



2ND SEPTEMBER 2021 - SMARTER DATA CENTER SOLUTIONS FOR SUSTAINABLE GROWTH - WEBINAR SERIES

Digital Medium Voltage Switchgear

Improve uptime, visibility, control and optimize operational cost with Digital Infrastructure



Agenda and The key takeaways

02 : Webinar



60 Minutes after this session start included Question



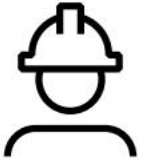
The key takeaways

- Medium Voltage Switchgear concept for Data Center
- A green focus with Eco-efficient gas-insulated switchgear
- The innovative solution for medium-voltage (MV) switchgear

About me



Ms Sakulthida Klomkleang
Electrical Engineering
King Mongkut's University of Technology Thonburi



- 2Y** Sales Engineer. ABB Medium voltage product and Dry type transformer
- 2Y** Senior Sales Engineer. ABB Medium voltage product and Dry type transformer
- 3Y** Sales Engineer Supervisor. ABB Medium voltage product and Dry type transformer
- 2Y** Sales Manager Transportation and Infrastructures segment.
- 1Y** Products Marketing Specialist. ABB Medium voltage products

Main product take care



- Medium Voltage Products
- ESM (Energy Storage Module)



About me

Product Marketing Team



Non Nontiwat Charoenbunyarit

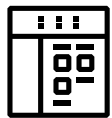


4Y Sales Engineer for ABB Medium voltage product

3Y Sales Engineer for ABB Service business of medium voltage product

2Y Product Marketing Specialist for ABB Digital Substation Products & Systems

Main product take care



- Digital Substation Products
- Digital Substation Systems



About me

Product Marketing Team



Wor Worawit Dechanuwong



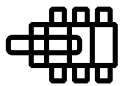
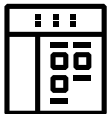
10Y Design Engineer at ABB Medium voltage products

1Y Product Specialist at ABB Medium Voltage Product

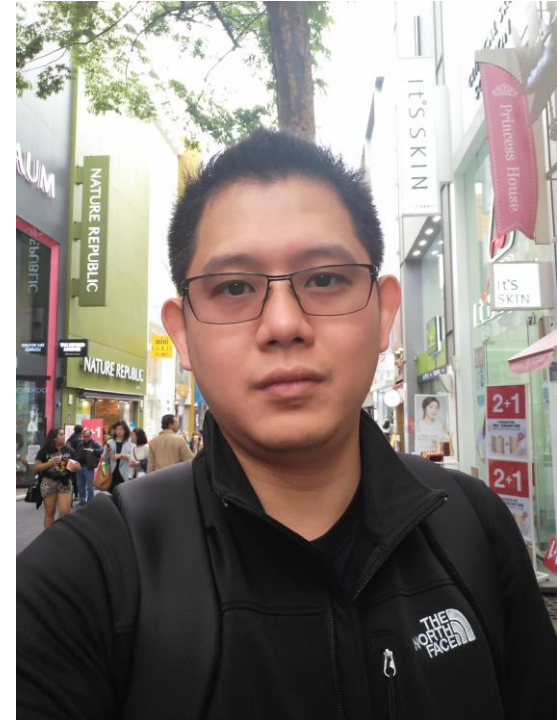
1Y Engineering Manager at ABB Low and Medium voltage Switchgear

2Y Product Marketing Specialist at ABB Low and Medium voltage Switchgear

Main product take care



- Low voltage Switchgear
- Medium Voltage Switchgear



Smarter data center solutions for sustainable growth - Webinar series

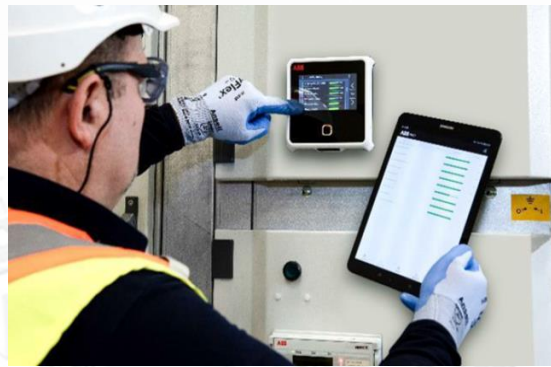
Data centers of tomorrow



Data Center Technologies and Trends You Need to Know

August 31st, 2021

02:00 PM – 03:00 PM



Digital Medium Voltage Switchgear

September 2nd, 2021

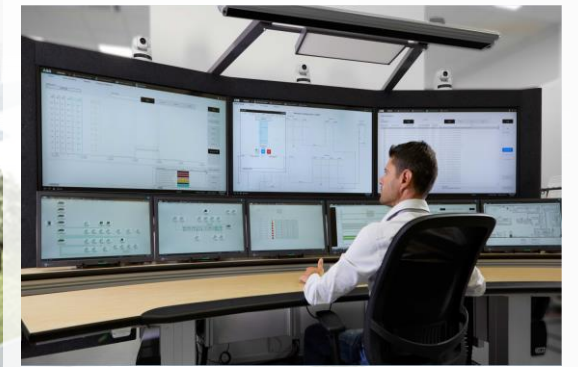
02:00 PM – 03:00 PM



Smart Low Voltage Switchgear and Sub-distribution

September 7th, 2021

02:00 PM – 03:00 PM



Intelligent Data Center Automation

September 9th, 2021

02:00 PM – 03:00 PM



ABB Data center IEC portfolio

LV Power Distribution

- LV switchgear
- LV Switchboards
- Electronic relays & controls
- Busway
- Arc flash protection
- LV MCC
- LV Power and lighting panels
- Meter, monitoring & signaling

Power Protection

- Uninterruptable Power Supplies (UPS)
- Power Distribution Units (PDUs)
- Remote Power Panels (RPPs)
- Automatic Transfer Switches (ATS)

Installation Products

- Cable tray
- Fiber tray
- Cable and wire management
- Grounding and bonding systems
- Mechanical and compression wire termination
- Fittings

Cooling system components

- Variable frequency drives
- High efficiency motors
- Enclosed breakers & switches

MV Primary & Secondary Distribution

- AIS & GIS MV switchgear
- AIS & GIS Ring Main Units
- Protection relays
- Protection & safety
- Control systems

ABB Ability Digital Data Center Operations

- Data Center automation
- Electrical power management system
- Asset management
- Smart building solutions
- Condition monitoring

Service & support

- Installation & commissioning
- Consulting services (engineering studies)
- Retrofits and upgrades
- Digital upgrades

Other capabilities

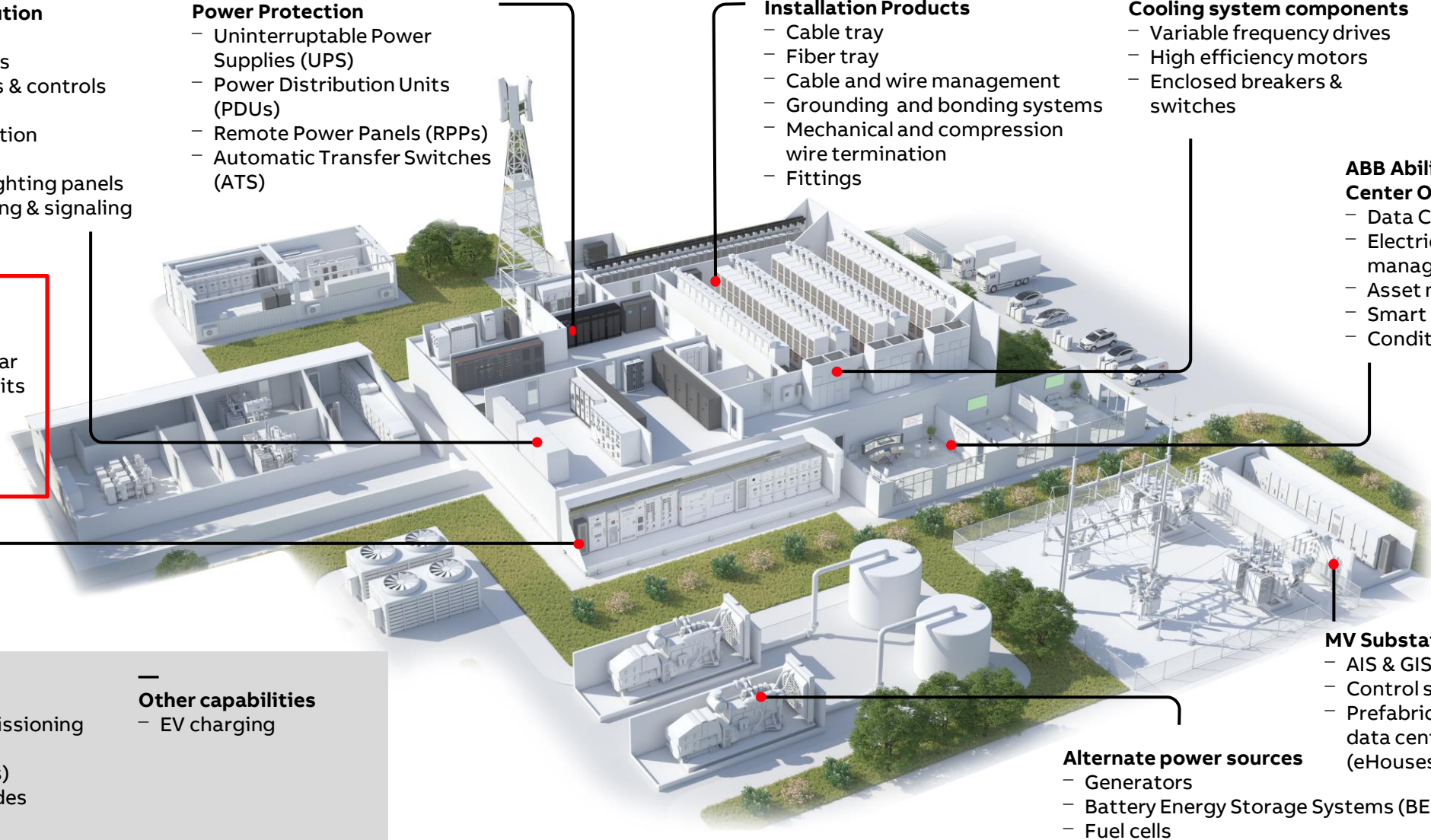
- EV charging

MV Substations

- AIS & GIS switchgear
- Control systems
- Prefabricated modular data center solutions (eHouses & skids)

Alternate power sources

- Generators
- Battery Energy Storage Systems (BESS)
- Fuel cells
- Microgrids
- Renewable integration



Contents.

- **1. Introduction**
- 1.1 Primary and Secondary Switchgear.
- 1.2. IEC Standard for Data Center
- 1.3. Power distribution for Data Center
- 1.4. Primary Switchgear GIS ZX series
- 1.5. Secondary Switchgear GIS RMU SafePlus.
- 1.6. Alternative for Green solution AirPlus.
- 1.7. Secondary Switchgear AIS Unisec.

- **2. ABB Ability® solutions for electrification**



**ABB
Switchgear**



Primary and Secondary Switchgear

Difference between Primary and Secondary ?

Primary Switchgear

- High fault current rating
- High current rating
- Full protection (Voltage and Current protection base on load and application, e.g. Motor protection, Transformer protection, line protection.
- High operation number (Mechanical class M2, VCB class M2 operation number >10,000 CO)

Secondary Switchgear

- Low fault current rating (<20kA)
- Low current rating (<630A)
- Basic protection (Overcurrent base protection)
- Low operation number (Mechanical class M0 or M1, VCB class M2 operation number >2,000 CO))

➤ Introduction to MV switchgear - general

Primary and Secondary distribution

Two main applications

Primary distribution switchgear

- Closer to HV transformer
- Up to 4000 A and 63 kA
- Mainly circuit breakers
- Mainly project-specific

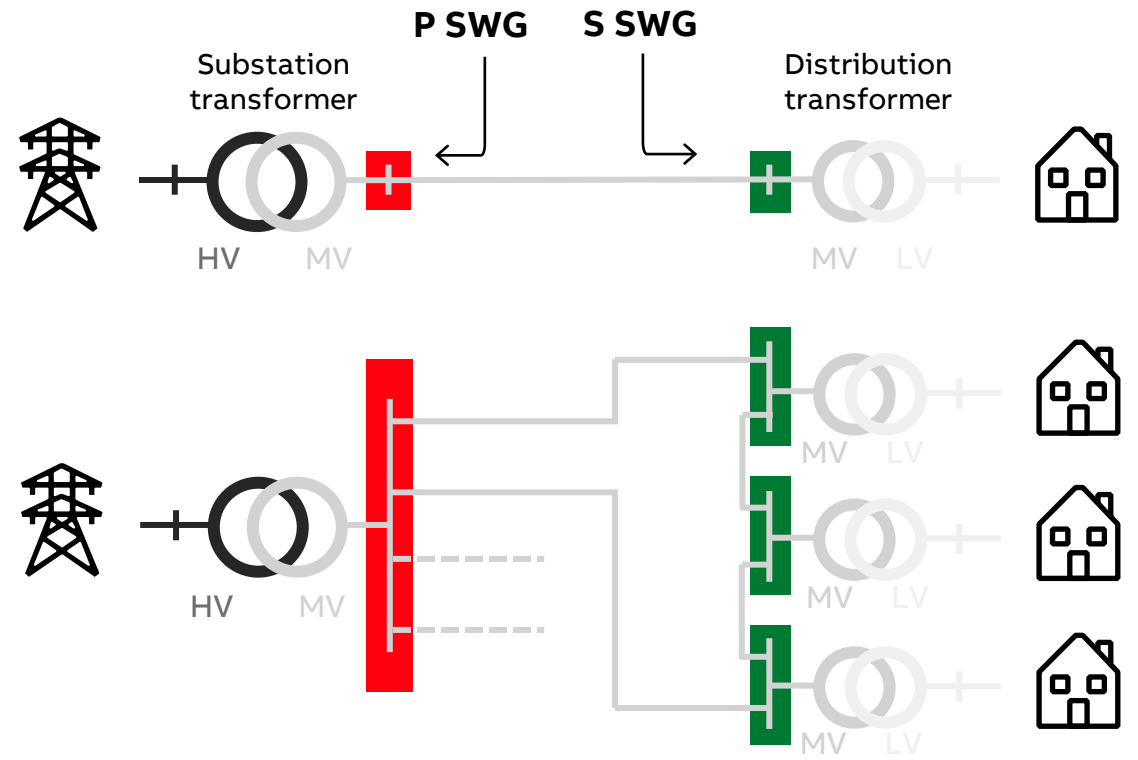


Secondary distribution switchgear

- Closer to LV transformer
- Up to 1250 A and 25 kA
- CB, LBS and fuse
- Often more standardized



Example: Power utility network



➤ IEC Standard for Data Center

ISO/IEC TS 22237 Information technology — Data center facilities and infrastructures

- Part 1: General concepts
- Part 2: Building construction
- **Part 3: Power distribution**
- Part 4: Environmental control
- Part 5: Telecommunications cabling infrastructure
- Part 6: Security systems
- Part 7: Management and operational information



