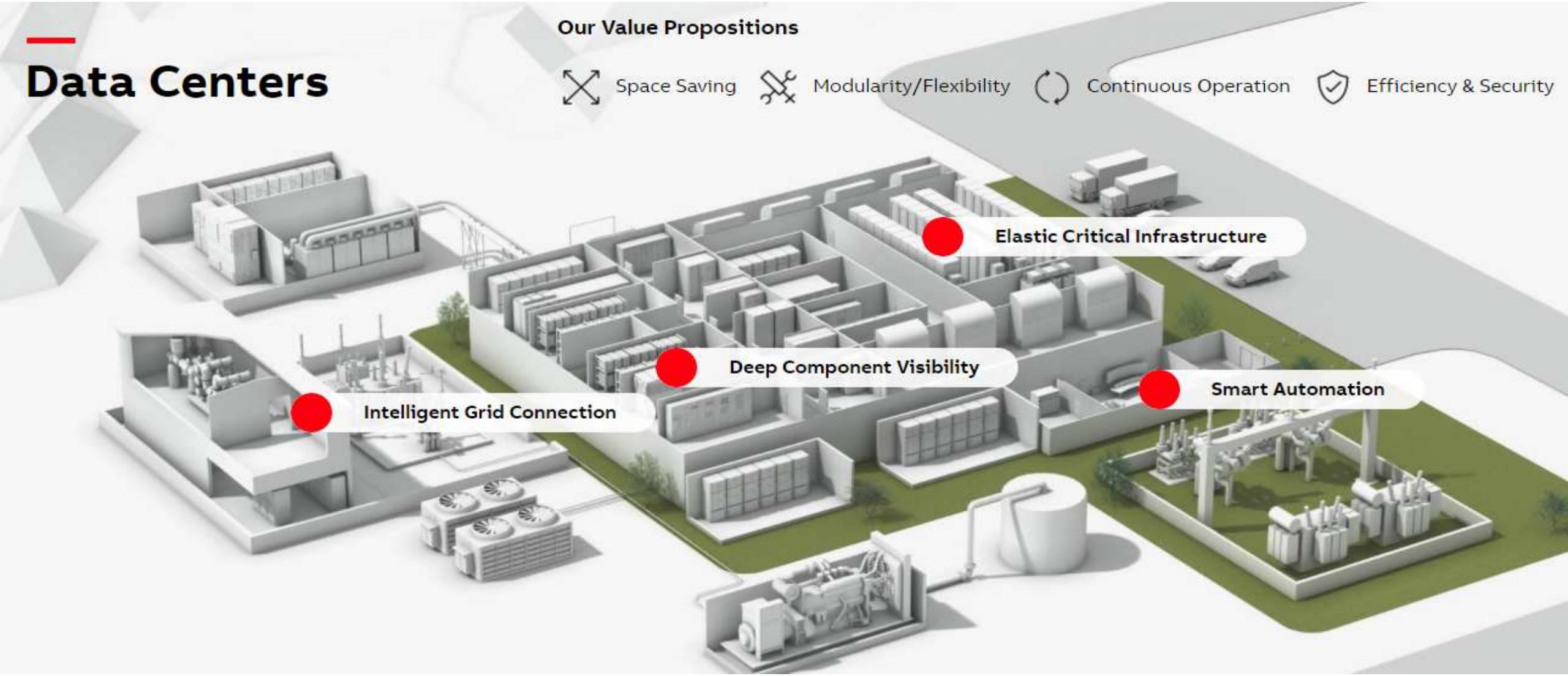
ee publishers

Data Centers

Our Value Propositions

Space Saving | Modularity/Flexibility | Continuous Operation | Efficiency & Security



Smart Data Center with digital integration across the power train

Substations & grid integration

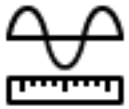
MV/LV Switchgear

Transformers

Motors & Drives

Skids or e-houses

Power Distribution & Protection



Service

Automation & control

ABB Ability ™

Digitally connected Products & Services.

