



ABB Medium Voltage Days MEA 2016

Major challenges in energizing data center and infrastructure projects

Power and productivity
for a better world™



Technical session 7

Major challenges in energizing data center and infrastructure projects

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- Speaker title Medium Voltage Business Unit
Data Centers and Infrastructures
Global Segment Manager
- Company name ABB
- Location Rome, Italy

Introduction

Medium-voltage segment



Datat centers represent an exciting growth area in our industry - they use approximately 30 times the power needed to run the average office building. It is critical that data is available at all times and that it is stored in a reliable and energy-efficient way. Our solutions focus on **safety, reliability** and uptime.

Overview



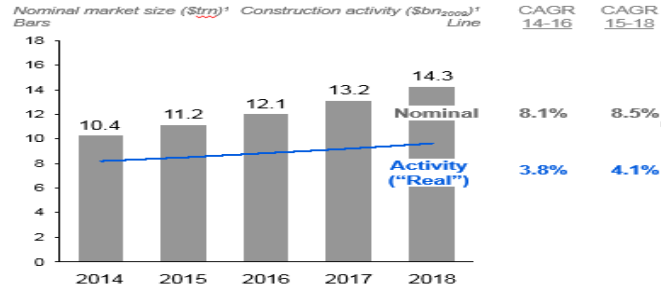
- Introduction & market outlook
- Focus on data center
- Airport and hospitals (example of application)
- Great experience on building construction
- Summary
- Questions and answers

Introduction

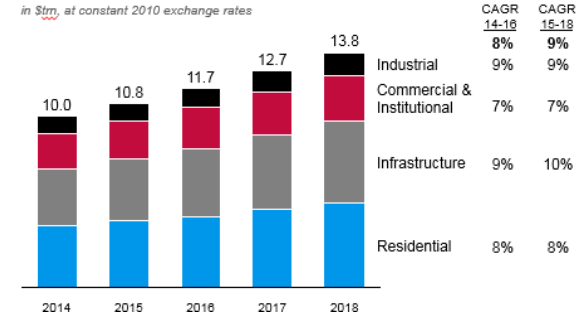
Construction market outlook



Global view



Sub-segment



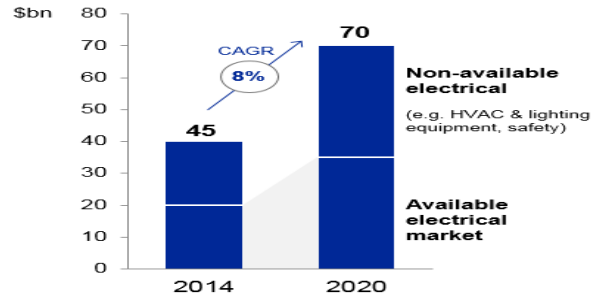
- **Construction activity** expected to increase ~4% p.a. going forward
- **Nominal market** to grow 8-9%
- **AMEA** to account for **more than 50%** of market (driven by China), Americas and Europe ~25% each
- Construction is **heavily sensitive to government intervention, interest rate** regimes and other **macroeconomic conditions**
- China remains the largest market by far, yet relative growth will slow to ~7% p.a.

Introduction

Data centers market outlook

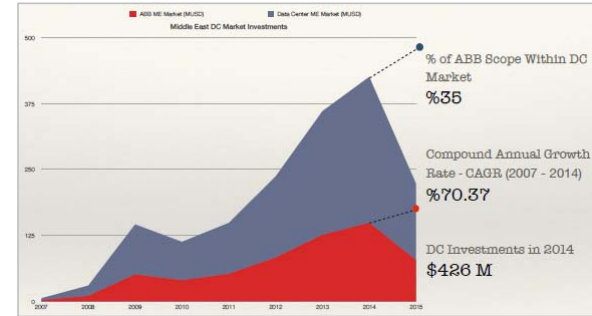


Total Market view



- We estimate a value of **MV total market** ~\$3Bn
- We estimate **Middle East market** ~ 500 \$M
- **Prefabricated DtC** are growing more than basis growth
- Market is US oriented since largest companies are US based
- China is second interesting market
- Cloud is new megatrend in Segment.