Polling 

➤ Power distribution for Data Center

ISO/IEC TS 22237-3 Power distribution

Availability Class design options

Class 1: Single path (no resilience) solutions

Class 2: Single path (resilience provided by redundancy of components) solutions

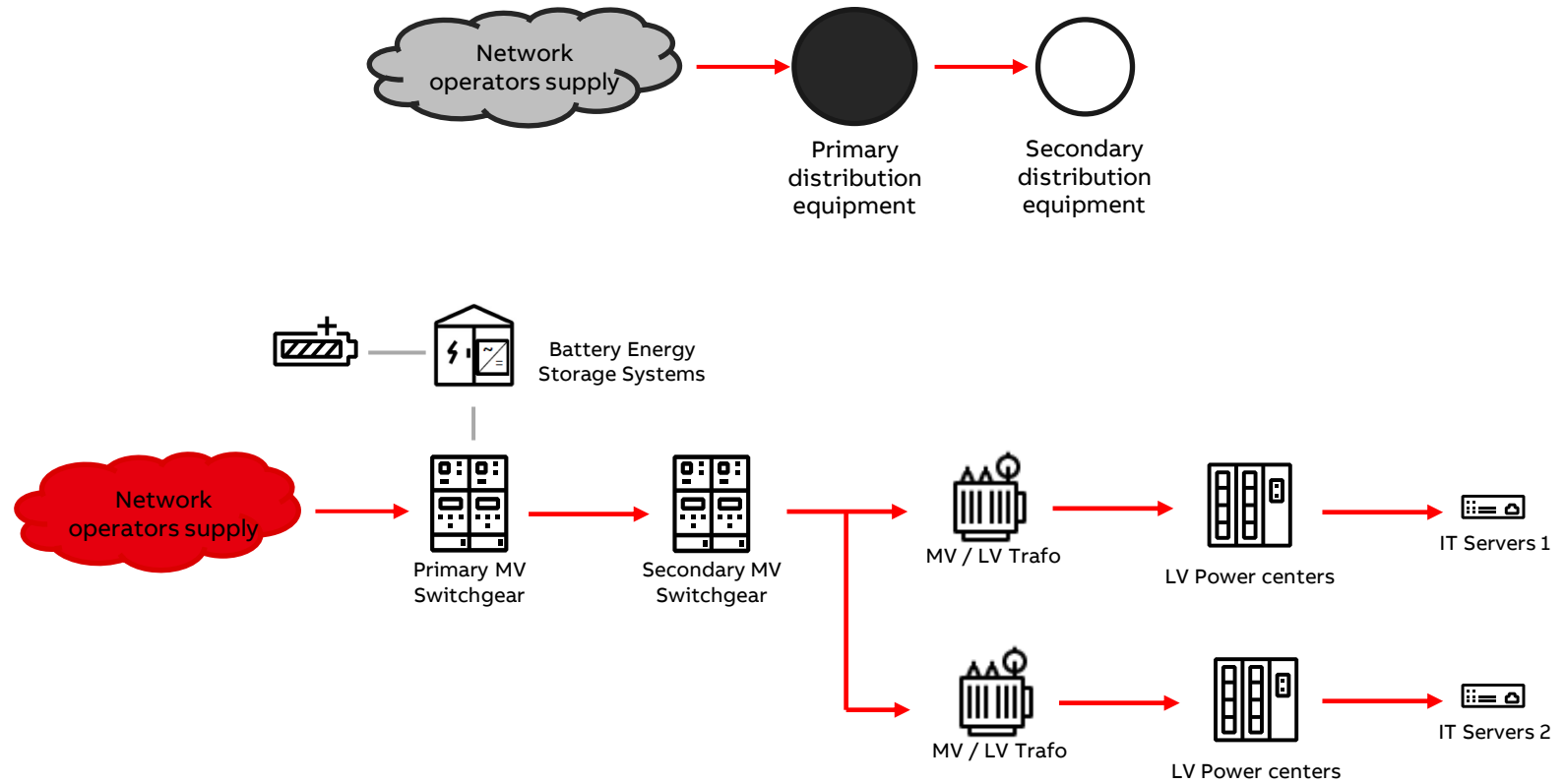
Class 3: Multi-path resilience and concurrent repair/operate solutions

Class 4: Fault tolerant solutions

➤ Power distribution for Data Center

Class 1: Single path (no resilience) solutions

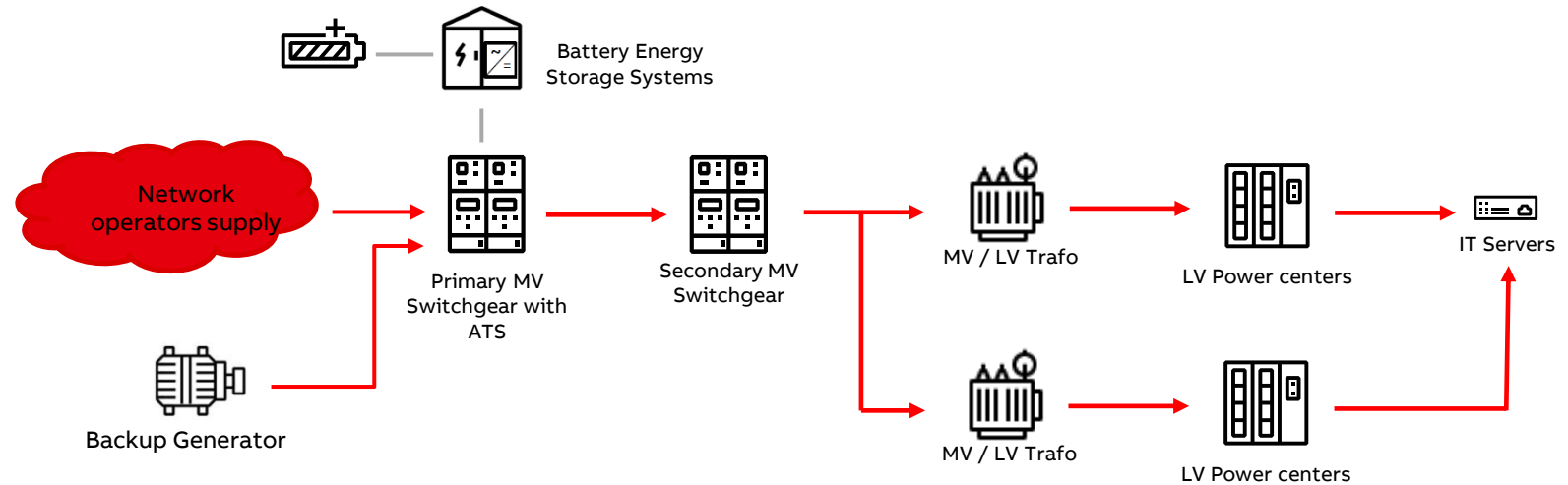
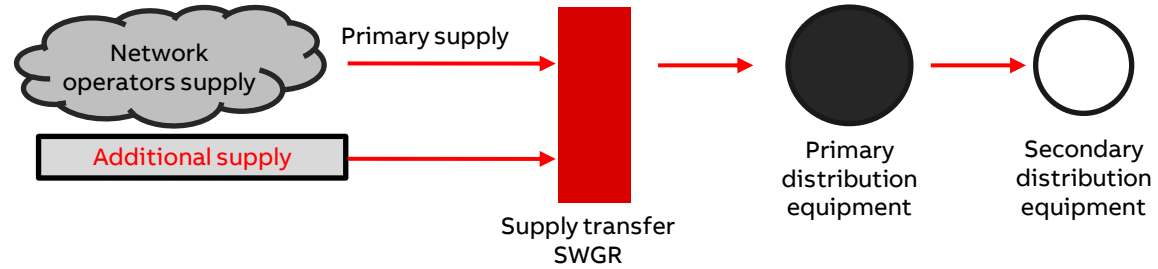
- Backup by UPS
- No backup equipment



➤ Power distribution for Data Center

Class 2: Single path (resilience provided by redundancy of components) solutions

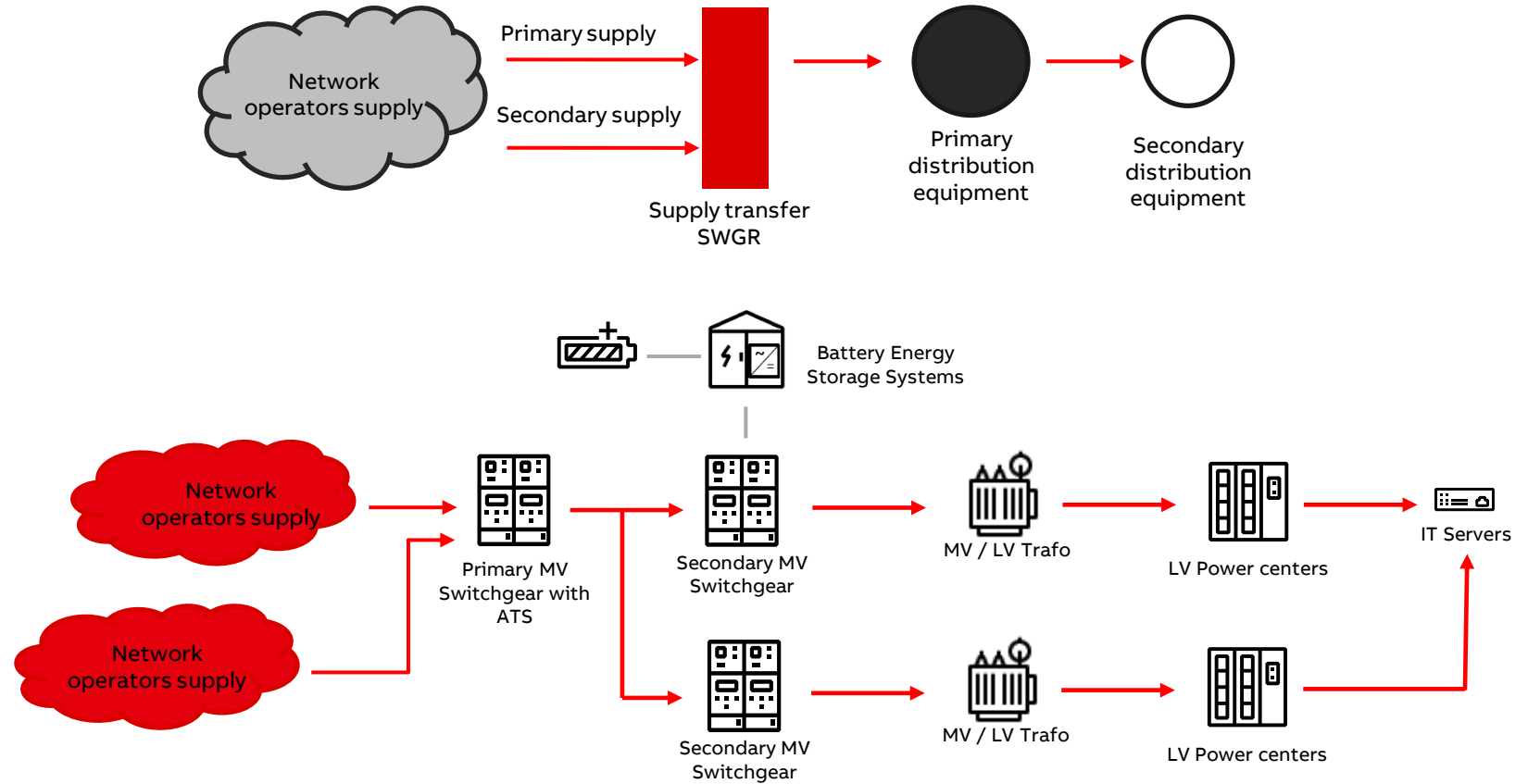
- Redundant distribution components
- Backup power supply



➤ Power distribution for Data Center

Class 3: Multi-path resilience and concurrent repair/operate solutions

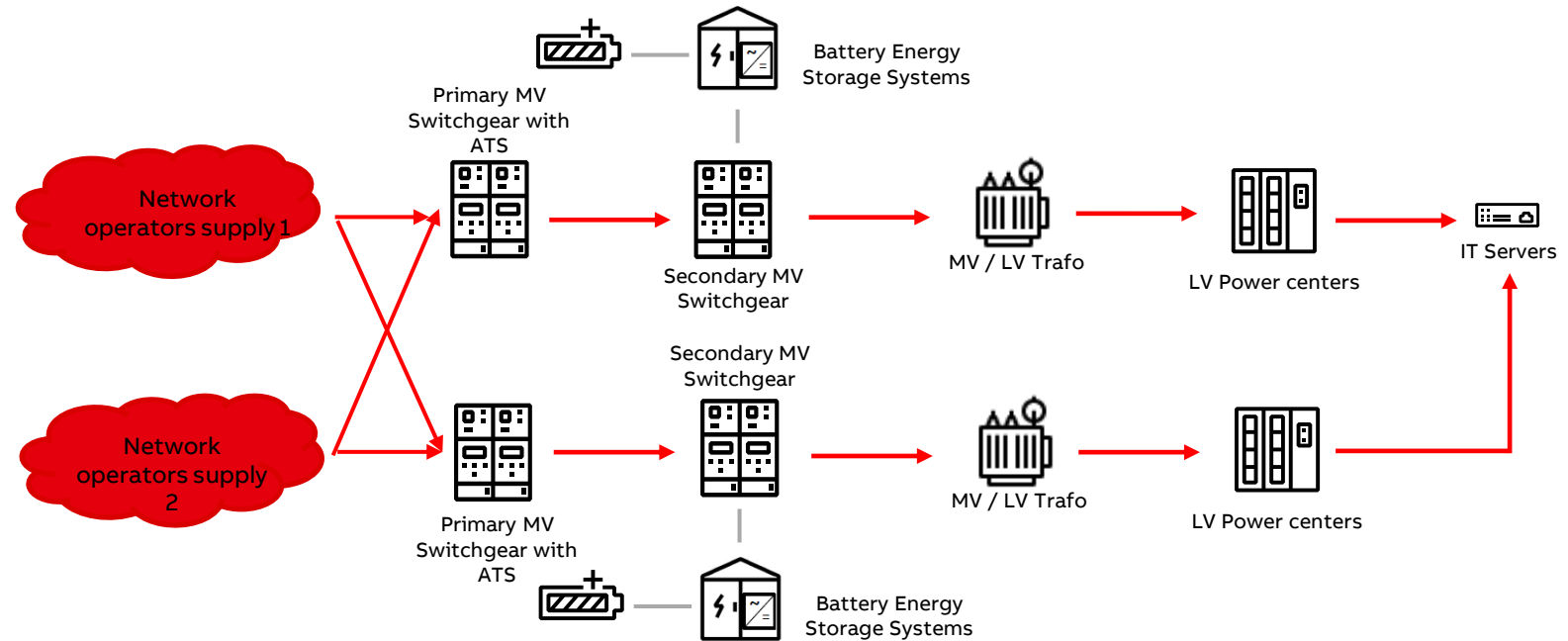
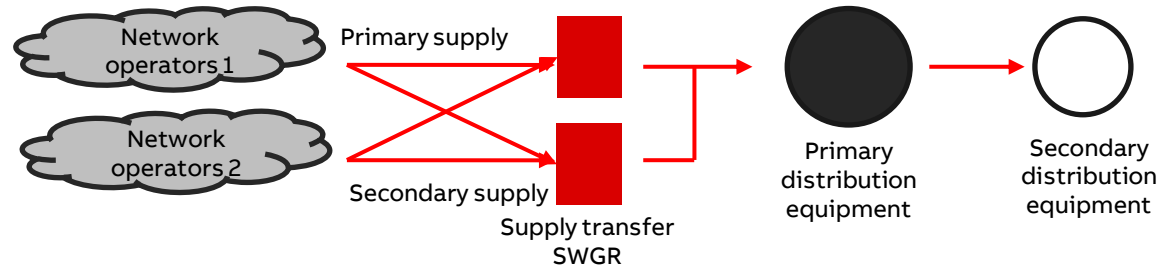
- Multi-source path
- Distribution components separate
- Backup source use for maintenance



➤ Power distribution for Data Center

Class 4: Fault tolerant solutions

- Each path shall be equipped with UPS/DC supply
- Separate distribution components
- Separate compartments
- Multi-Primary Supply



➤ Primary Switchgear GIS ZX series

Introduction.

Medium voltage switchgear for primary distribution up to 42 kV suitable for indoor installations. Panels are available as a single busbar, double busbar, back-to-back or double level solution.

Product range

- Rated voltage up to 42 kV; rated feeder current up to 5000A
- Rated short time current up to 40 kA/3s

Key benefits

- Partitioned function compartments lead to maximum safety
- High voltage section totally independent of environmental influences
- No effect of site altitude on dielectric strength
- Independence of the environment makes for extremely long system life
- Longer life than other system types
- Variety of demanding applications

Key features

- Vacuum circuit breaker
- CMT welded stainless steel enclosures for modular design
- Panels coupled by plug-in busbar connectors
- No SF₆ gas work on site
- View ports to check switch positions
- Highly customized versions available
- Switchgear can be back to wall installed
- Available in digital version

Gas-insulated switchgear (GIS Primary):

– Global: ZX0, **ZX0.2**, **ZX1.2**, **ZX2**, ZX1.5R (for rail applications)

Recent innovations: **Digital switchgear, eco-efficient GIS**

Applications



Utilities (ZX0.2, ZX2)

- Electricity Distribution
- Substations
- Power Generation
 - Conventional
 - Renewables



Industry (ZX2, ZX1.2)

- Oil and Gas
- Mining and Minerals
- Pulp and Paper
- Petrochemicals
- Steel



Transportation (ZX0.2, ZX2, ZX1.5R)

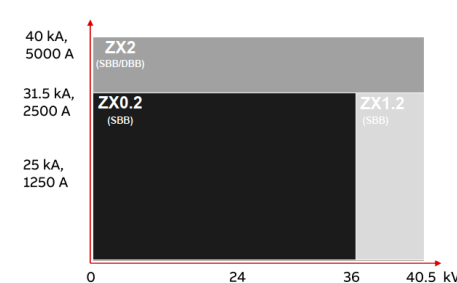
- Rail
- Airports
- Marine
 - Offshore Applications
 - Vessels



Building (ZX0.2, ZX2)

- Data Center
- Hospitals
- Infrastructure

ZX Family



**Data Center
ZX0.2 / ZX2**

➤ Primary Switchgear GIS ZX series

ZX0.2

Description

- Up to **36kV**
- Up to **2500A**
- Up to **31.5kA, 3 sec**
- **3-phase encapsulated, modular arc-resista**
- Factory-assembled, -filled and –tested pane
- IEC62271-200
- Several local certifications available on request



Gas Compartment

- Gas compartments made from laser-cut stainless steel
- Gas compartment is equipped with a on-return filling valve (with protective cap) and repair openings
- Rated operating pressure 130kPa up to 24kV, 150kPA @36kV
- **Low amount of SF6** used per panel: 5 - 10kg
- **Gas leakage < 0,1% per year**
- **No checks on the insulating gas are necessary and maintenance-free**

Operators

- Motorized operating mechanisms for switching devices located easily accesible inside LVC
- Optional view ports for visual verification
- Operator control area, controls and indicators for the CB
- CB operation mechanism is located in the mechamism bay of the panel. The indicators and control for CB are located in the operator control area of the panel

Installation.