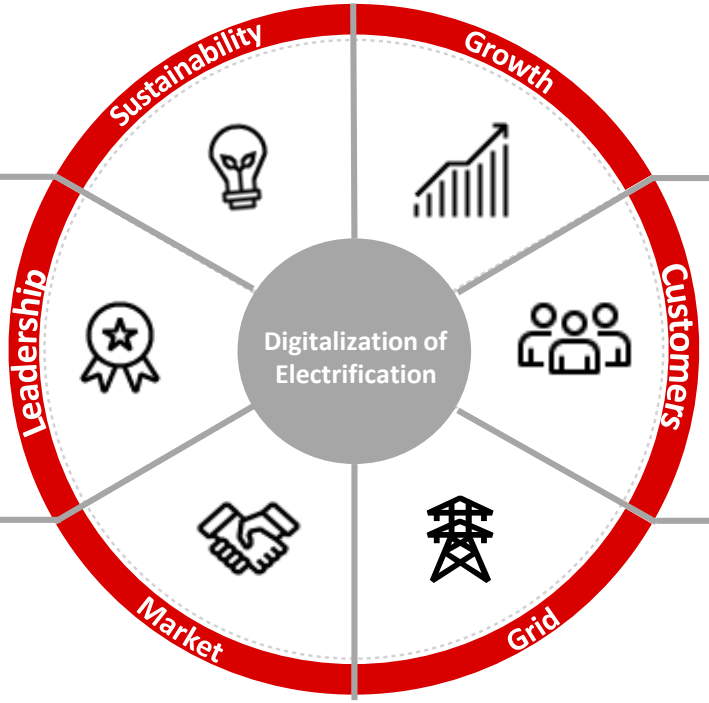
Digitalization improves control – matches supply with demand.

Why should we digitalize?

- Green energy by integrating renewables
- Reduce pollution with infrastructure for e-mobility
- Meet corporate sustainability targets

- Enables players to be part of the game
- **Innovation, partnerships, collaboration**
- Drive and influence

- New market products and services
- Minimise costs of energy
- **Optimise energy consumption**



- **Distributed generation growth**
- Enable interaction among all players
- Reduce complexity and accelerates market evolution

- **Whole new customer experience**
- New services for consumers
- E-commerce

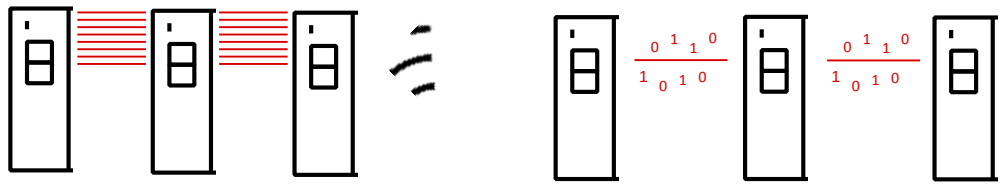
- Reliability of infrastructure
- Maximise efficiency and quality of supply
- **Aging infrastructure, modernization**

Digital Energy

What is it?

Definition

- Digital switchgear enables **smart electrical networks** that deliver power reliably and efficiently.
- A combination of the latest digital technologies and ABB's switchgear which bring **increased flexibility, reliability and safety**, while reducing weight, footprint and delivery time.
- **Seamless integration** of innovative protection, control and sensing devices, where all measures, statuses and commands transferred via a real-time Ethernet bus using IEC 61850 protocol.
- Enables **pro-active management** of equipment throughout the entire life cycle. Enables easy integration for smart functionality, including power management, real-time diagnostics and remote monitoring.