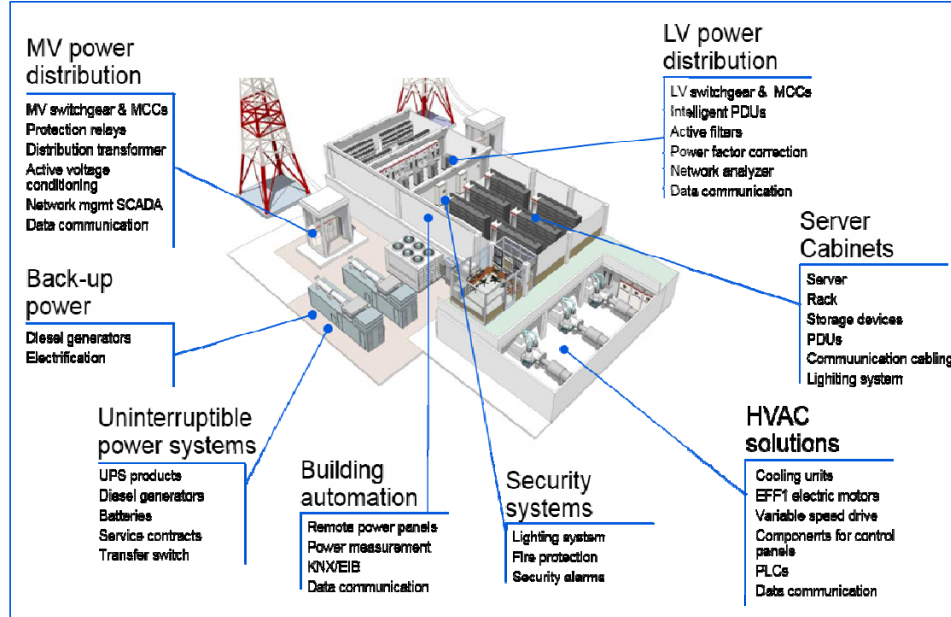
Middle East (DtC) Investments



Considered countries: UAE, KSA, Qatar, Oman, Bahrein, Jordan, Kuwait & Pakistan

Focus on data centers

Definitions



- A data center is a facility housing computer systems and associated components. Includes redundant or backup power supplies and communications, as well as environmental controls (e.g., air conditioning, fire suppression) and security devices.
- Data centers use large amounts of energy. Some of the largest use up to 100MW, while an average size will use 5 – 50MW.
- For most small businesses, the cloud is a more cost-effective option than a data center.

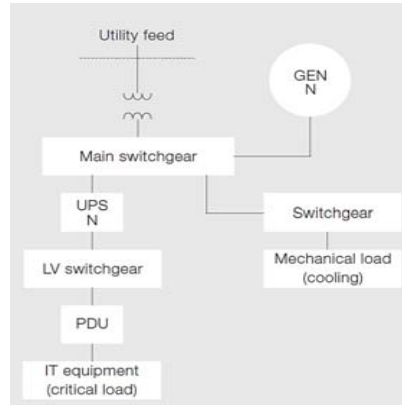
Classification is based on size (Square meter, and Power), redundancy and availability (TIER I, II, III and IV)

Focus on data centers

TIER classification

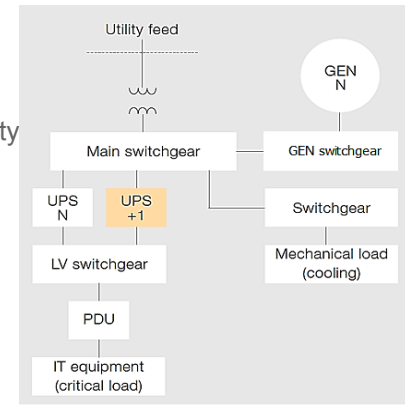
Tier I

- Non-Redundant Components
- Expected availability of 99.671%



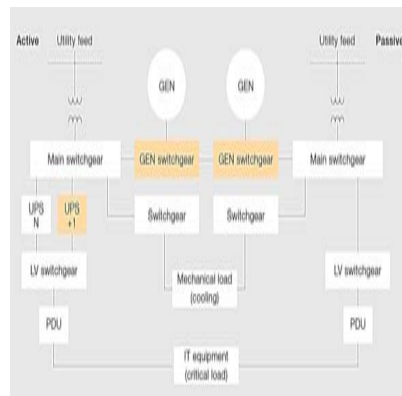
Tier II

- Redundant Infrastructure Capacity
- Expected availability of 99.741%



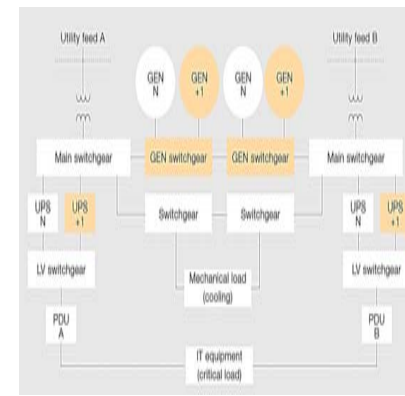
Tier III

- Dual Powered IT Equipment
- Expected availability of 99.982%



Tier IV

- Dual Powered HVAC & fault tolerant Infrastructure
- Expected availability of 99.995%



Focus on data centers

Why in large and hyperscale DtC MV distribution is more than option?