- Delivery of **factory filled and tested panels**
- Installation without gas works at site
- Wall mounting installation
- Transverse installation is possible
- Installation on standard floor frames embedded in concrete floor, on intermediate frame or on raised false floor
- Installation and commissioning shall be done by **trained and certified service personnel**

Flexible ,High-quality design to meet all customer requirements type ZX0.2

➤ Primary Switchgear GIS ZX series

ZX2

Description

- Up to **40.5kV and 200kV BIL**
- Up to **5000A (SBB) or 3150A (DBB)**
- Up to **40kA, 3 sec**
- **3-phase encapsulated, modular arc-resistant design**
- All gas compartments are fully segregated, no gas connection between adjacent panels
- Factory-assembled, -filled and -tested panels
- IEC 62271-200
- Several local certifications available on request



Gas Compartment

- Each **feeder consists of 2 (SBB) or 3 (DBB) gas** compartments made from laser-cut **stainless steel**
- Each gas compartment is equipped with a on-return filling valve (with protective cap) and **repair openings**
- Operation at slight overpressure - rated **operating pressure 130kPa** (alarm level 120kPa) for rated voltage > 36kV
- **Low amount of SF6** used per panel: 5 - 10 kg
- **Gas leakage < 0,1% per year**
- **No checks on the insulating gas are necessary and maintenance-free**

Operators

- Motorized operating mechanisms for switching devices located easily accessible inside LVC
- Manual emergency operation possible
- Advantages of **earthing via circuit breaker and three position switch** in series:
 - Circuit breaker is of higher quality than any earthing switch
 - Higher number of make-proof earthing operations
 - No contamination of SF6 through switching operations
- Optional view ports for visual verification
- High performance CB

Installation.

- Delivery of **factory filled and tested panels**
- Installation without gas works at site
- Transverse installation is possible
- Installation on standard floor frames embedded in concrete floor, on intermediate frame or on raised false floor
- Installation and commissioning shall be done by **trained and certified service personnel**

Flexible ,Hight-quality design to meet all customer requirements type ZX2

➤ Secondary Switchgear GIS RMU SafePlus.

Introduction.

– SafeRing/SafePlus is the SF6 Gas insulated Ring Main Unit, with high performance of safety, reliability, economic. The main features:

- Sealed gas tank with IP67 degree; Mechanical and Electrical interlock
- Compact structure and maintenance free
- Module design, and free configuration

Product range

- Rated voltage up to 36 kV; rated feeder current up to 1250A
- Rated short time current up to 20 kA/3s

Applicable Standard

- IEC 60694** : Common specifications
- IEC 60298** : Arc fault
- IEC 60129** : Isolation and Insulation
- IEC 60265** : Switching and operations
- IEC 60056** : Circuit breakers
- IEC 60420** : Switch-fuse co-operation
- IEC 60529** : Protection Degree



Safeplus Function Units

- C- Cable Switch
- F- Switch Fuse disconnecter
- V- Vacuum Circuit Breaker
- CB- VD4 Circuit Breaker
- SI- busbar sectionaliser
- Sv- with vacuum circuit breaker
- D- Direct cable connection
- De- with earthing switch
- Be- Busbar earthing
- M- Metering

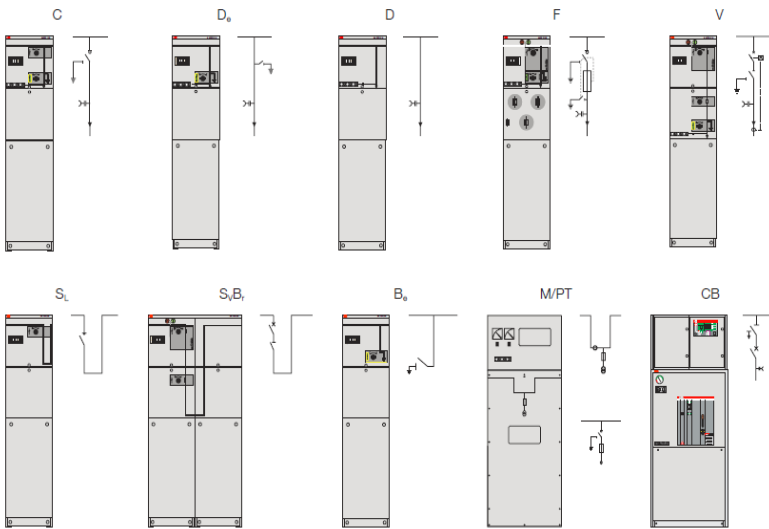
SafePlus Features:

- Customized design
- Flexibility through top extension
- Semi- & fully modular options



➤ Secondary Switchgear GIS RMU SafePlus.

Function Units



SafePlus can be supplied in 11 different function units.

Components and features

Voltage Indication.

Voltage presence indication system (VPIS)
Voltage detection system (VDS), low resistance (LRM)



Manometers

Increases customer's assurance and safety
Signaling contact for signaling of pressure drops
Signaling contact without indicative scale



Low voltage compartment

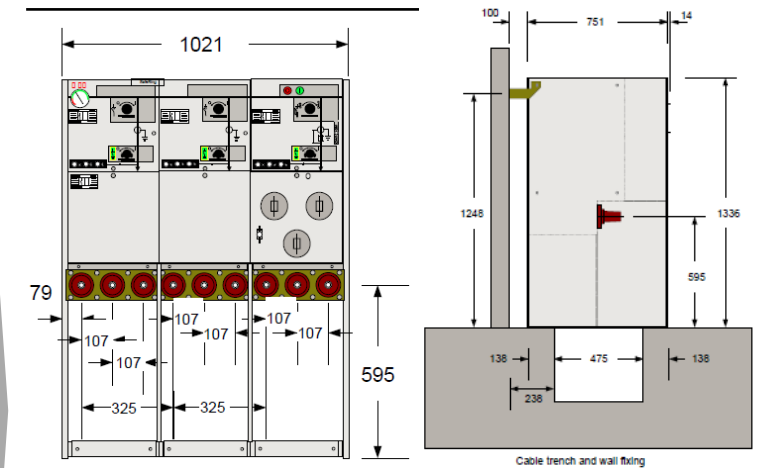
Available heights 124, 470 and 700 mm
Low voltage equipment can either be located behind front covers, or in a top entry box



Combisensor.

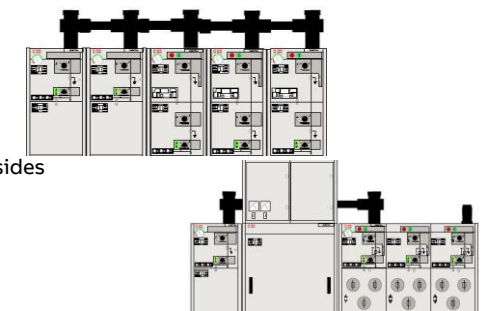
The combi sensor is a Interface C bushing (400 series bolted) with three integrated sensors. It is installed instead of the normal bushing. The three sensors are one "ROGOWSKI" coil for current measurement and two capacitive voltage dividers for voltage measurement and indication.

Dimension External Busbar.



External busbars

- Up to 1250 A
- Easy installation
- Extensible on both sides
- Safe and reliable
- Sealed & screened
- Completed
- Additional cover available





Polling



➤ Alternative for Green solution AirPlus.

ZX2 AirPlus - for primary distribution

- **Ratings:**
IEC ratings up to
36 kV, 2000 A, 31.5 kA
- **Variants:**
Most panel variants available
- **Coverage:**
First introduction in Central
and Northern Europe.

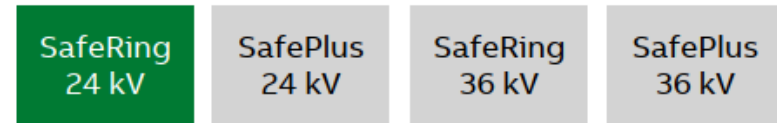


(not yet available with AirPlus in first step)

Also available as ZX2 'Ready-for-AirPlus'

SafeRing AirPlus - for secondary distribution

- **Ratings:**
IEC ratings up to
24 kV, 630 A, 16 kA
- **Variants:**
circuit-breaker (V) unit
load-break switch (C) unit
- **Coverage:**
First introduction in Central
and Northern Europe



(not yet available with AirPlus in first step)

For 12 kV IEC, also available with 100% dry air and GWP = 0

➤ Alternative for Green solution AirPlus.

Reducing the global warming potential by 99.99%

Overview.

SF₆ insulates 3× better than air

- Compact dimensions

Protected from environmental impacts

- High reliability
- High personnel safety
- Maintenance-free

Proven technology with over 50 years in worldwide use

Despite all positive features, SF₆ with one downside:

Global warming potential (GWP) of 22,800



Benefits of AirPlus.

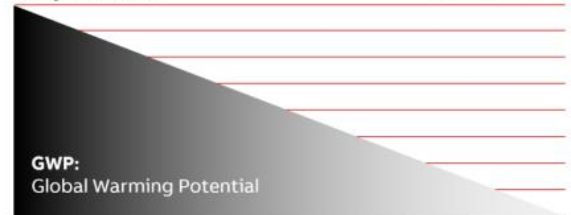
- Eco-efficient alternative with a GWP < 1
- Used in reliable and proven GIS products
- Same compact dimensions as SF₆ GIS
- All advantages of GIS technology
- Not covered by SF₆ regulations
 - Save cost for administration & reporting
 - Save cost of SF₆ certificates for service staff

AirPlus™



SF₆: 22,800

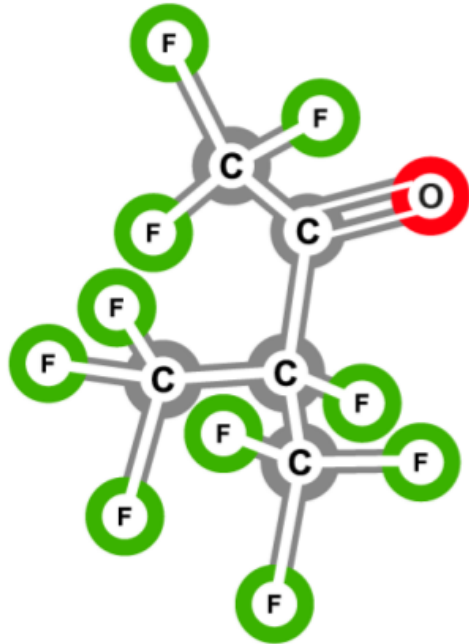
AirPlus: < 1



➤ Alternative for Green solution AirPlus.

What is AirPlus made of ?

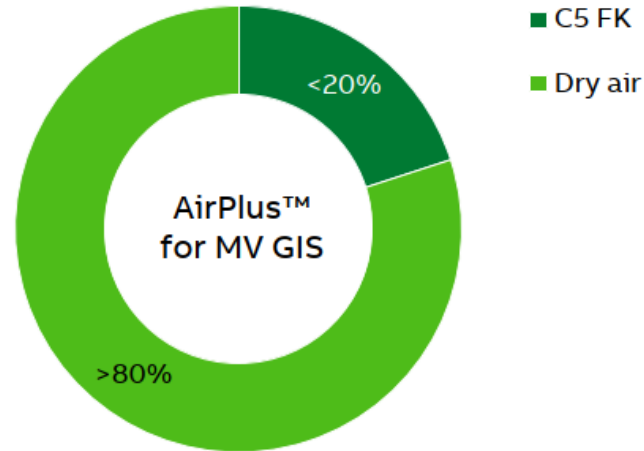
C5 FK molecule



AirPlus composition for MV

More than 80% dry air

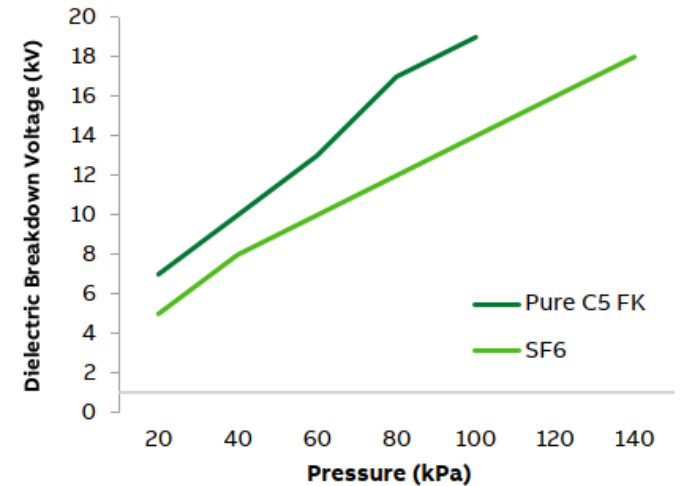
Less than 20% C5 Fluoroketones (C5 FK),
3M™ Novec™ 5110 Fluid



Dielectric properties of C5 FK

Pure gas of C5 FK has better dielectric strength than SF₆

When used in the AirPlus™ mixture, dielectric strength is close to SF₆



➤ Alternative for Green solution AirPlus.

Main GWP driver

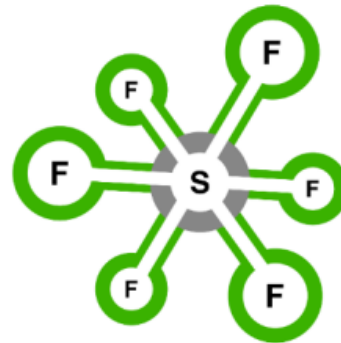
Atmospheric lifetime of the molecule

- SF₆ molecule is very robust even in the atmosphere. Atmospheric lifetime of 3,200 years
- New C5 FK molecule is very robust when inside the switchgear. But in the atmosphere exposed to solar radiation, lifetime is only 16 days

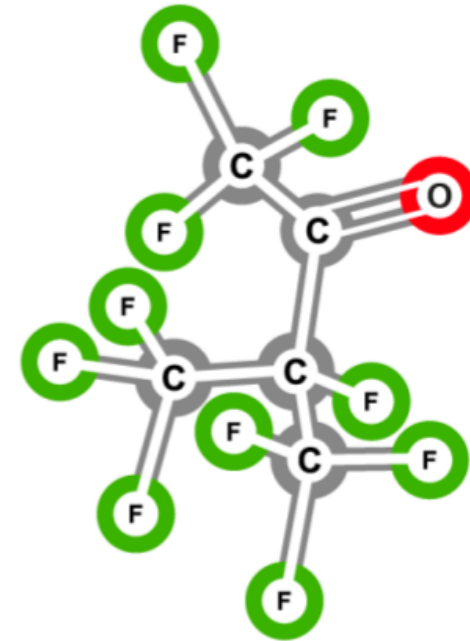
	Atmospheric lifetime	GWP
SF ₆	~3,200 years	22,800
C5 FK	~16 days	< 1

GWP is a potential. No real impact when handled in closed gas loop.

SF₆



C5 FK



Alternative for Green solution AirPlus.

Projects Reference.

ewz



ewz

UW Oerlikon, Zurich, Switzerland



- 8 bays HV-GIS of GLK-14 / 170 kV / 40 kA / 1250 A with AirPlus for HV
- 50 panels MV-GIS of ZX2 / 24 kV / 25 kA / 2000 A with AirPlus gas mixture
- All panels fully type tested acc. to IEC

Experiences



- Successful operation since August 2015
- Regular gas probes confirm all research results

Alternative for Green solution AirPlus.