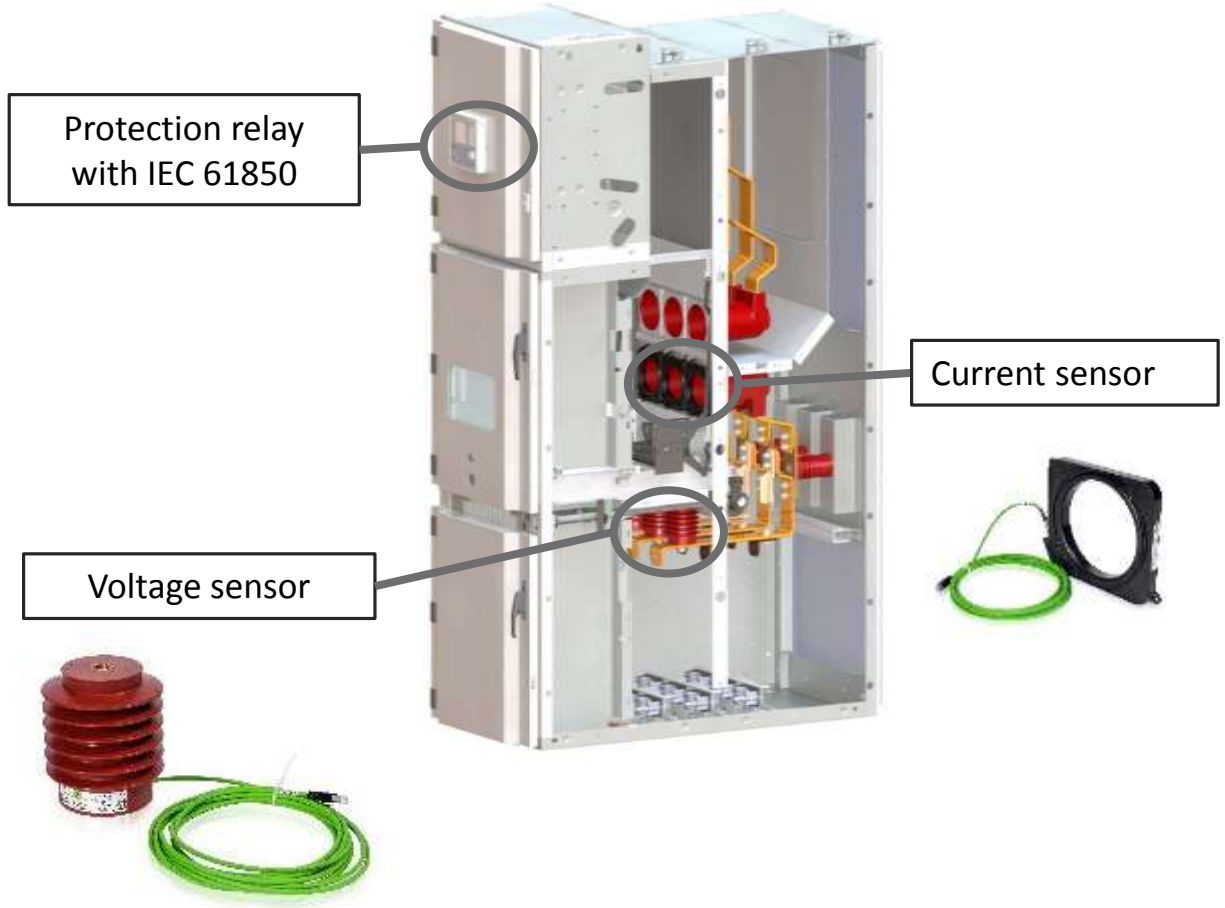


Digital Switchgear

Levels of digitalization

Digital switchgear	Description	Main switchgear value
Level 1	Simply replace CTs & PTs with Current & Voltage Sensors	1. Reduced weight 2. Space saving (primarily due to elimination of PT compartment) 3. Eliminates problems of saturation and Ferroresonance 4. Safety- no possibility of open CT circuits
Level 2	Above + IEC61850-8-1 & GOOSE messaging Ethernet cabling between Protective Relays	Above + 5. Significant reduction in wiring between frames 6. Late customization
Level 3	Above+ Process bus (61850-9-2LE) Requires use of Merging Units (MUs), time synchronization devices & Ethernet switches Fiber optic connection from bay (switchgear) to substation	Above + 7. Improved flexibility – changes in protection only require IED level changes