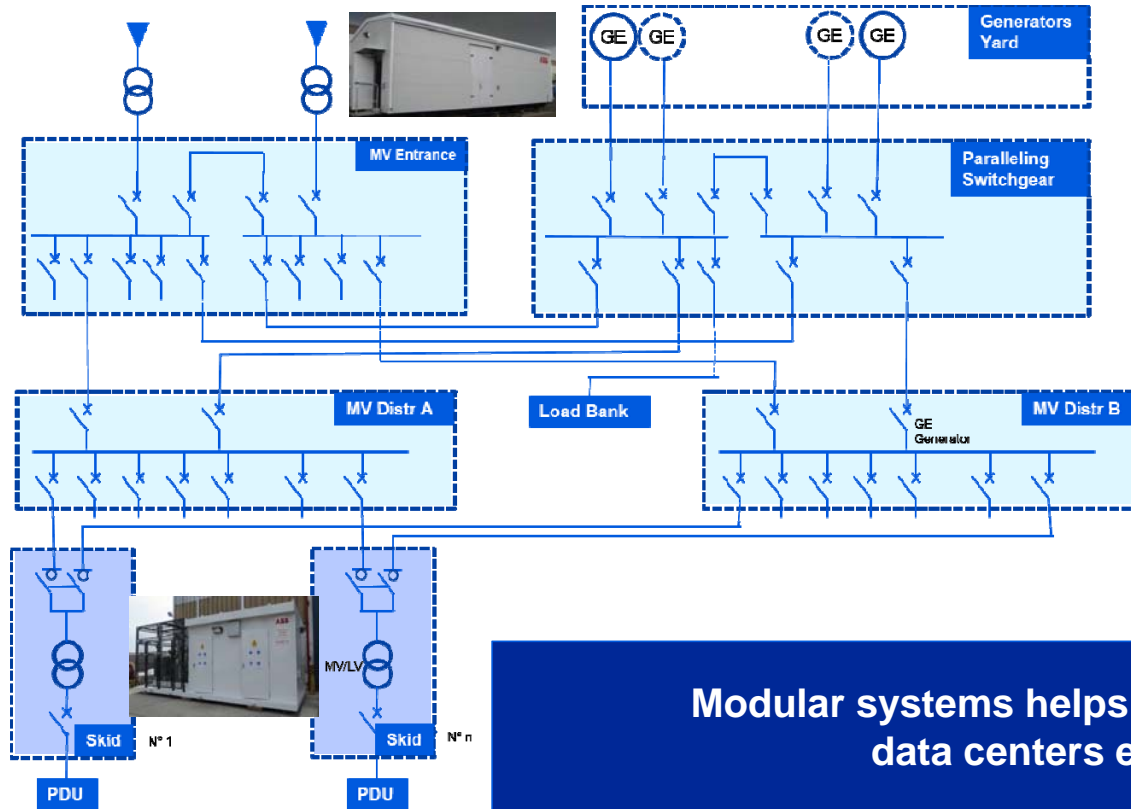
- Cost reduction
- Smaller footprint
- Greater safety
- Higher reliability
- Lower maintenance
- Greater flexibility
- Greener building



MV Switchgear technology associated to Relion® relays are the right answer to the market expectations

Data centers

In large and hyperscale DtC ABB prefabricated solutions enables

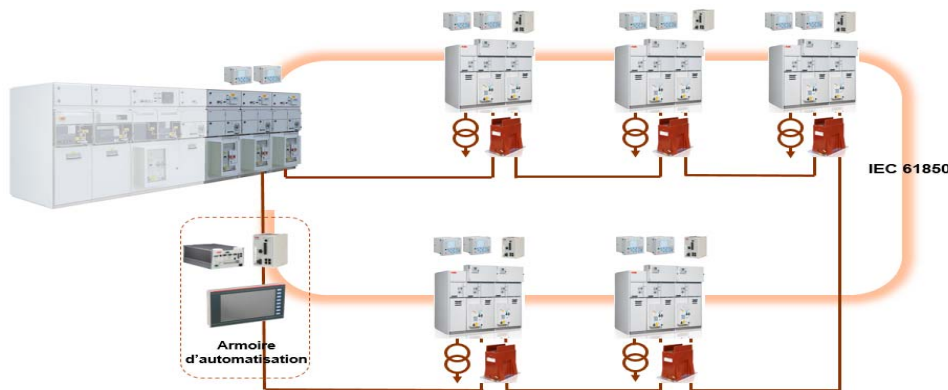


- Safe building space for IT equipment..
- Huge time reduction of project execution
- Minimize risk for End User/ EPC

Modular systems helps its partner to build more efficient data centers everywhere in the world.

Airport and hospitals (example of application)