Projects Reference.

Netze BW

UW Trochtelfingen, Germany

- Total of 32 panels ZX2, 24 kV
- Thereof 8 with AirPlus – connected in same lineup
- Successful operation since June 2016

Showcasing that panels are externally identical



Alternative for Green solution AirPlus.

Projects Reference.

Liander

Wind farm in Flevoland, Netherlands

- Four 24kV ring main units, SafeRing AirPlus
- Installed November 2015
- 3-years field test in real-life application

Excellent performance - so far as expected



➤ Secondary Switchgear AIS Unisec.

MV air-insulated switchgear Unisec.

Description

UniSec air-insulated switchgear is based on a highly flexible, modular concept with fewer parts and standardized solutions that can be readily configured to meet the specific needs of each application.

Key features

Designed and tested according to latest IEC 62271-200, GOST (RU) & GB (CN) standards

Internal arc proof IAC AF/AFL/AFLR with different gas exhausting variants

Loss of Service Continuity LSC2B/LSC2A/LSC2 solutions available

Partition Metallic PM Classification

Load break switch, vacuum contactor, vacuum and SF6 circuit breakers

Anti-seismic and marine version available



Ratings

Rated voltage	Up to 24 kV
Rated current	Up to 1250 A
Rated short-time withstand current & IAC	Up to 25 kA @ 12-17 kV Up to 25 kA @ 24 kV
Rated frequency	50 Hz / 60 Hz

Safe conditions for all applications

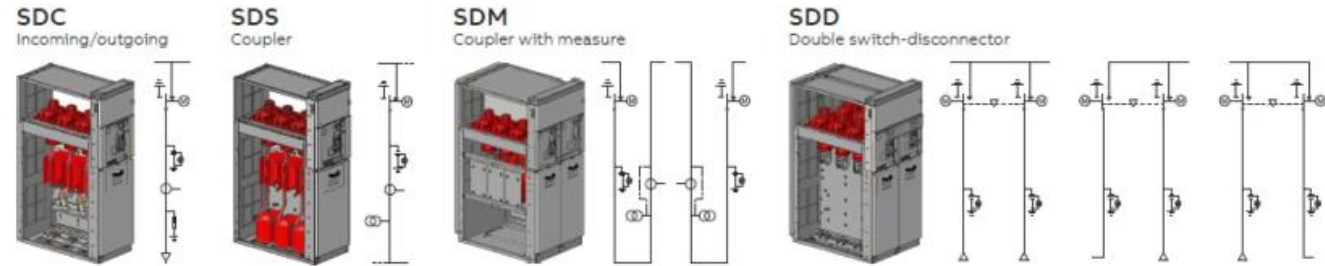
➤ Secondary Switchgear AIS Unisec.

Broad portfolio

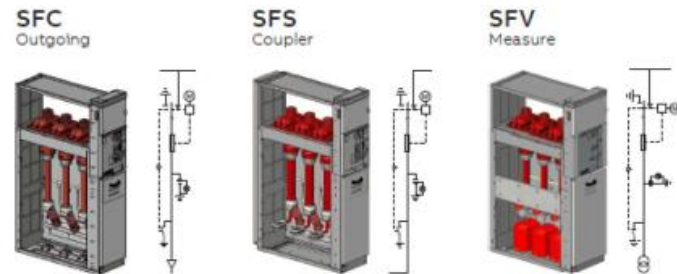
Different projects line-up to be covered with more than 20 typical panels:

- Units with switch disconnectors
- Units with fused switch disconnecter
- Units with frontal withdrawable circuit breaker or contactor
- Metering units
- Units with switch disconnecter and fixed/removable/withdrawable circuit breaker

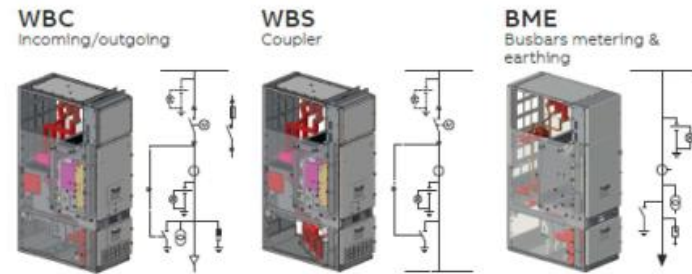
Units with switch-disconnector



Units with switch-disconnector and fuses



Units with withdrawable circuit-breaker or contactor



Secondary Switchgear AIS Unisec.

Easy to install

Modular design

Extension and upgrades always possible on both sides

Complete access from the front (installation against the wall)

Frontal earthing busbar

Bottom and Top cable entry

Just 4 fixing point to save time

Lifting hooks for easy handling

Installation Videos available

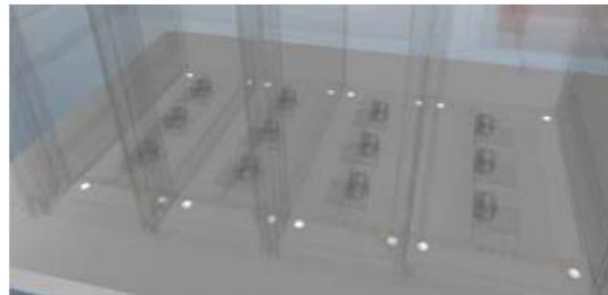
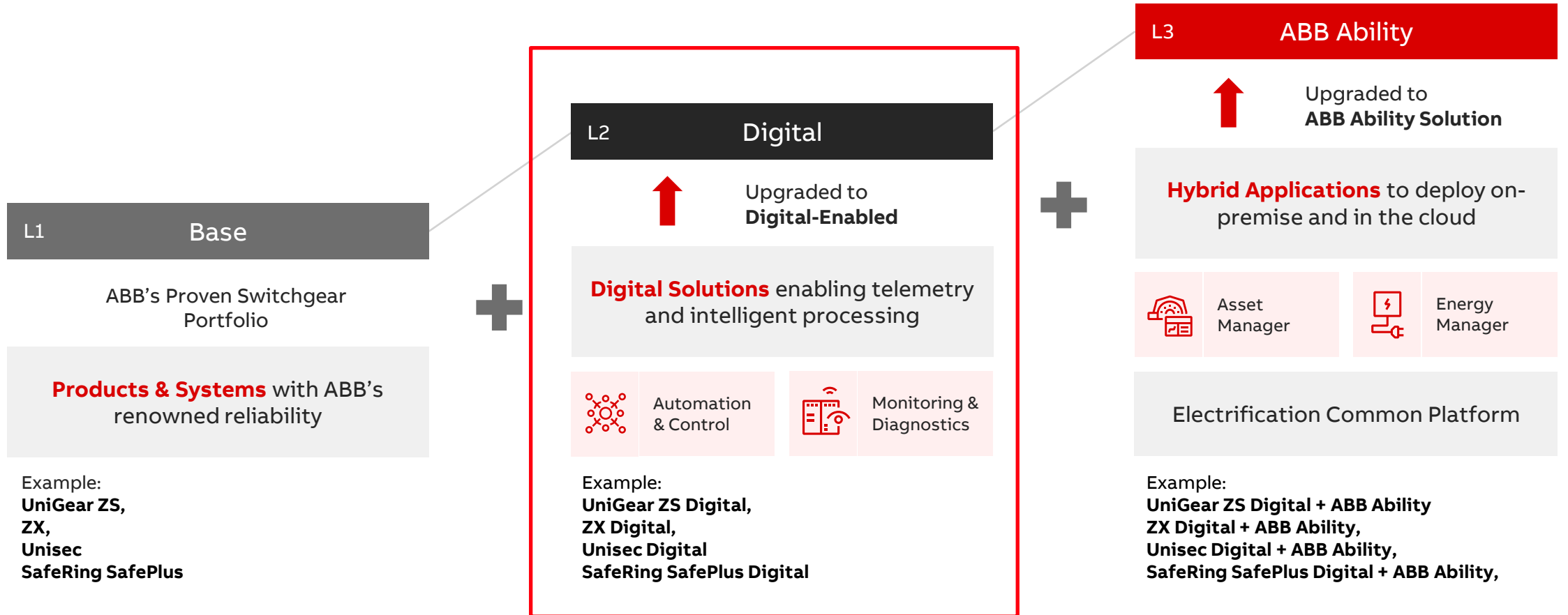


ABB Ability[®] solutions for electrification

Digital Switchgear

Offering Levels



Digital solutions for electrification

The digital journey: digital enabled assets



Data collection

Efficient, reliable sensors. Smart sensors.



Connectivity

Data available on standard protocols and digital bus. Aggregation of different data sources, and for different purpose (protection, diagnostic, energy efficiency, etc)

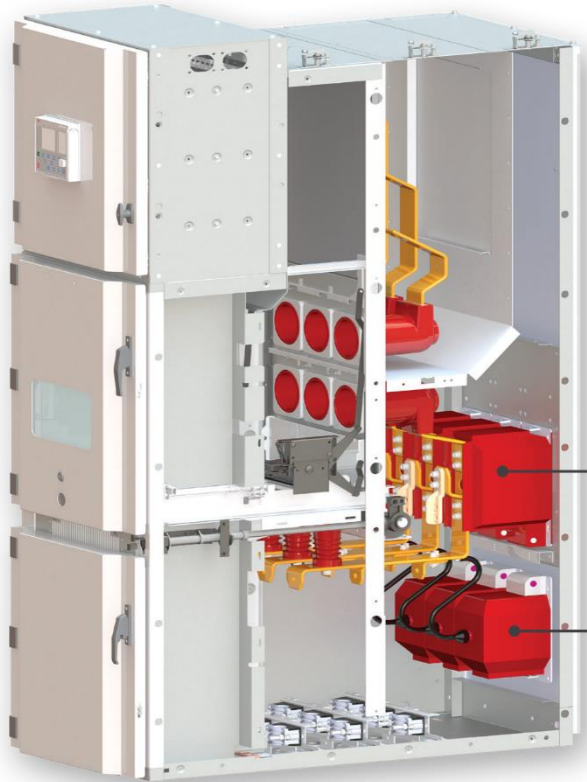
Key digital switchgear components

Levels of digitalization

	Description	Main value
Level 0	Simply replace CTs and PTs with Current and Voltage Sensors. Add additional sensor packages (e.g., temperature) as needed.	<ol style="list-style-type: none">1. Reduced weight2. Space saving (primarily due to elimination of PT compartment)3. Eliminates problems of saturation and ferroresonance4. Safety – no possibility of unsafe voltages from open CT secondary circuits5. Equipment condition for switchgear and circuit breakers.
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Level 2	Above + Process bus (61850-9-2LE) Requires use of Merging Units (MUs), time synchronization devices and Ethernet switches. Fiber optic connection from bay (switchgear) to substation.	Above + <ol style="list-style-type: none">7. Improved flexibility – changes in protection only require IED level changes.

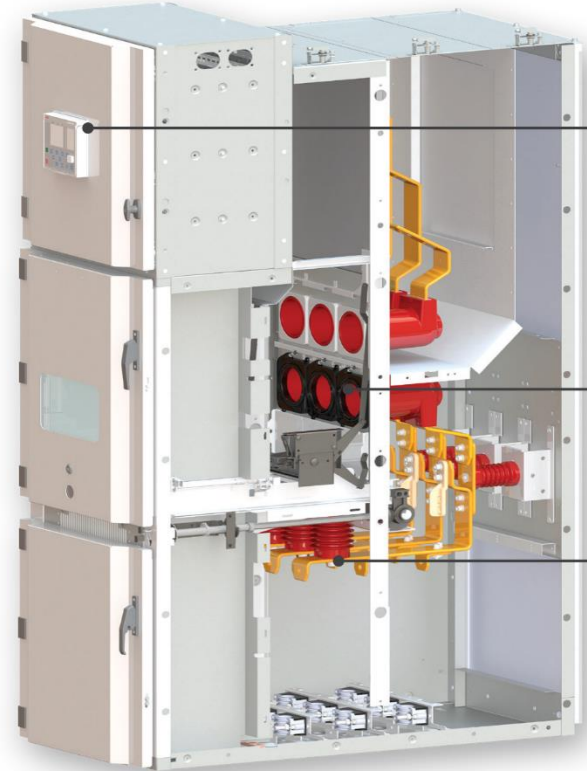
Conventional versus digital switchgear

Sensors require less space



Conventional UniGear with instrument transformers

1. Current transformer
2. Voltage transformer



UniGear Digital with sensors

1. Relion® protection relay with IEC 61850
2. Current sensor
3. Voltage sensor

Benefits – Safety

Safety by design

Installation & commissioning

- Reduced wiring & simple connectors reduces errors and installation time.
- Reduced weight of components makes handling of the equipment easier.
- Low energy analog (LEA) output of sensors reduce shock hazards during commissioning.

Operation

- Current & voltage sensors have LEA outputs.
- Voltage sensor eliminates danger of ferroresonance.
- Elimination of primary fuse protection for voltage sensors reduces likelihood of personnel interaction with the equipment.
- Sensors have a wide and linear accuracy range.
 - Current sensors do not saturate. Thus, varying loads can be accommodated without the need to change CTs.

Troubleshooting & Maintenance

- Current sensor eliminates danger of high voltage across the secondary terminal of an open CT.
- For the same application, fewer sensors vs. transformers to fail.
- Self-supervision & error detection in the relays facilitates troubleshooting.
- Minimal control connections that could fail and require repair.
- With digital test switches the testing process is same as today.

Benefits – Simplicity

Wiring & variants



Conventional



Digital

Reduced Wiring



Conventional

No cable tray

Single conduit to carry fiber



Digital

Reduced Variants

Voltage transformers



10's



2



Voltage sensors

Full range: up to 4000 A, 63 kA, 27 kV

Current transformers



100's



2



Current sensors

Benefits – Sustainability

Sustainability via material and energy savings

Reduced material consumption

- Sensors are small & weigh less compared to Its
- Building support structures can be optimized
- Footprint savings possible (less frames)

Energy loss is minimized with the use of sensors

- Saving potential of up to 250 MWh over 30 Years
- Saves up to 150 tons of CO2

	Feeder	CTs	Number of panels	Number of CTs	Power consumption	Energy consumption in 30 years*
CT w/1A rated secondary current	Incoming	1000:1/1A	2	6	140 VA	36 698 kWh
	Outgoing 1	200:1/1A	8	24	448 VA	117 776 kWh
	Outgoing 2	100:1/1A	4	12	102 VA	26 724 kWh
	Total	-	14	42	690 VA	181 198 kWh
CT w/5A rated secondary current	Incoming	1000:5/5A	2	6	172 VA	45 244 kWh
	Outgoing 1	200:5/5A	8	24	629 VA	165 208 kWh
	Outgoing 2	100:5/5A	4	12	179 VA	47 124 kWh
	Total	-	14	42	980 VA	257 576 kWh
Sensor	Incoming		2	6	0.0000 VA	0.000 01 kWh
	Outgoing 1		8	24	0.0000 VA	0.000 04 kWh
	Outgoing 2		4	12	0.0000 VA	0.000 02 kWh
	Total	-	14	42	0.0000 VA	0.000 07 kWh

Key digital switchgear components

Levels of digitalization

	Description	Main value
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ABB Ability™ Digital Connectivity

What about IEC61850 Standards?

