



ABB, BU PSNM, PG 2818, April 2015

Communication Networks

Communication solutions for mission critical applications

What we do

Applications markets served



Electrical grids



Transportation



Oil and Gas



Industry



Smart Cities



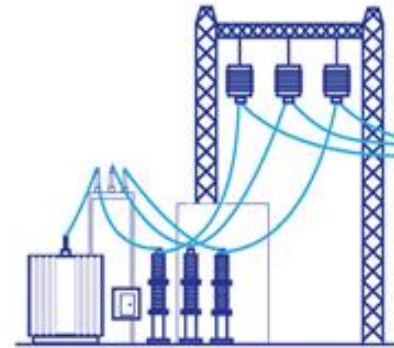
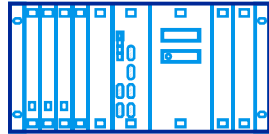
Mining

We deliver turnkey communication systems for mission critical applications

What we do
We have been building communication networks
in 120 nations for 75 years

21,000,000

Voice, data and
protection channels
being transmitted simultaneously
over fiber optics via FOX
Multiplexers

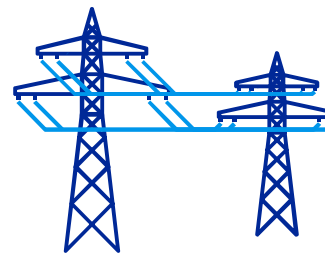


up to **25%**
HV Substations
worldwide secured by
NSD teleprotection



+60,000

Tropos Mesh Routers
installed worldwide

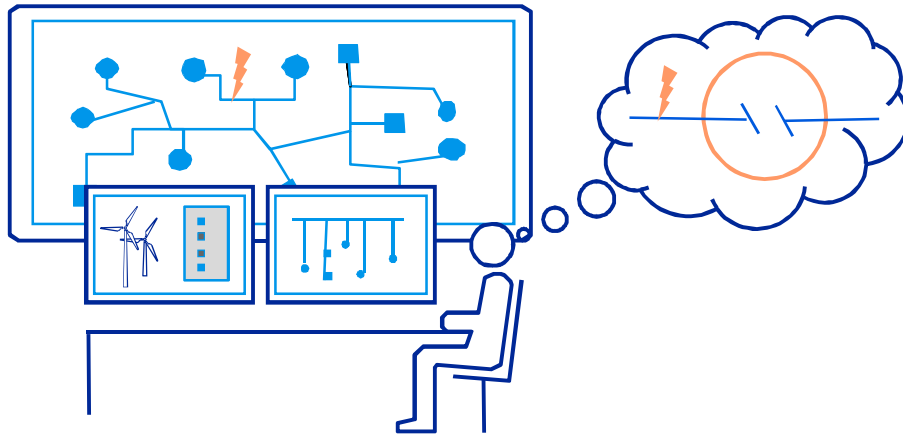


ETL Power Line
Carriers
communicating
across

+1,500,000km HV Lines

What we do

We ensure that the power keeps flowing



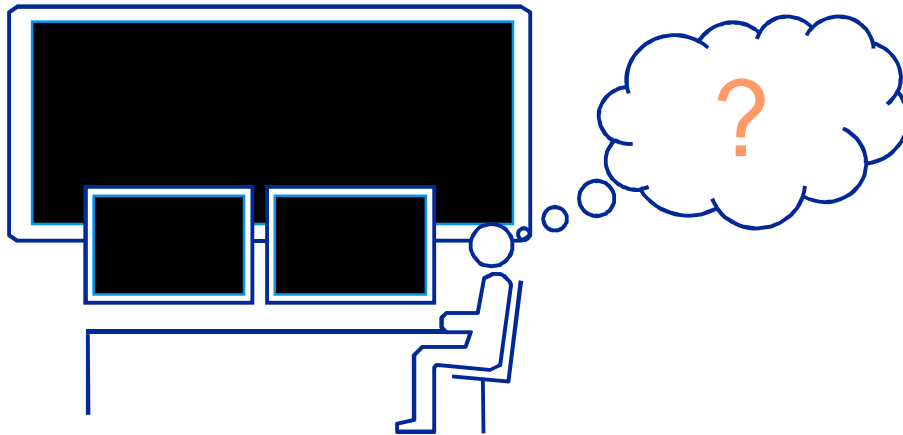
Communication enables

- Performance
- Workforce enablement
- Protection of equipment



What we do

We ensure that the power keeps flowing



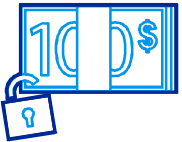
Without Communication

- Loss of visibility and control
- Mission-critical services cannot be guaranteed
- In case of a power outage, network cannot be restored



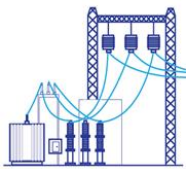
Communication Networks

What you can expect



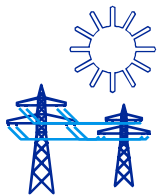
Protection of investments

- Long term availability of products
- Seamless upgradeability



Domain-specific solutions

- Deep understanding of utility specific services
- Highly integrated products with different technologies



Hardened for harsh environments

- Rigorously tested communication equipment
- Easy operation and reduced maintenance

Communication Networks

Why ABB for utility communication solutions?