High reliability and availability are common main requirements

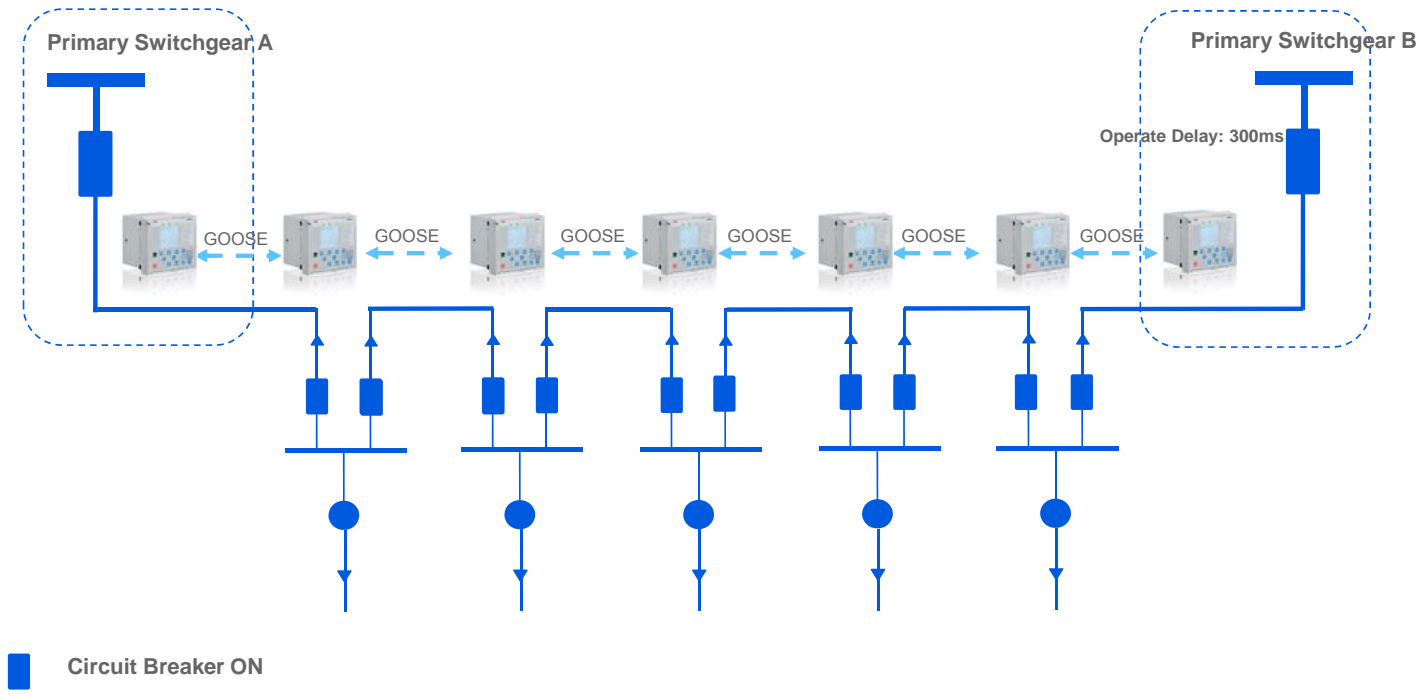


- Minimize time and number of outages
- Locating remotely the fault
- Isolating quickly the faulty part
- Reconfiguring the network
- Remote control of units in switchgears ring
- Monitor remotely the status of the network
- Using a standard communication network to transmit information around the plant

MV Switchboard equipped with Relion and Innovative Sensors performs FDIR functionality (Fault Detection, Isolation and Restoration)

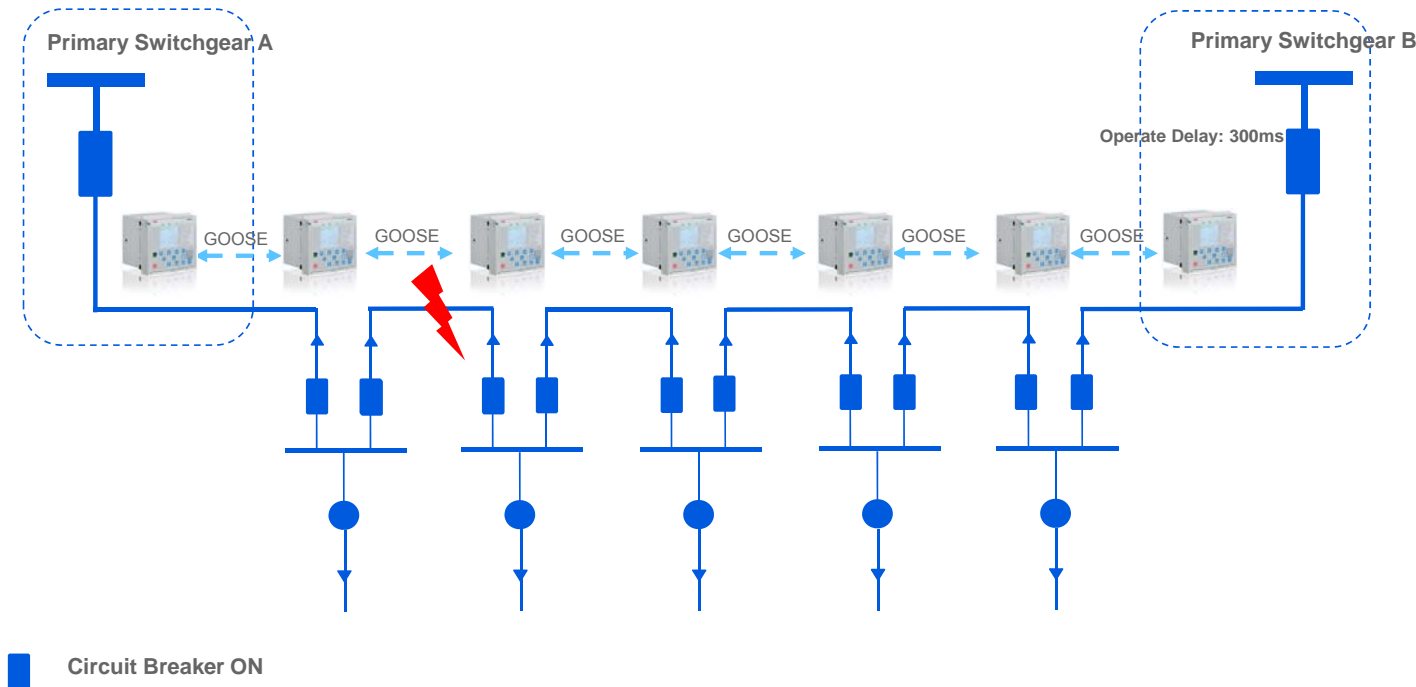
Airport and hospitals (example of application)