Digital Switchgear



Current transformer

1pc = 20kg

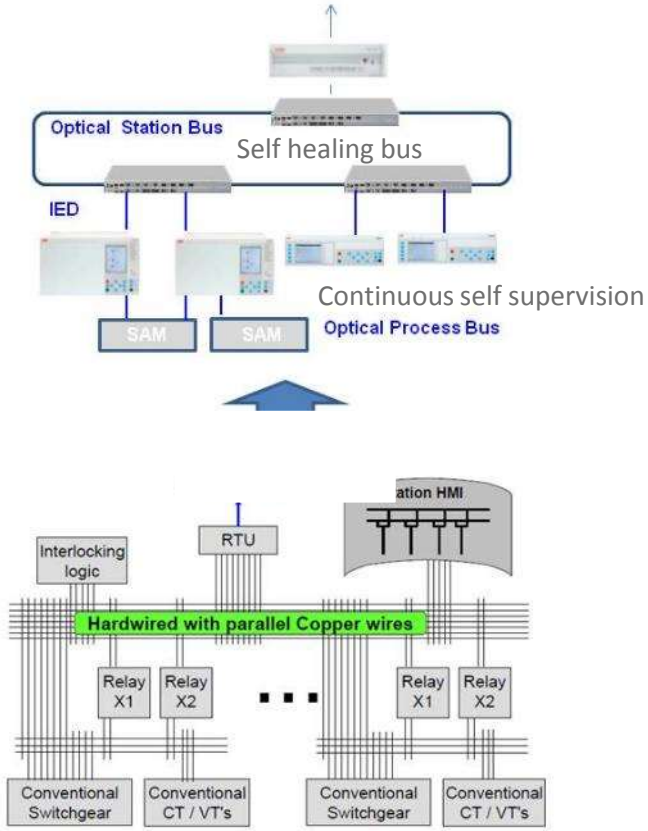
Voltage transformer

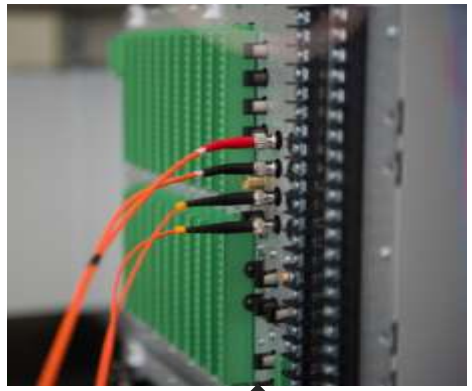
1pc = 30kg

3x20 + 3x30 = 150kg

Clear benefits in going digital

Scale drives simplicity





Clear benefits in going digital

Replacing copper with Ethernet

Digital switchgear reduces wiring complexity

ABB digital portfolio

Digital Transformer with TXpert

- Integrated solution built into the transformer as opposed to a bolt-on attachment
- Capitalized expense (CAPEX) vs. expense on existing operational equipment (OPEX)
- No additional wiring or hardware required
- Time-synched data allows for trending analytics (inference and predictive)
- Remotely expandable platform that can be accessed while still online
- Built-in Wi-Fi and Ethernet connection
- Flexible configuration to support data through numerous communication mediums

Digitization of controls is a critical building block

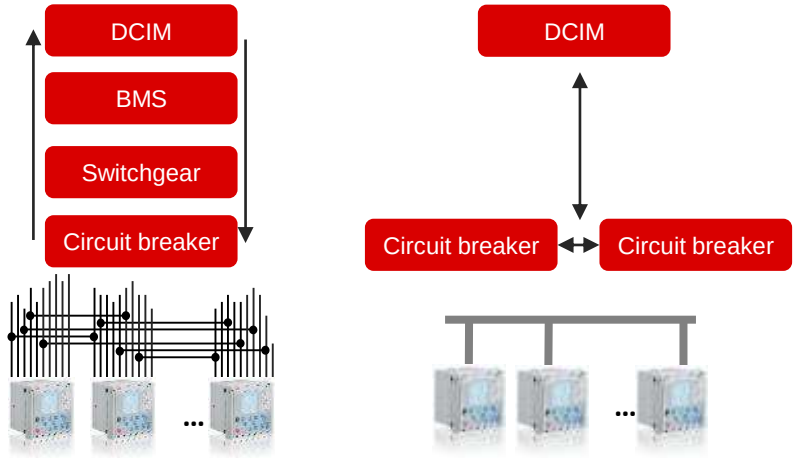
Smart Components

Digital communication and peer to peer control, metrics like contact wear, changing OT paradigm