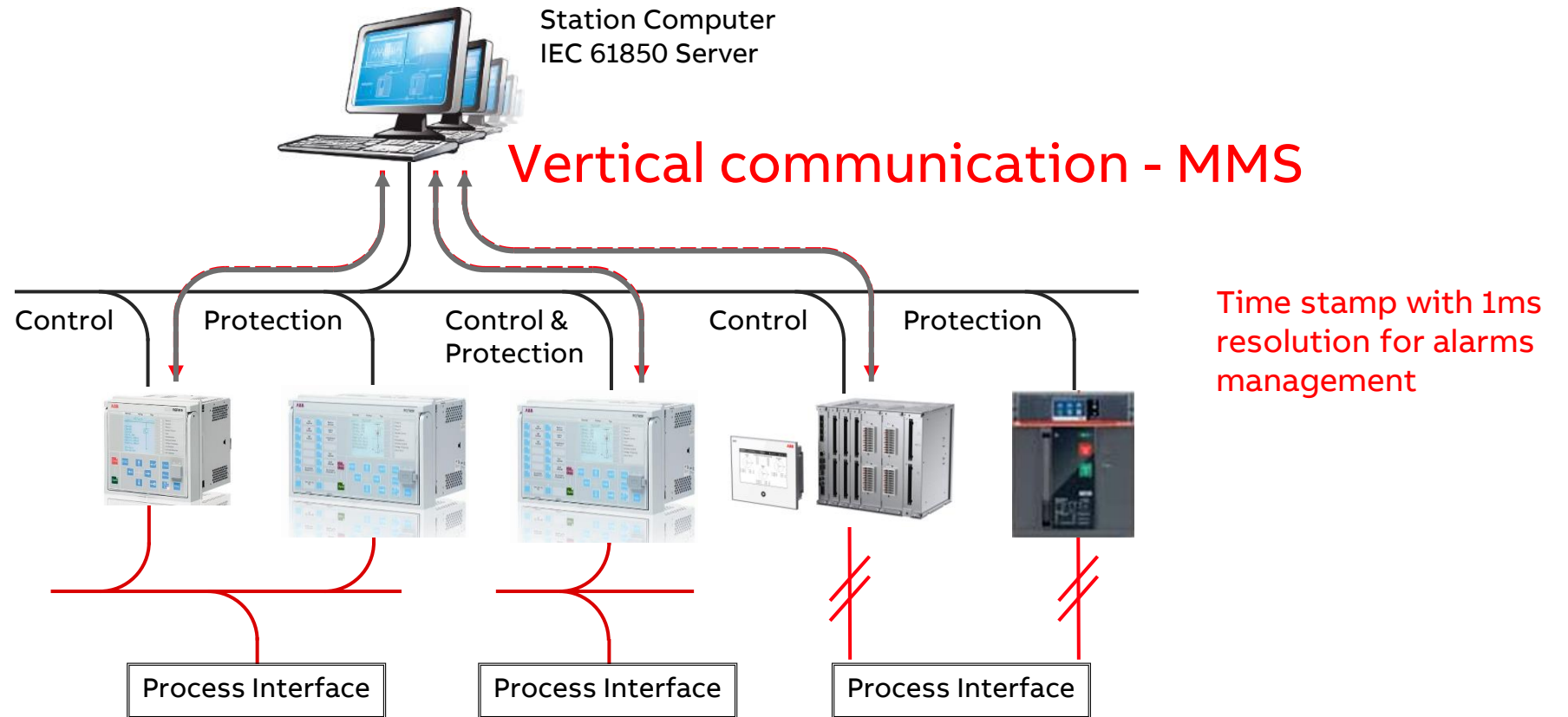


ABB Ability™ Digital Connectivity

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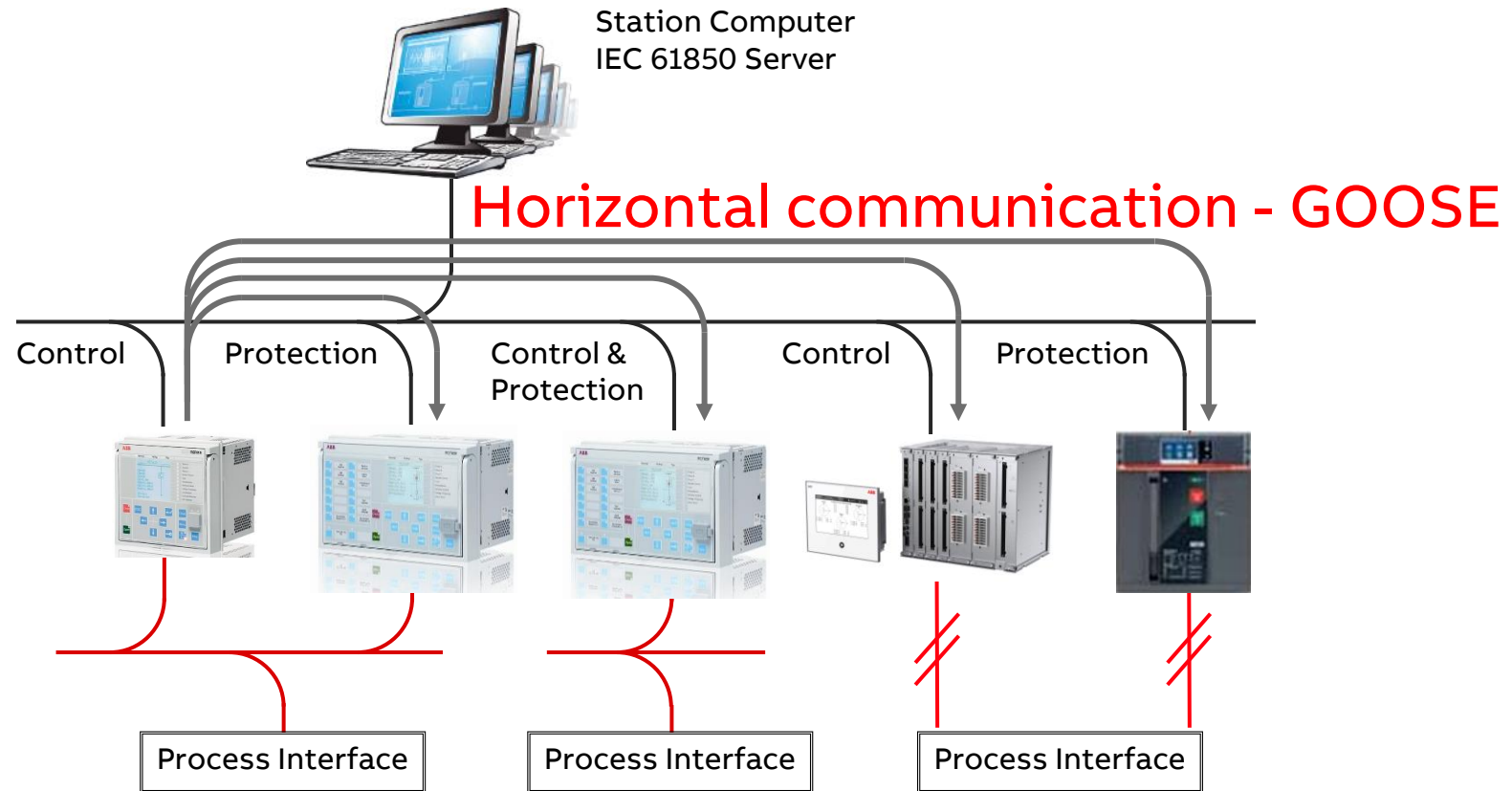
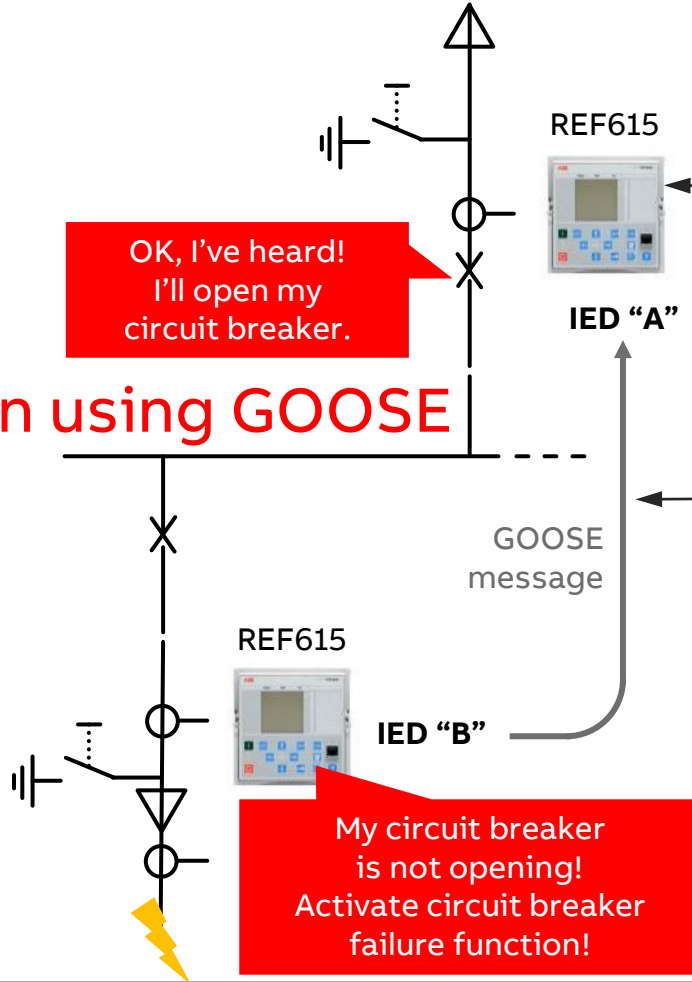


ABB Ability™ Digital Connectivity

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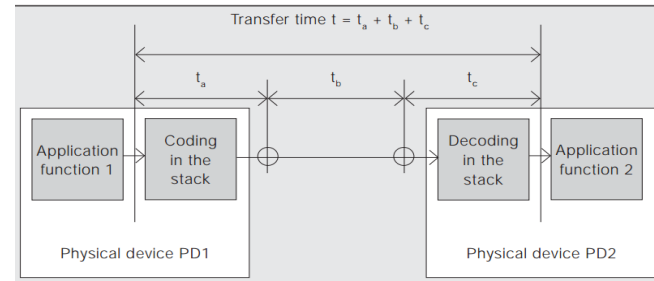
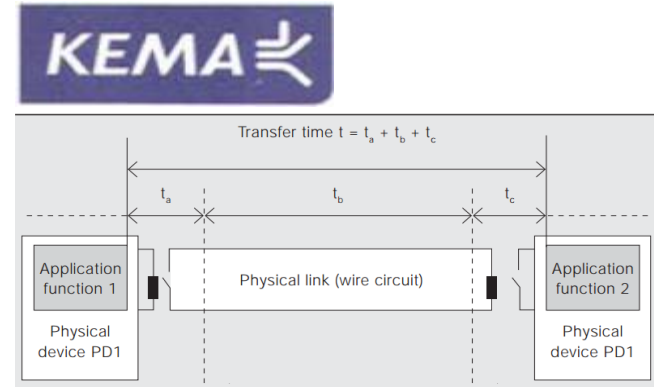
Protection using GOOSE



Re-configuration via software:
Easier and safer than changing wires after commissioned

No cables for interlocks

16 ms faster interlock:
Also for load shedding

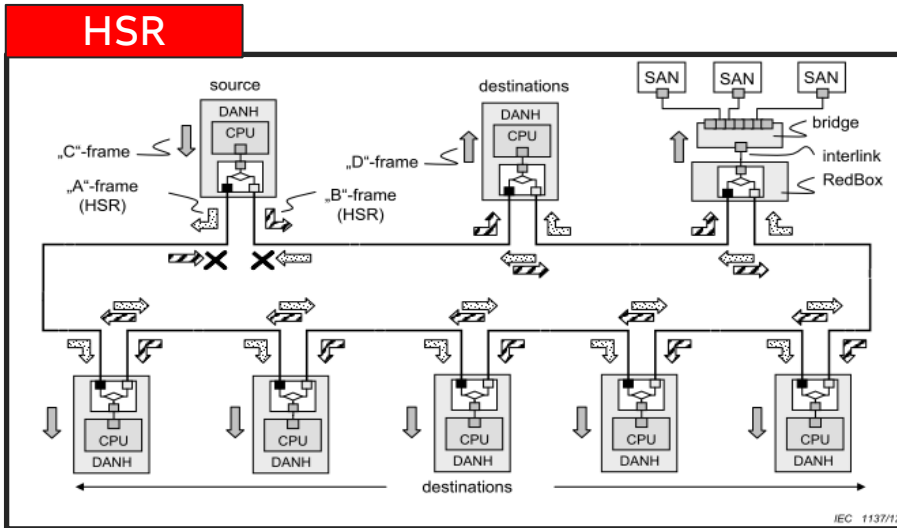


Protection blocking data exchange time between Relion® IEDs using hard wired signals (max) including protection activation time	32 ms
Protection blocking data exchange time between Relion® IEDs using IEC 61850 GOOSE (max) including protection activation time	16 ms
Signal transfer time between Relion® IEDs using hard wired signals (max)	24 ms
Signal transfer time between Relion® IEDs using IEC 61850 GOOSE (max)	8 ms

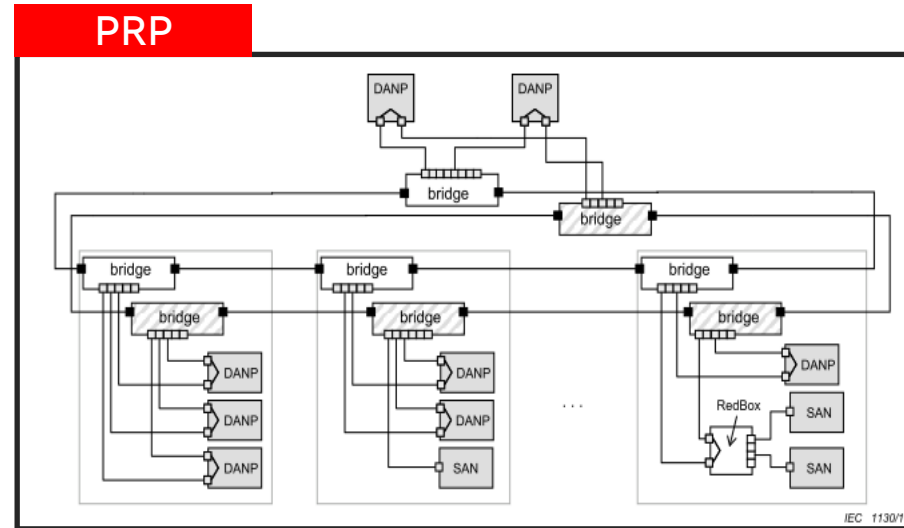
ABB Ability™ Digital Connectivity

What about IEC61850 Standards?

Network redundancy protocols



- 2 ports each device, full-duplex multicast
- Cost efficient – reduced no. switches
- No switch over time



- Double ring topology
- No switch over time
- More than one error can be tolerated

ABB Ability™ Digital Connectivity

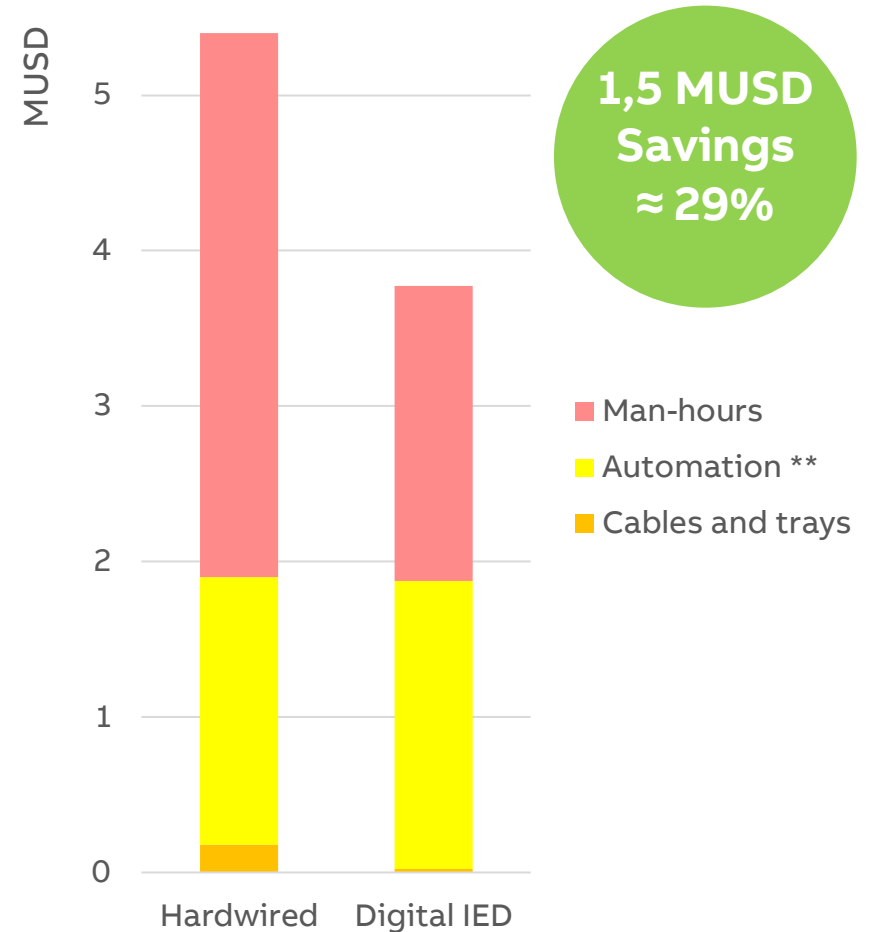
Cost Saving on Investment

Case studies cost saving :