Logic selectivity in closed loop



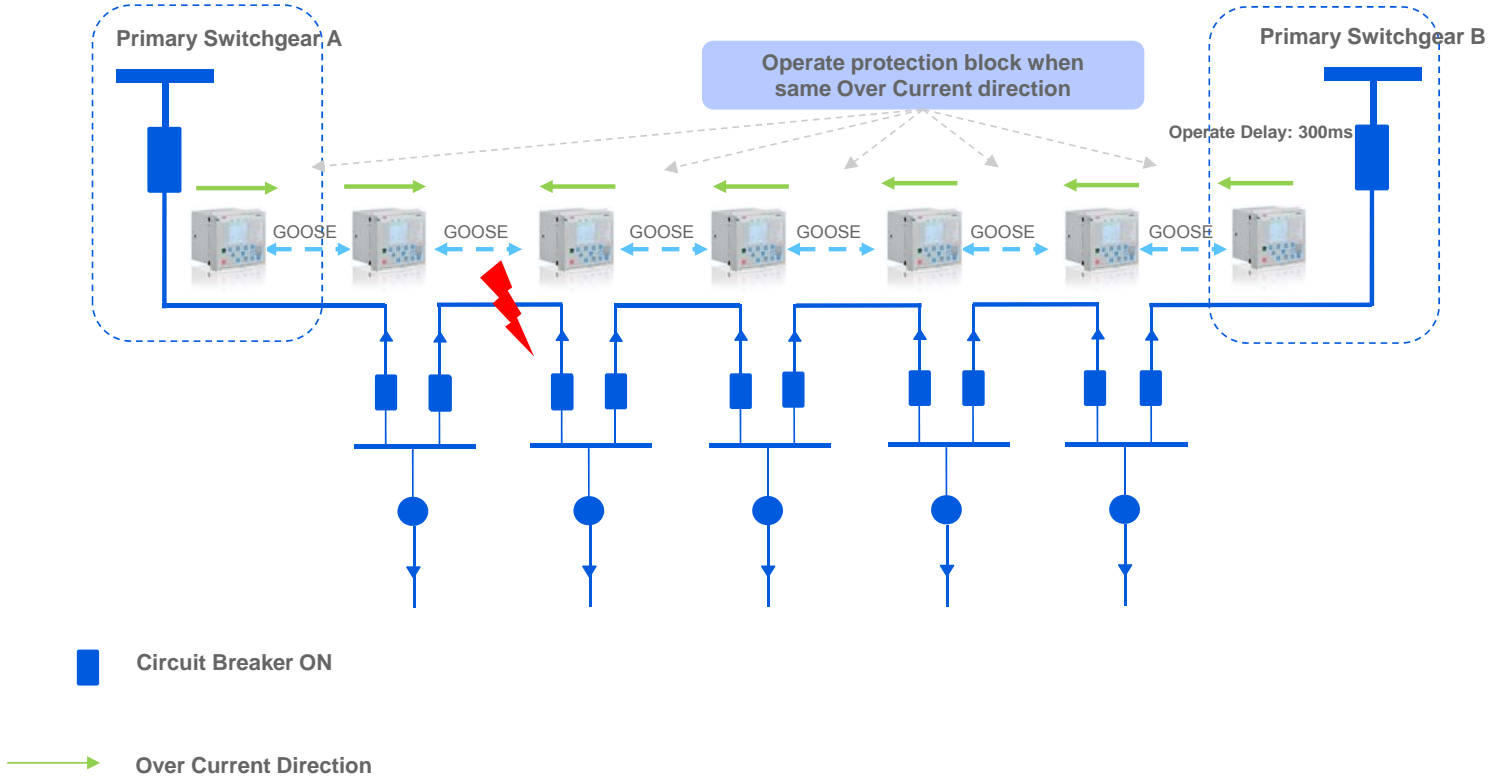
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Logic selectivity in closed loop