Emax 2

IEC 61850

End of multiple control layers



Scale demands simplicity

ABB digital portfolio

Smissline TP

Safe: The SMISSLINE TP plug-in socket system allows for load-free plugging in and unplugging under voltage without additional personal safety equipment for protection against electrical hazards

Economical: Saves time thanks to the plug-in technology and saves space thanks to the vertical installation of the bus bar socket

Easy and quick maintenance of the switchboard as wiring is already integrated in the plug-in socket system, thus the installation is better arranged and tidier to check, even by not highly qualified personnel

Flexible: rapid replacement, easy expansion and modification even under voltage as no tools are needed thanks to the snap-on installation

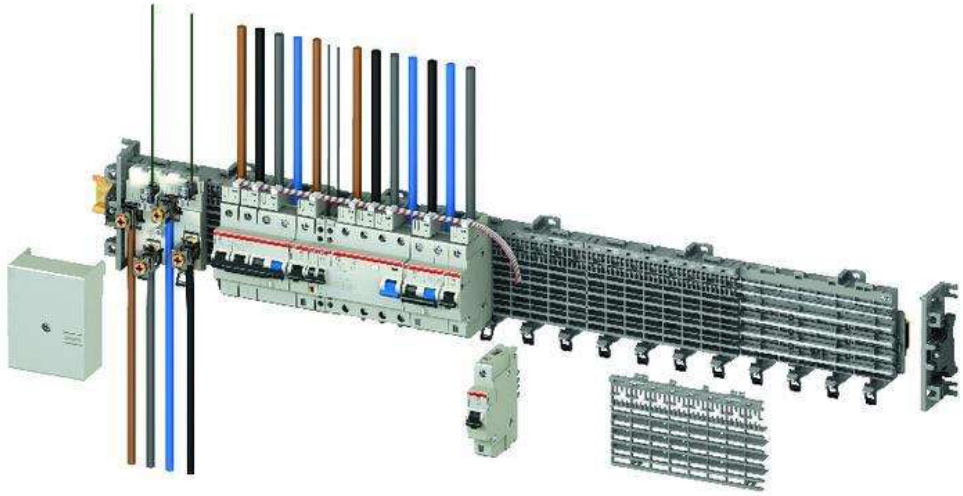


ABB digital portfolio

CMS700

Assets preservation - Early detection of any deviations in power consumption at branch level, avoid before serious damage occurs in the system

Energy efficiency - Consumption optimization and cost saving can be performed in the system thanks to maximum transparency on where and how the electricity is used up to lower branches