- 10 substations
- 150 medium voltage cubicles
- 2000 low voltage breakers and motors
- 100 low voltage drives

** includes computers, switches, cabinets and IED costs

* Switchgear equipments not considered (the same for both cases)



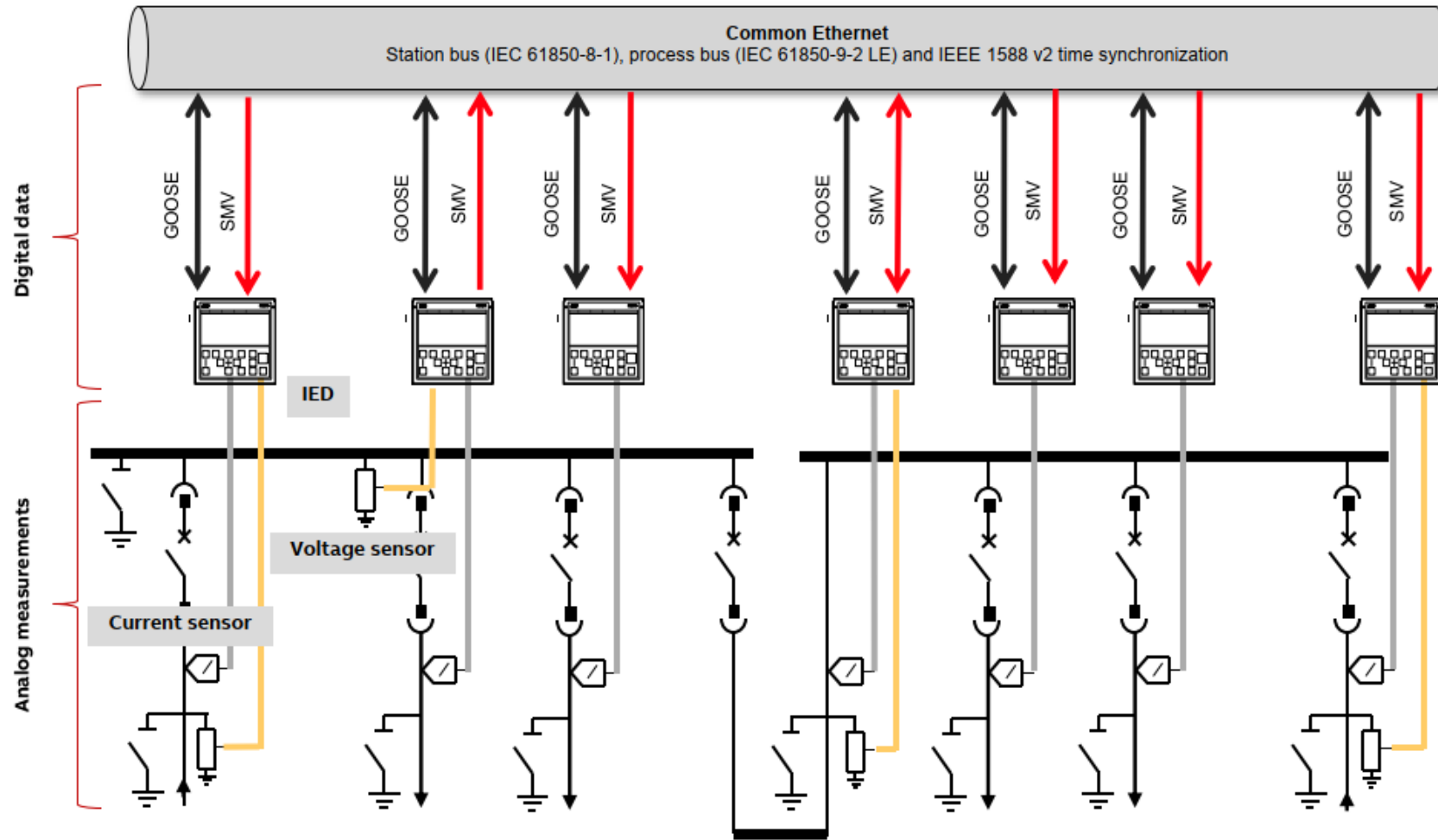
Key digital switchgear components

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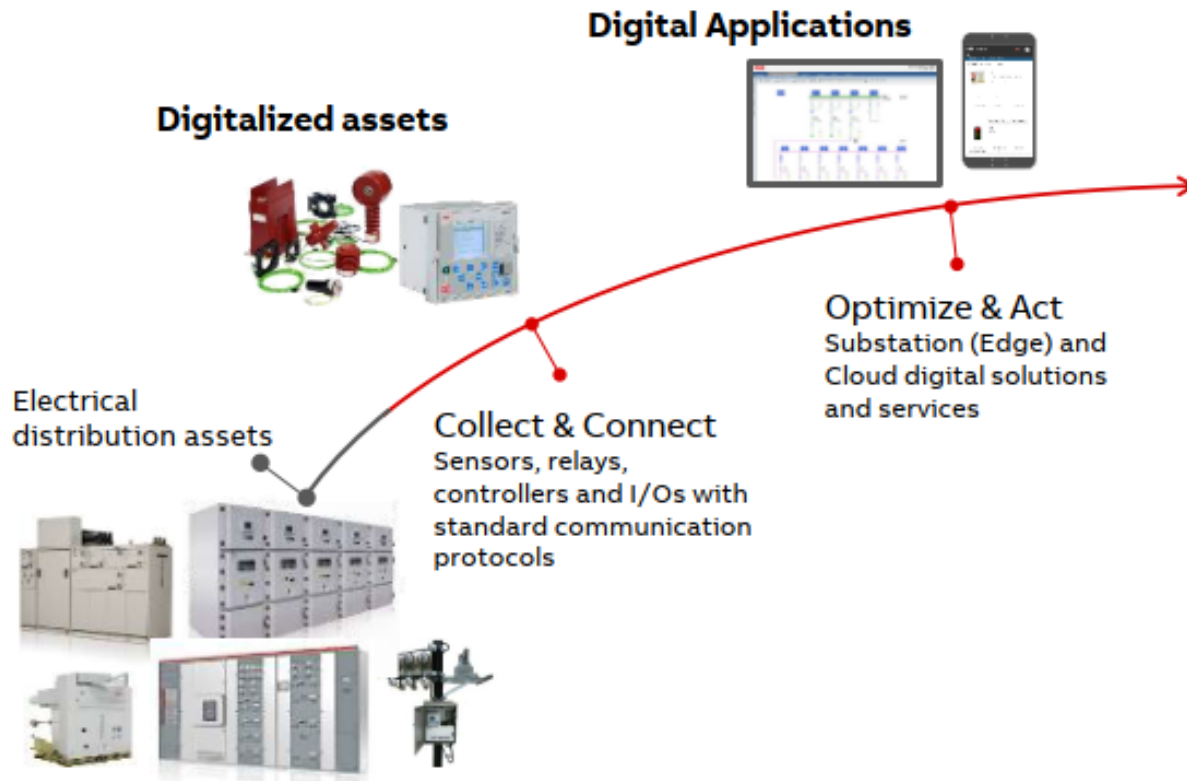
IEC 61850-9-2LE process bus and GOOSE messaging

One line diagram



Digital solutions for electrification

ABB Ability™: digital journey to improve business



Digital Substation and Digital distribution

Increase flexibility and scalability with feature adaptation during lifetime, and data integration



Asset Health and Performance management

Condition monitoring and predictive algorithms to optimize maintenance and assets lifecycle



Power and Energy management

Maximize power availability and quality, energy monitoring and efficiency



Cyber asset management

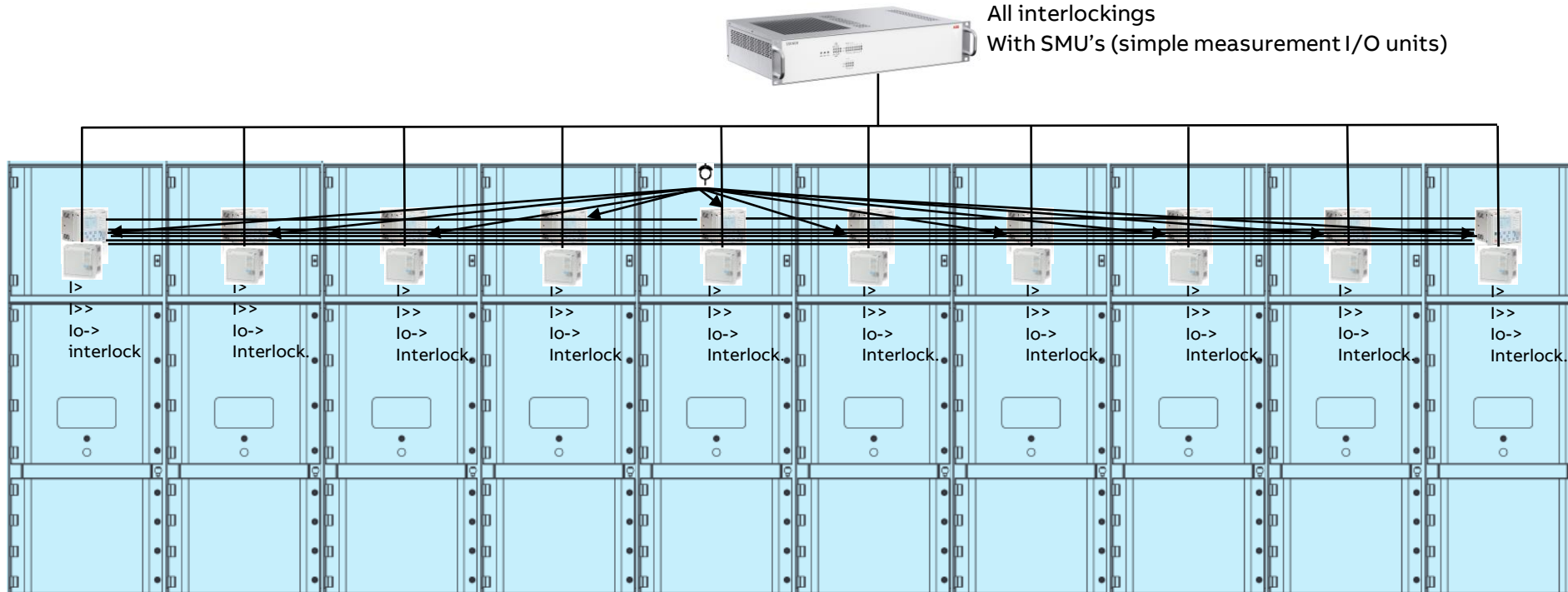
Electronic devices inventory, security updates, configurations and documentation traceability.

Digital Substation and Digital Distribution

SSC600: ABB Ability™ Smart Substation Control and Protection for electrical systems

Smart substation control and protection SSC600

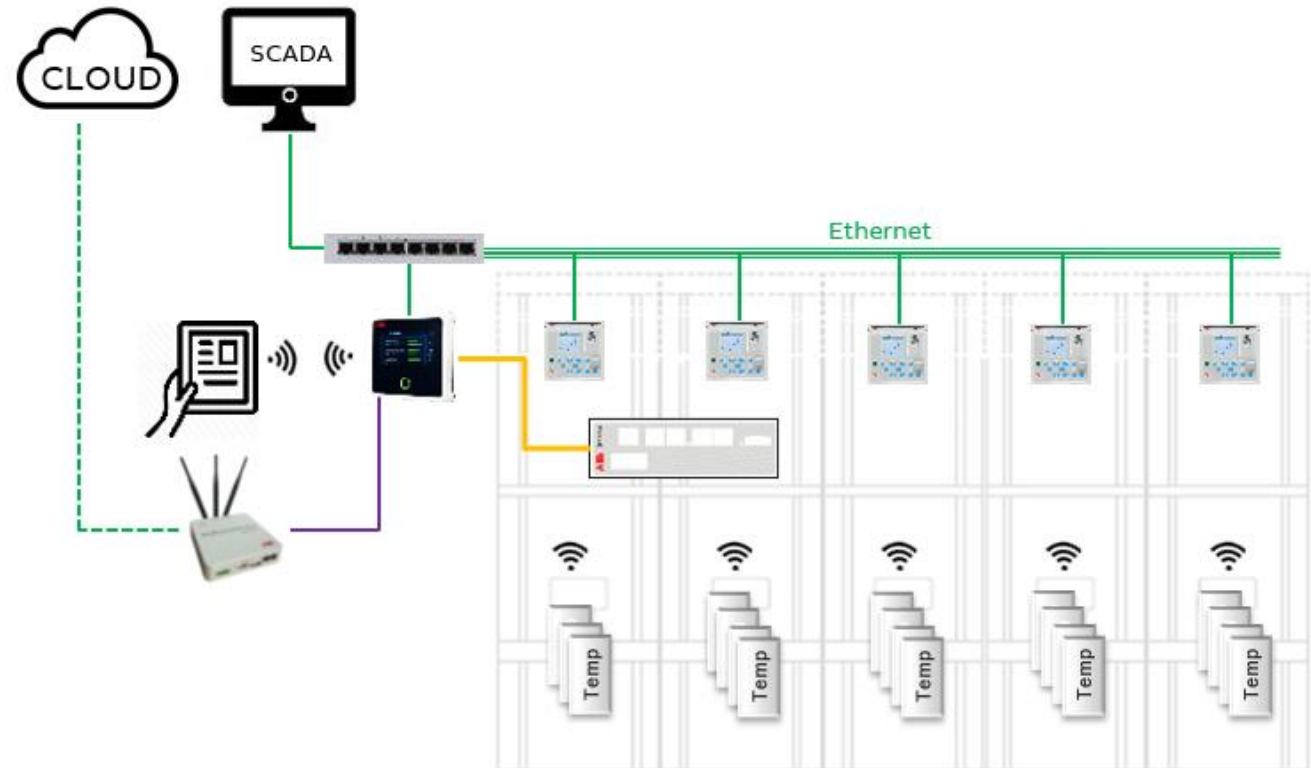
All protections
All measurements
All interlockings
With SMU's (simple measurement I/O units)



Asset health and Performance management

MV Switchgear Condition Monitoring

- One device for lineup - one Swicom can be connected to up to 24 Relion® 615/620 relays as primary sensing infrastructure to monitor the circuit breakers:
 - Opening and closing times estimation and analytics
 - Operation, trip counting etc.
 - Contact wearing etc.
- Ready for additional sensors like:
 - Temperature (Sensor, Exertherm)
 - Partial discharge (PDCOM)
 - Ambient temperature/humidity



Power and Energy management

cPMS: power management solution

cPMS: compact Power Management System

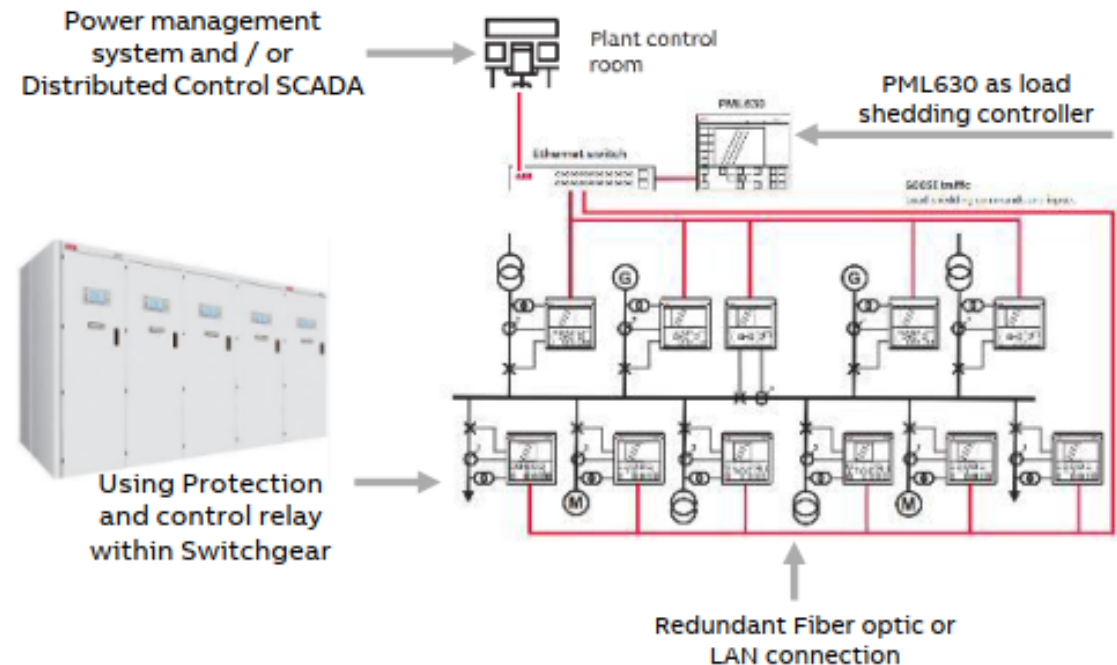
Prevent power black-out in industrial plants with critical loads: keep essential process alive disconnecting less-important loads.