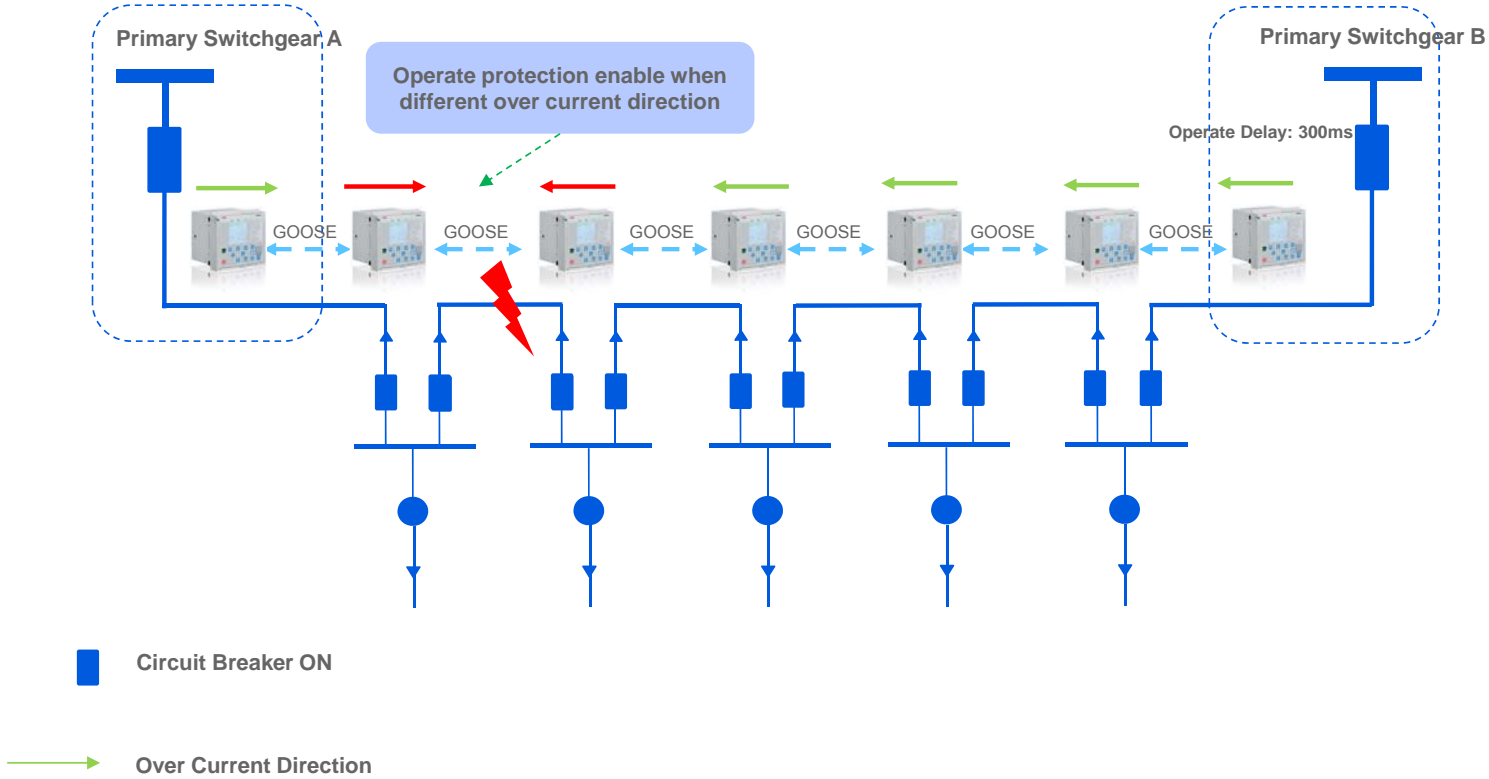
Airport and hospitals (example of application)