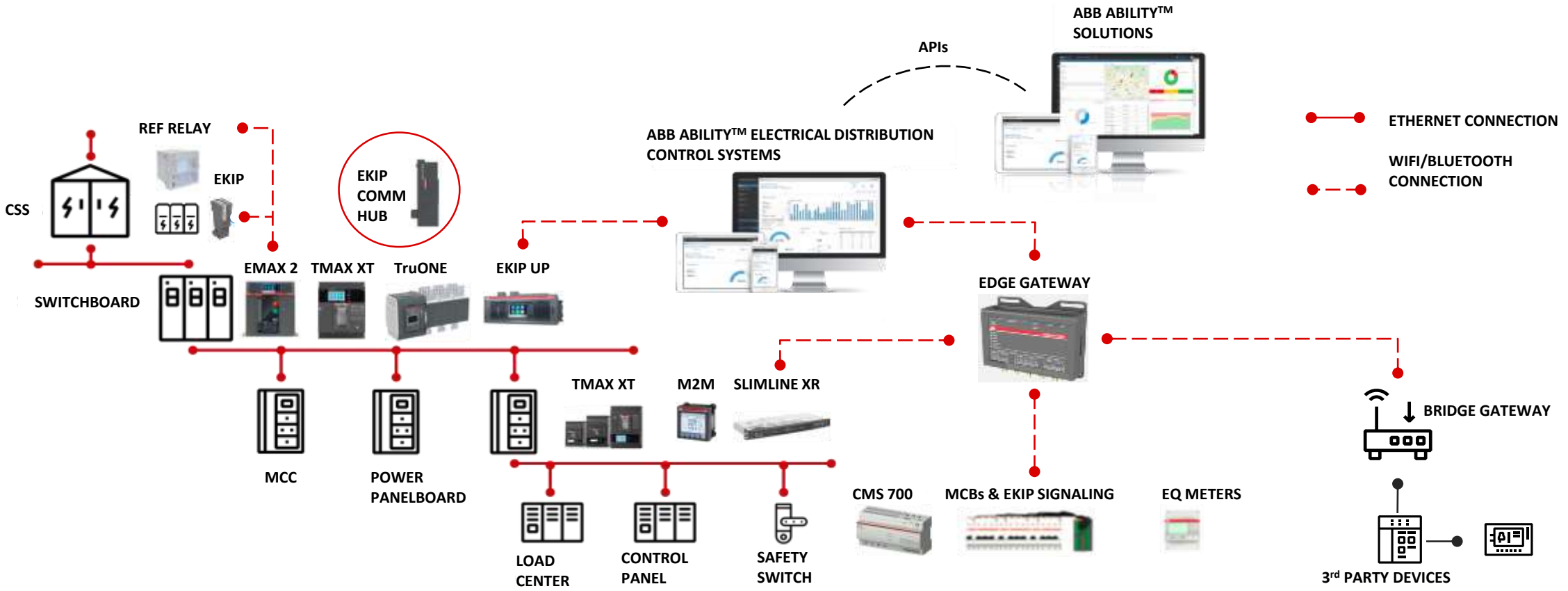
Maximum security - Thanks to the most secure communication protocols built-in in the CMS central units

Easy Installation and configuration - Save up to 30% installation time thanks to smart configuration and quick installation guaranteed

Easy selections - Optimization of the portfolio and product selection thanks to sensor able to measure AC, DC or mixed currents