Prevent damage to motors (not subject to deceleration) before the load shedding operation as compared to slow frequency based load-shedding. Motors benefit of longer life and reduced maintenance cost.

Captive local generation sizing can be optimized according to needs of operation criticality.

Advantages:

- Off-the-shelf components easy to engineer and integrate for small-mid plants: without a complex and expensive DCS
- Future-proof, pre-engineered and scalable solution based on IEC 61850: avoid hard-wired and custom solutions (e.g. with PLC)



Power and Energy management

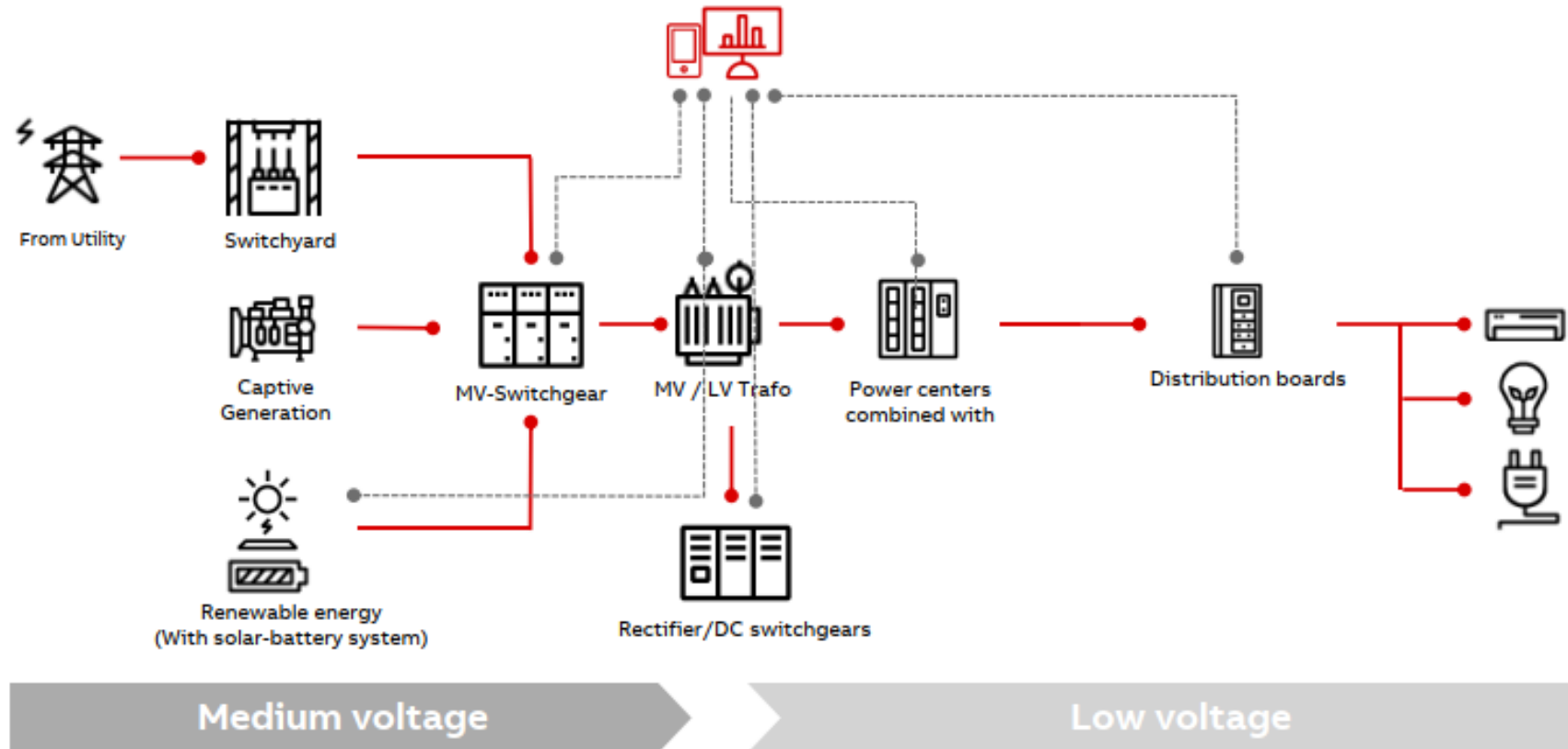
Energy management for infrastructure and plants/SCADA system

ABB Zenon



Electrification supervision, local/remote **full energy control** of single-multi site

Renewable and sustainable power integration with monitoring, microgrid management, substation management



Cyber Asset management

Clionet Data Care

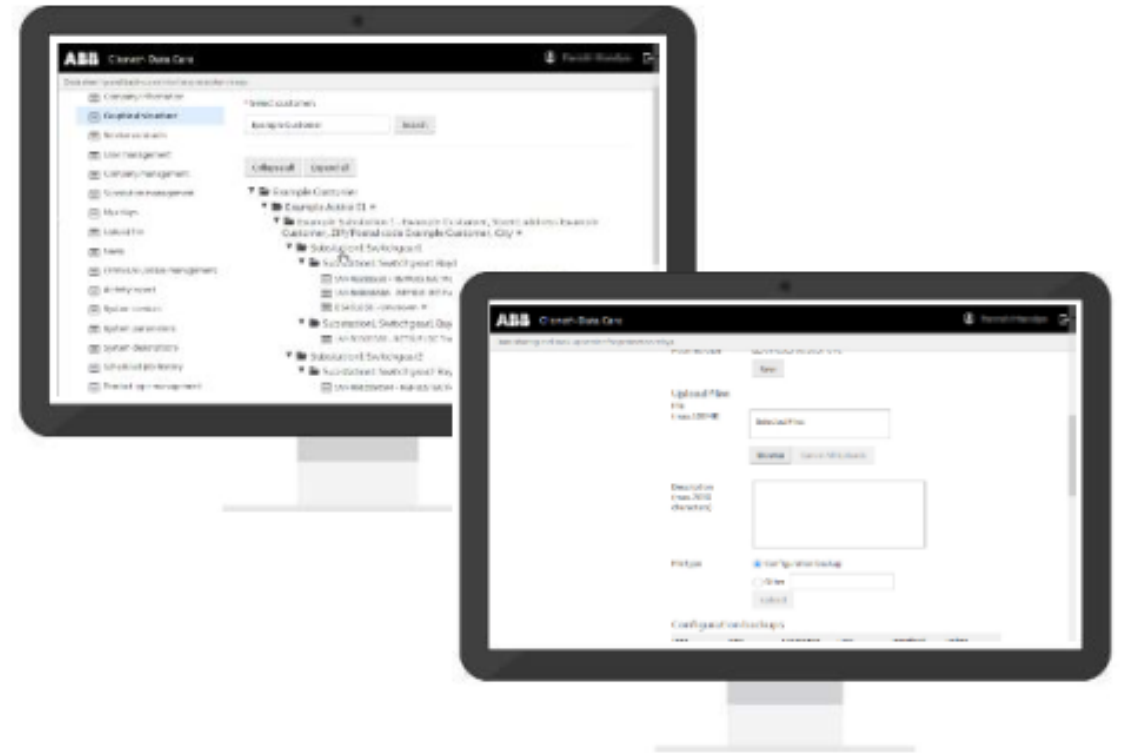
Clionet® Data Care: cloud secure storage

Central, efficient and secure relay data backup for operators and maintenance staffs:

- Configuration files
- Documents and technical solutions
- Disturbance recordings
- Integrated with PCM600 relay engineering platform
- Notification for firmware updates for the installed protection relays

Advantages:

- End-user can share files with subcontractors, third-party, as well as ABB specialists
- Remote support by ABB specialists
- Cloud application: very low TCO, always updated, secure



Digital Switchgear

Offering Levels

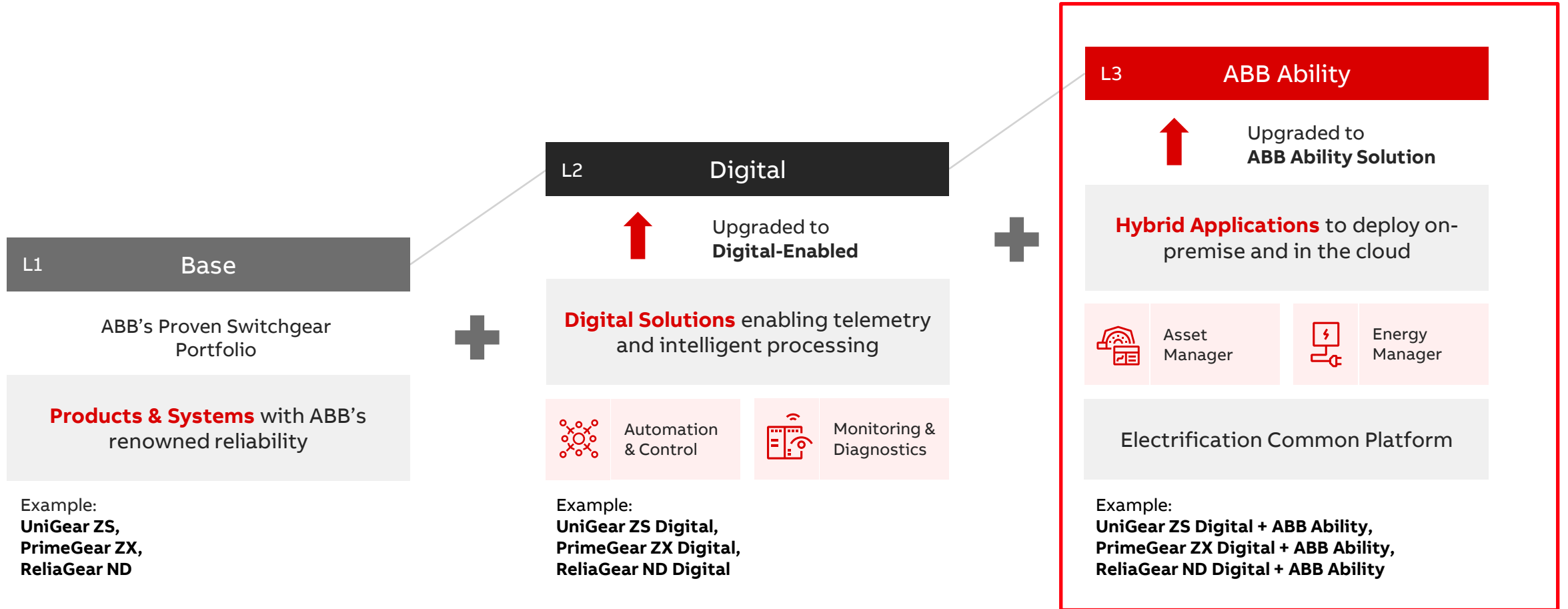


ABB Ability™ Energy Manager

Energy management made easy

Energy efficiency has become essential to running cost-efficient operations. ABB Ability™ Energy Manager provides real-time understanding of your energy consumption and identifies areas of improvement. And it's scalable, from a single site to a multi-facility system with hundreds of users.

Monitor

Discover Site performance, supervise the electrical system and allocate costs

Analyze

Schedule automatic data exports, improve the use of assets and take the right business decision

Act

Set up alerts and notify to key personnel and remotely implement an effective efficiency strategy to achieve energy savings in a simple way.



ABB Ability™ Energy Manager

Key features



Monitoring

Visualize your plant data with pre-configured and customizable dashboards and share with your team



Reporting

Get scheduled Excel and PDF reports with relevant site information



Energy audit

Keep your consumptions under control, enhance your efficiency and monitor your Energy Performance Indicators



Alerting

Automatize your alerts to receive immediate feedback on the status of your site via email or SMS



Cost management

Check your energy consumption, customize your cost plan and visualize the relative impact on your energy bill



Multi-utility

Monitor water, gas, heating and power consumption with one single dashboard

ABB Ability™ Asset Manager

Asset management made easy

ABB Ability™ Asset Manager sets a new benchmark for simplicity and flexibility in asset-performance management. It gives you the power of seeing and optimizing your site equipment behavior any-time, anywhere via an intuitive graphic interface, resulting in greater reliability and availability and minimized unplanned maintenance.

Condition Monitoring

ABB Ability™ Asset Manager provides granular visibility of your asset behavior in real time for both LV and MV environments.

Predictive Analytics

Detect potential faults through condition assessment, performance trends and pre-alarm notifications.

Maintenance Planning

Root-cause analysis of asset condition enables predictive maintenance that significantly reduces unplanned downtime and operational costs.

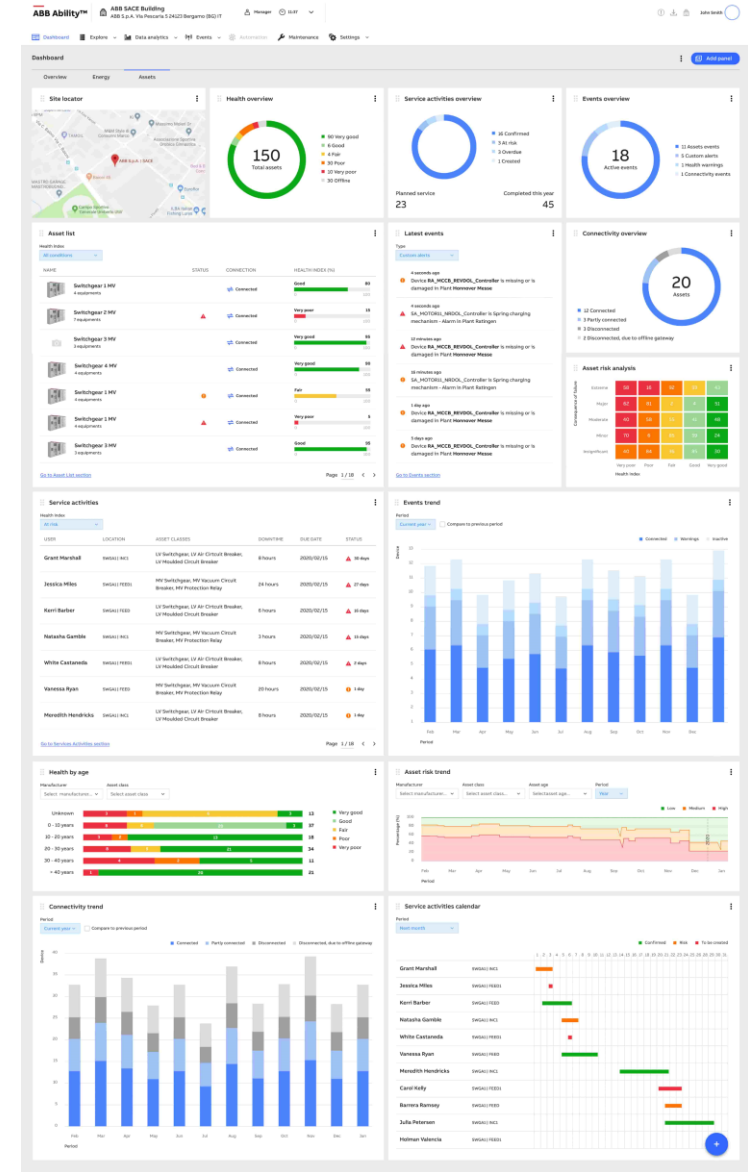


ABB Ability™ Asset Manager

Key features



Asset health

Get the overall view of your assets by health condition, sort from poor to good condition, dive into the diagnostic and prognostic information



Events and notifications

Track alarms and events of your site and set notifications to the responsible personnel in order to quickly react in case of any warnings



Asset management

Get full visibility of the installed base, from real time data to historical trends, from health analysis to future predictive insights, from documentation to device information, from events to past maintenance activities



Predictive maintenance

Plan maintenance based on suggestions generated by predictive analytics



Service activities

Schedule and track maintenance activities on assets to have full visibility on asset life and performance