Logic selectivity in closed loop



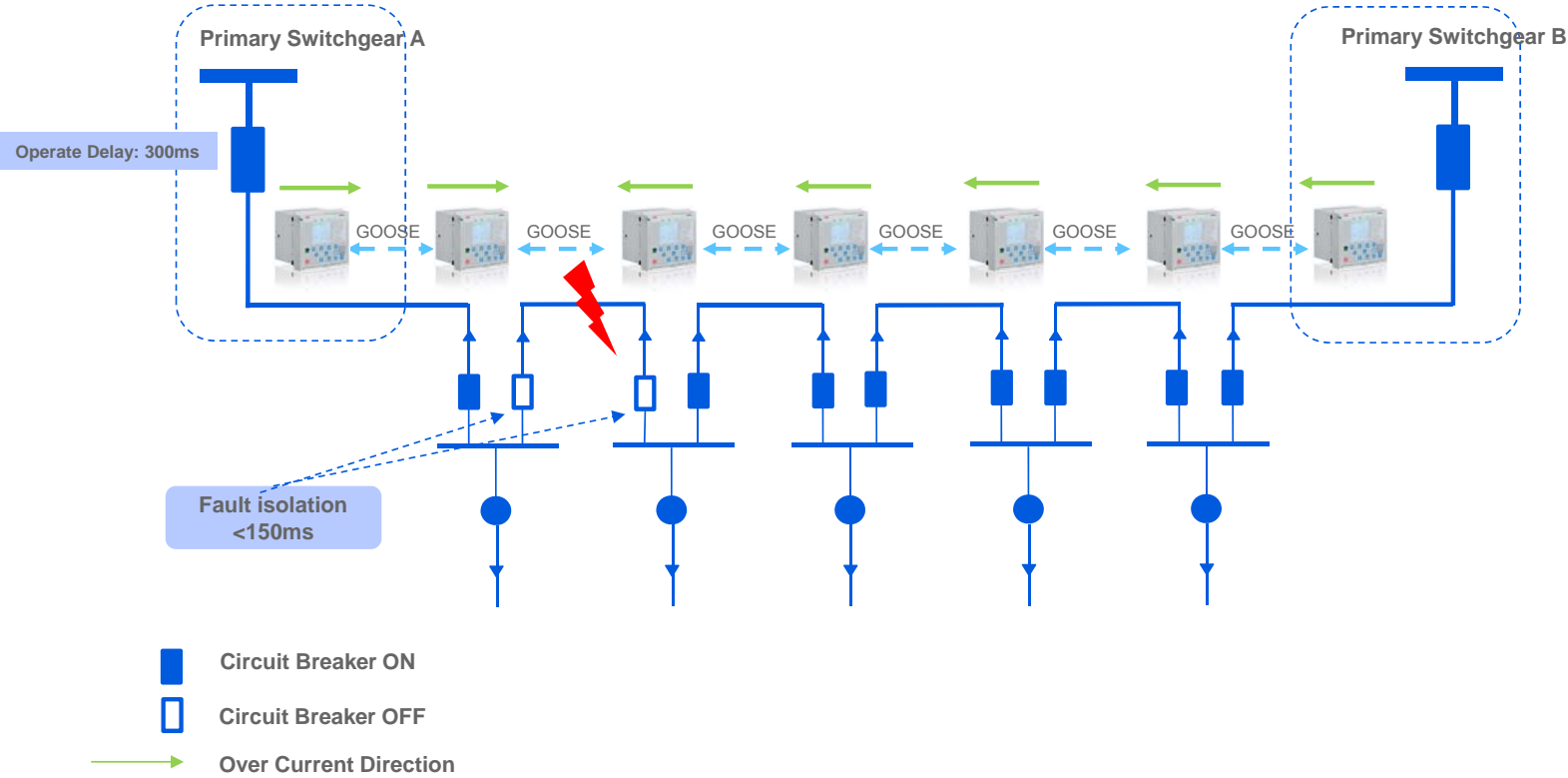
Airport and hospitals (example of application)

Logic selectivity in closed loop



Airport and hospitals (example of application)

Logic selectivity in closed loop



Building (Great experience)

Medium-voltage solution - customer value

- High safety
- High availability & reliability
- Lightweight
- Reduced footprint
- Integration with Supervision Management Systems
- Project Management
- Customer support during all phases of project
- After sales services



Building (Great experience)

Skyscraper - Burj Khalifa

- World's highest substation (155 floor) powers tallest building-ABB 792m high in the Burj Khalifa.
- The Burj Khalifa has a peak demand of 13.5 MW,
- One-of-a-kind distribution substation solution throughout the 5-million square-foot building.
- ABB delivered 120 lightweight, space saving gas-insulated medium voltage switchgears and 32 primary air insulated switchgear. (SafePlus GIS from Norway and Unigear AIS from CZ).