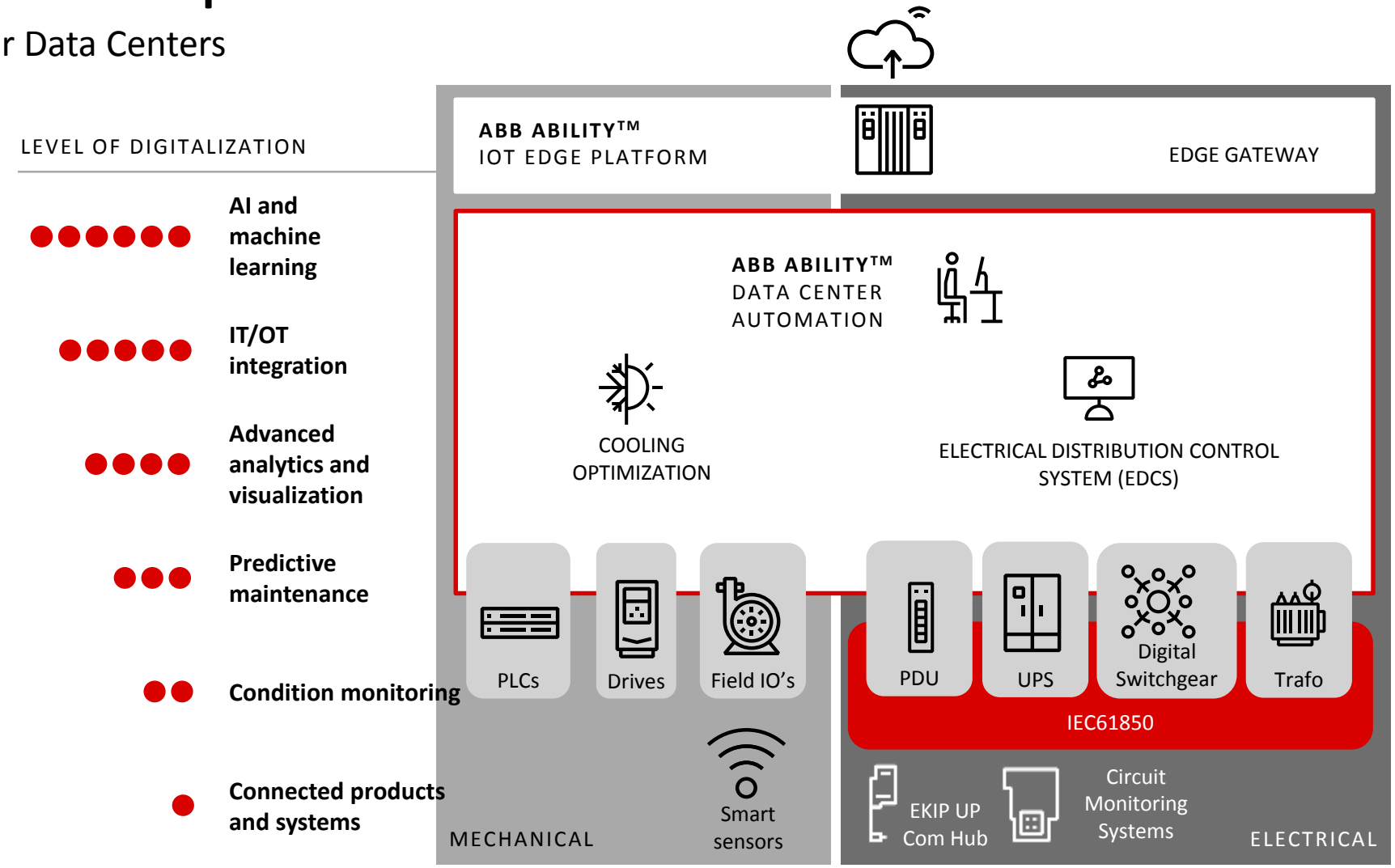
ABB Ability™ Electrical Distribution Control System

Controlling a physical infrastructure with a digital window.



Digital Data Center Operations Architecture

ABB Ability™ for Data Centers



Why Digital?

90% fewer wires

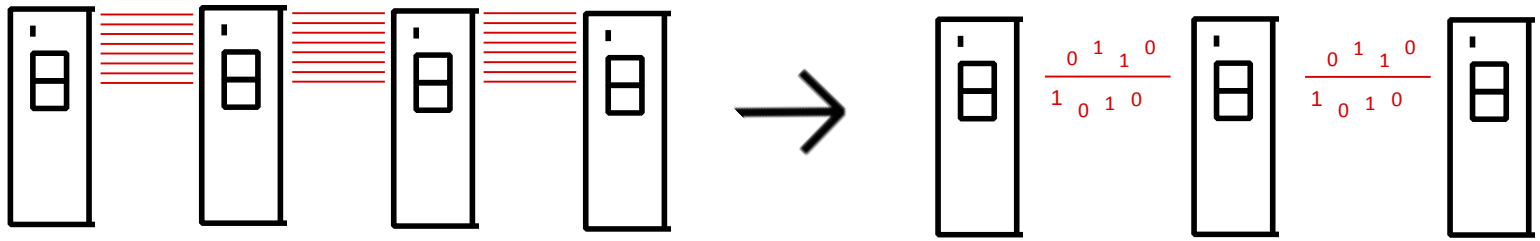
30% less space needed

25% savings in install & commission

30% faster delivery

Increased reliability

Saves up to 150 tons of CO_2



IEC 61850 digital communications