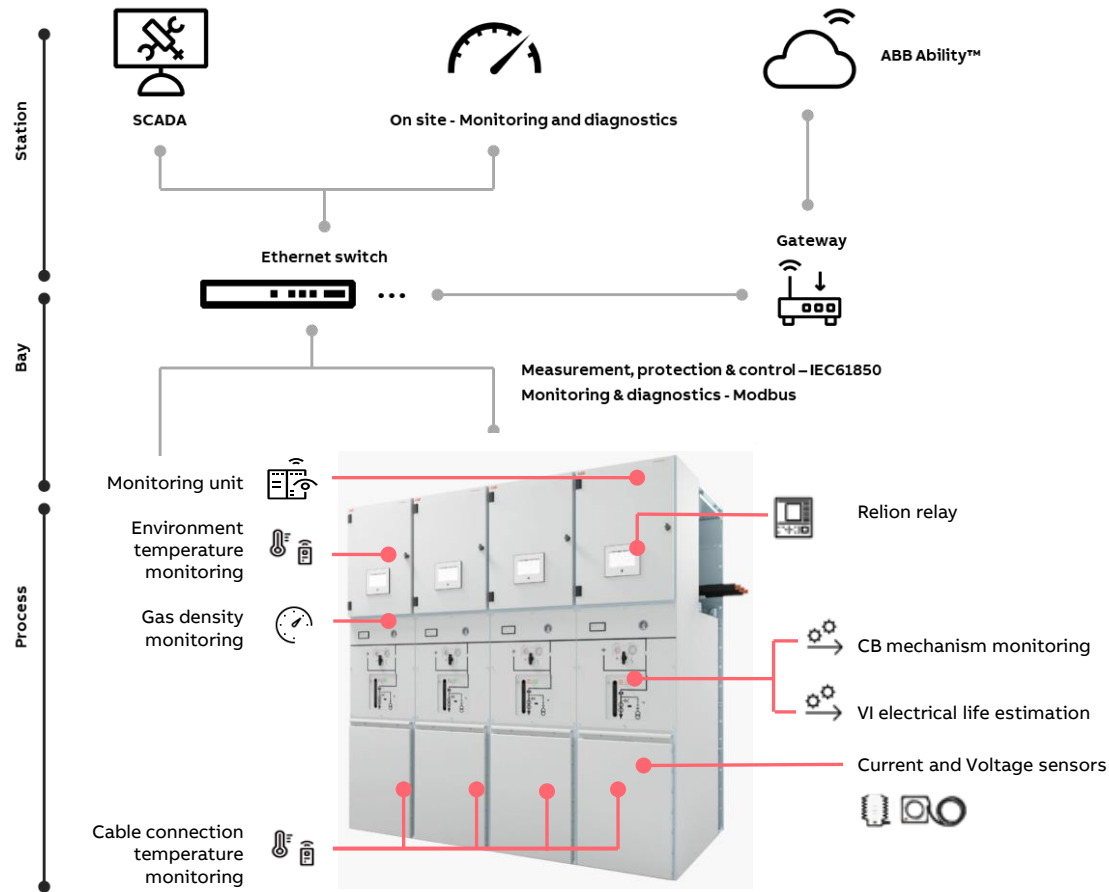


Reporting

Generate and schedule reports about site and assets conditions and performances

Primary GIS

ZX0/ZX0.2/ZX2/PrimeGear ZX0 *



Automation & Control

Digital switchgear if:

- Current and Voltage Sensors **and**
- Relion relay with or without digital bus IEC 61850 and GOOSE/SMV
- or**
- Traditional CT/VT **and**
- Relion relay with digital bus IEC 61850 and GOOSE/SMV
- or**
- Centralized control and protection SSC600

Monitoring & Diagnostics

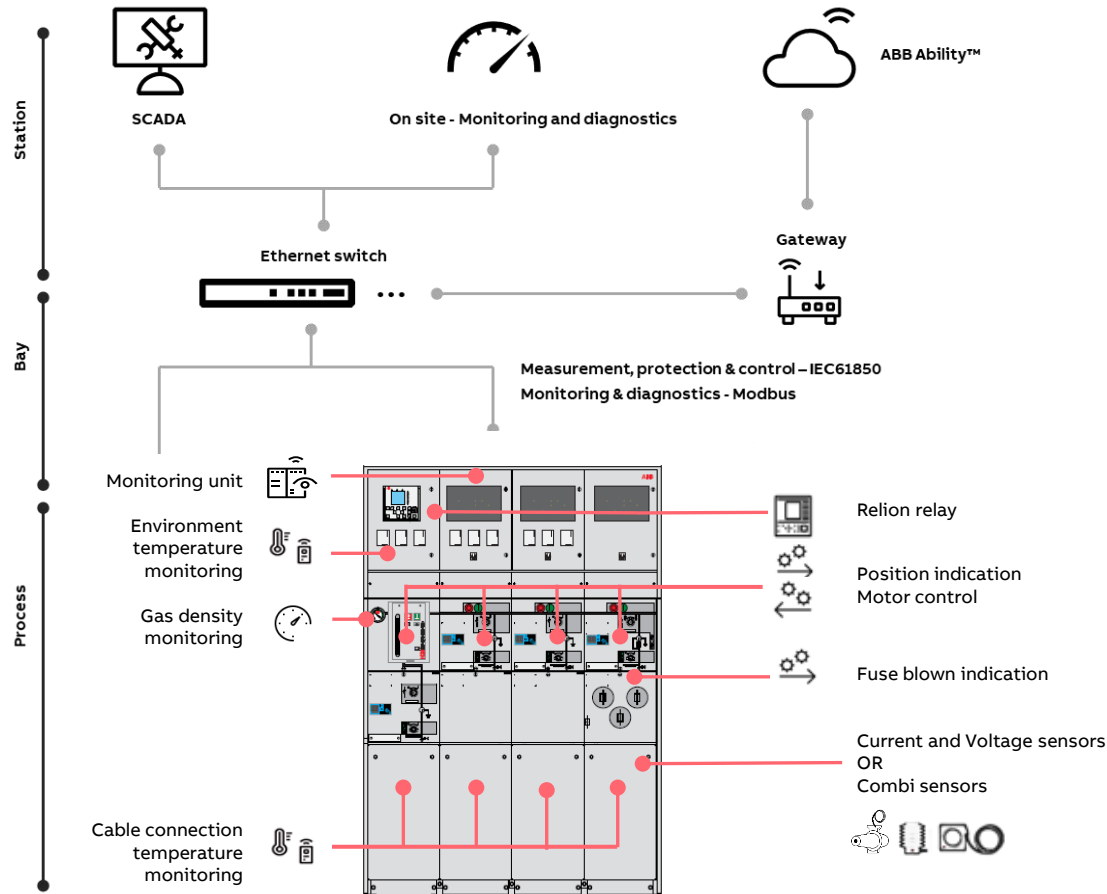
Digital switchgear if:

- M&D Solution such as:
 - o Cable temperature
 - o Gas density
 - o Others...

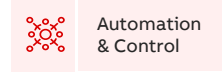
NOTE: Monitoring options like ABB Ability™ SWICOM and connectivity with ABB Ability Asset Manager (formerly MyRemoteCare) are separate add-ons.

Secondary GIS

SafeRing/SafePlus

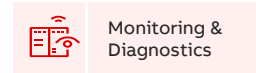


Digital switchgear if:



- Current and Voltage Sensors (or combisensors) **and**
- Relion relay with or without digital bus IEC 61850 and GOOSE/SMV
- or**
- Traditional CT/VT **and**
- Relion relay with digital bus IEC 61850 and GOOSE/SMV
- or**
- Centralized control and protection SSC600 / RTU solution with external communication

Digital switchgear if:



- M&D Solution such as:
 - Cable temperature
 - Gas density
 - Others...

NOTE: Monitoring options like ABB Ability™ SWICOM and connectivity with ABB Ability Asset Manager (formerly MyRemoteCare) are separate add-ons.

ABB

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segment

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Webinar Materials

ABB Review – Data Centers

ABB Review 3/2020

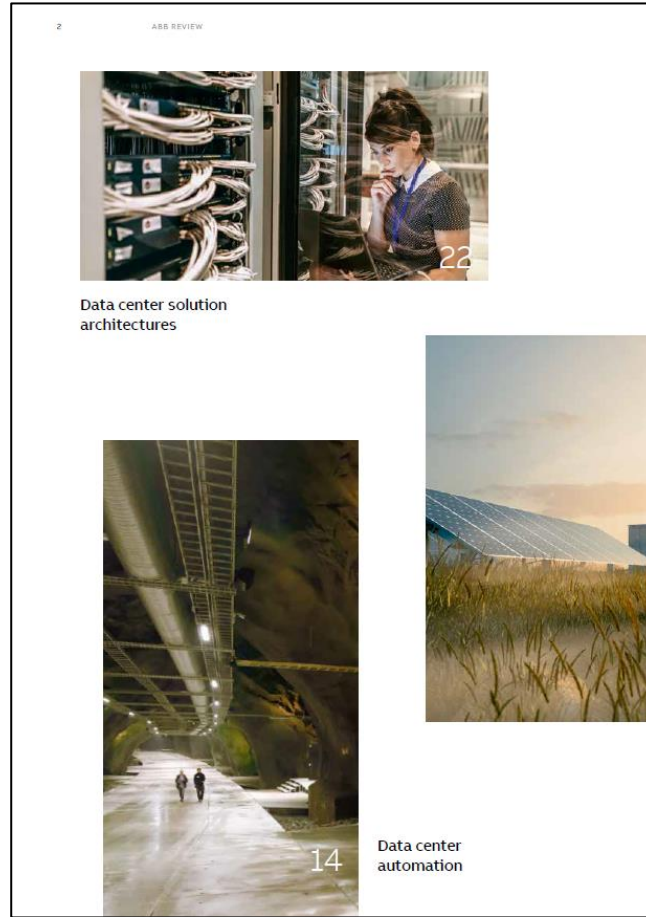


ABB
review
03|2020 en
Data centers

08

06–55 Data centers
56–77 Inside the cloud

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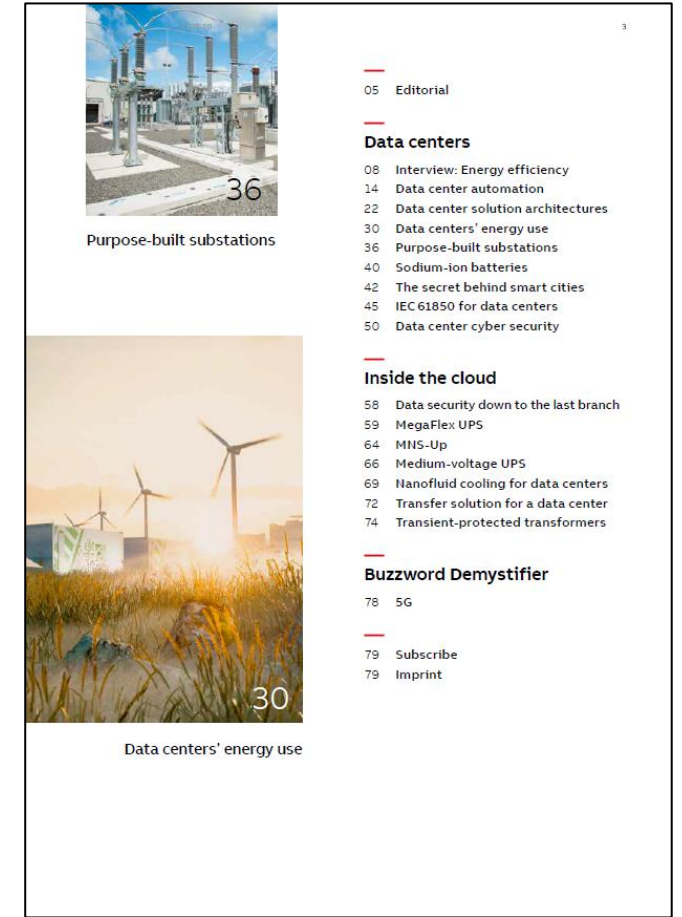
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Data center solution architectures

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Purpose-built substations

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Data centers' energy use

Webinar Materials

Websites

ABB Data Center Solutions

MV products for Data Centers

LV products for Data Centers

ABB Thailand

Webinar Materials

Global webinars and virtual events

ABB HOME • OFFERINGS • DATA CENTER • INDUSTRY EVENTS GLOBAL SITE

Data center industry events

While most in-person industry events have been canceled or postponed this year there are many opportunities to learn about the latest technologies and best practices and engage with us virtually. Join us for these virtual events and visit our [data center web portal](#) to learn more.

On Demand events | Live and future events

Data Center Dynamics Control & Automate

What's next for advanced data center management and operations? This conference brings together leading mission critical ops professionals and technologists to examine the operational strategies being deployed, the impact of machine learning and AI and the new infrastructure management stack that includes advanced DCIM, DMaaS, other remote monitoring, visualization tech and the network that connects them. Join us as ABB's Rich Ungar will be speaking on: "Are industrial control systems the best fit for modern data center automation?"

DCD Control & Automate: March 17-18, 2021 | 8:00-15:00 Eastern Standard Time (EDT) UTC-5

Data Center Server Room Solutions Show

The data center industry needs safer, smarter and more sustainable solutions. Join our Virtual Innovation Show and discover how to protect, monitor and make your Data Center smarter and fully connected with ABB solutions to finally increase the value of your investments.

Data Center Server Room Solutions Show: March 3rd, 2021 | 8 am (CET) and 4 pm (CET)

Data Center virtual events

DCD Control & Automate
Broadcasting live 17-18 March
Richard Ungar
Head of Data Center Automation - Americas
ABB
The FREE virtual event on management & operations...

Register now



Watch sessions on demand



Watch sessions on demand



Watch sessions on demand

Webinar Materials

ABB Smart Societies - Data center interactive landscape



https://abbsmartsocieties.com/#data_center

<https://abbsmartsocieties.com/>

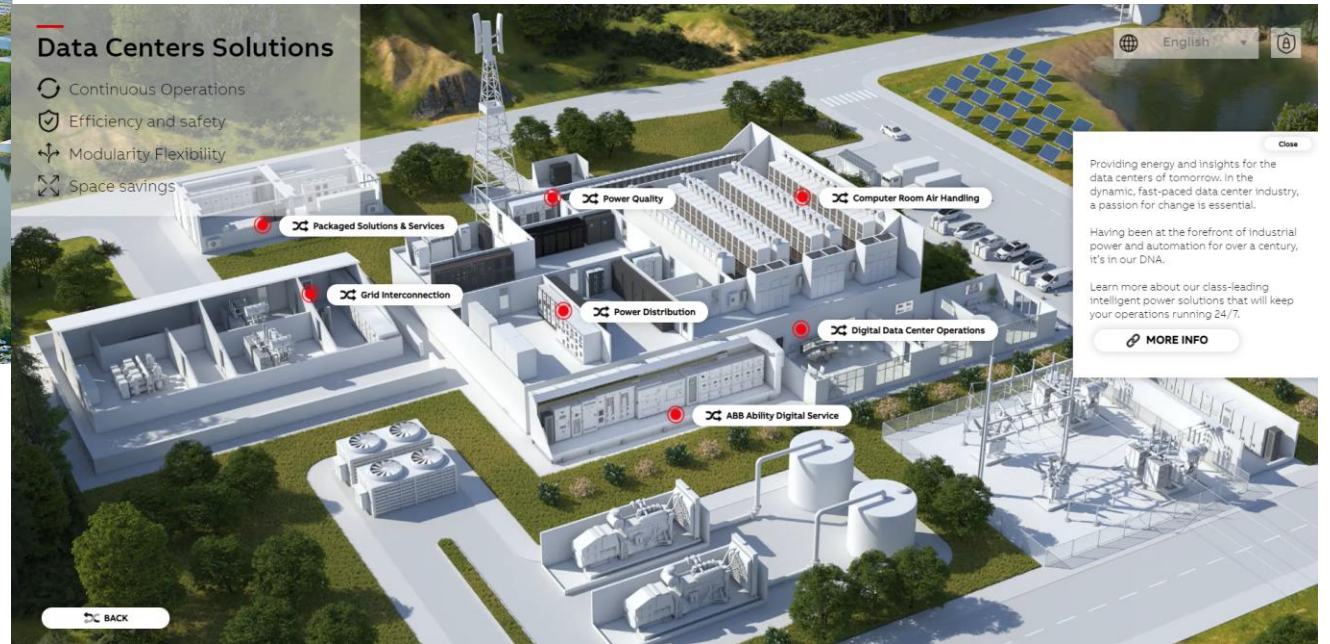


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Website: www.abb.co.th



Facebook: ABB Thailand



Line official: @askabb