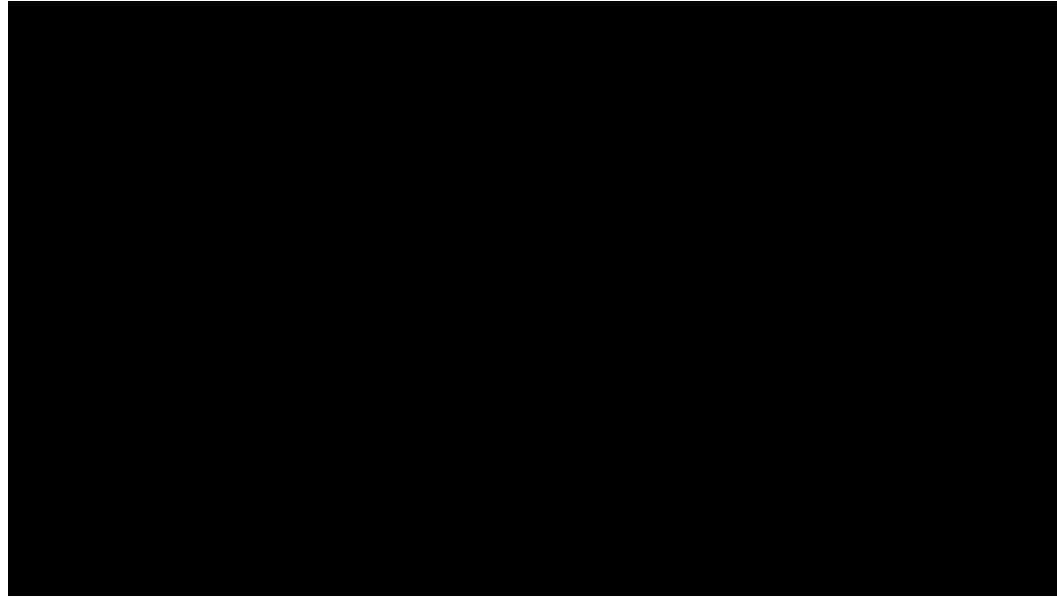


ABB products from the utility connection point until the point of consumption

BU Medium Voltage Products

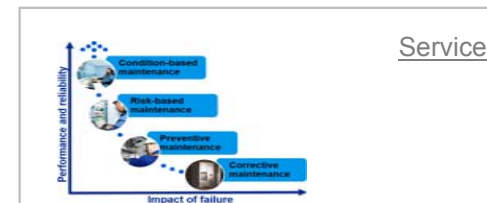
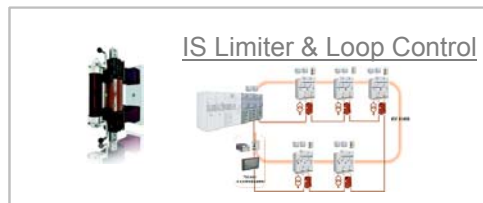
Data center & Infrastructure segment : Complete portfolio for different applications



Added Value

Safety &
reliability

Base
proposal



BU Medium Voltage Products

Data center & Infrastructure segment : Complete portfolio for different applications

- Complete portfolio of product and solutions for all different application
- Innovative solutions to solve customers needs
- Deep knowledge if utilities need, specially concerning Interface to the national grids
- High level of competencies and Project Management capabilities for complete electrification product portfolio.
- Global organization including after-sales service

Modular substation

E- House



E-Houses

Metal enclosed buildings for safety, simple maintenance and Engineering, installation and on site Testing cost reduction

Skid-Mounted substations



Skid-Mounted Substations

A Prefabricated and economic option with easy access to equipment, normally include Medium Voltage Section, transformer and Low Voltage.

Skid mounted substation enables a huge reduction of Installation time , wiring and testing activities on site.

Compact Secondary Substation



Compact substations:

Compact Secondary Substations are prefabricated substations which include low voltage switchboard, transformer and medium voltage switchgear. CSS is internal arc tested for high safety. ABB CSS portfolio is covered with different enclosure material: steel, concrete, glass fiber reinforced polyester.

Medium-voltage primary distribution

Unigear Digital



UniGear Digital is based on the well-experienced market leading design of UniGear and makes full use of ABB's RELION communication protocol IEC 61850, combined with the advantages of sensor technology. All this leads to substantial benefits for the user:

- Flexibility – changing loads are managed in the software without changing hardware
- Efficiency – less losses, lower cost of operation
- Increased reliability and safety

Motor Control Centers



UniGear MCC

up to 12 kV, 50 kA

Designed for the highest degree of safety and reliability, the UniGear MCC provides for maximum ease of use. All operations and maintenance actions are made from the front of the panel, which is equipped with mechanical safety interlocks between vacuum contactor and earthing switch

- Slim and compact panel only 400 mm wide
- Wide range of applications
- Fused vacuum contactor with magnetic actuator
- Fitted with safety interlocks and visible earthing connection

Gas Insulated Switchgear



ZX Family

up to 42 kV, 40 kA

GIS provides ultimate protection to MV electrical distribution

- All "live" parts are completely protected from external influences like humidity, dust and vermin
- Provides safest operating conditions over extended lifetime while minimizing maintenance
- Saving space in particular at higher voltage levels
- Easy "plug & play" installation

Medium-voltage secondary distribution

Air Insulated Secondary Switchgear



UniSec indoor Air-Insulated switchgear for Medium Voltage secondary distribution up to 24kV.

UniSec metal-enclosed 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. This approach reduces training and maintenance requirements, ensures fast installation and facilitates future expansion to meet changing needs. UniSec offers highest level of safety with different solutions in terms of Internal Arc classification and Safety Interlocks.

Gas Insulated Secondary Switchgear



SafeRing / Safeplus is a SF6 insulated ring main unit / Compact switchgear platform for the secondary distribution network up to 40,5kV.

Together, SafeRing/ SafePlus provides a complete, flexible and compact switchgear system solution. It is a completely sealed system with a stainless steel tank containing all the live parts and switching functions. This ensures a high level of reliability as well as personnel safety and a virtually maintenance-free system.

Medium-voltage relays

Relion®



The Relion® family of programmable numerical protection relays offers a full range of genuine IEC 61850 products for the protection, control, measurement and supervision of power systems. IEC 61850 supports interoperable and future-proof solutions including peer-to-peer GOOSE communication. Relion® enables the creation of comprehensive protection schemes for feeders, motors, transformers, generators, busbars, capacitor banks etc.

Features supporting high situational awareness and communication availability:

Graphical display and web browser-based human-machine interface

Disturbance recorder for in-depth analysis of network disturbances

Support for additional communication protocols including use of two communication protocols simultaneously

Communication redundancy including HSR and PRP protocols

One configuration tool for all Relion® relays

COM600



Web server functionality providing access to substation processes, operations and relays via a web browser (web HMI)

Substation Automation function and its features enabled by default

- Process visualization based on web HMI
- Alarms and events
- IEC 61850-based integration to ABB or third party relays
- Remote relay parameter setting using SPA protocol or IEC 61850
- Relay disturbance record upload
- Operational and user security

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