Utilities mission in the focus



Power utility need to reliably transmit and distribute electrical energy

Various applications help the utility to ensure the reliable energy transmission and distribution

Some of them are mission critical

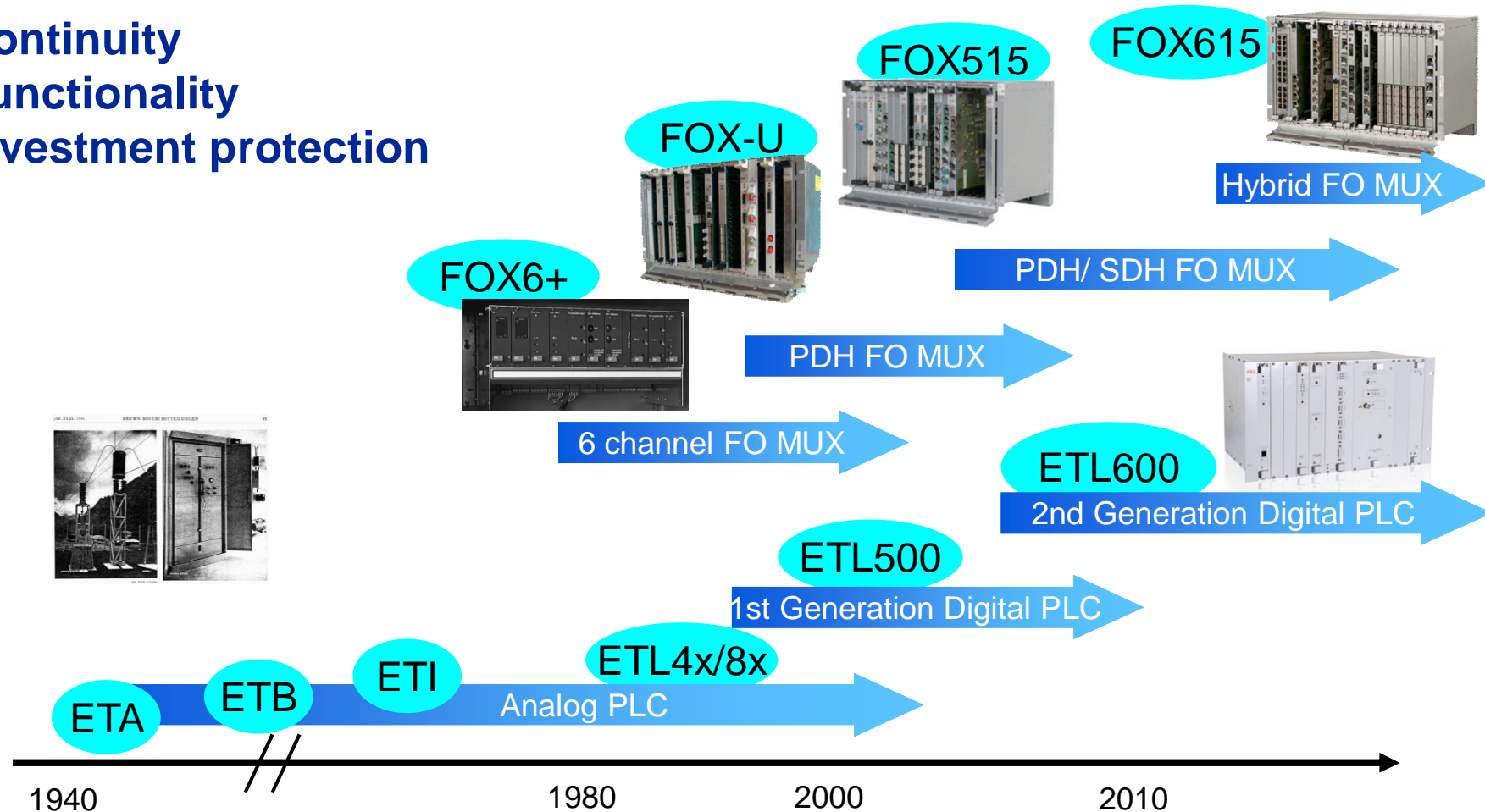
- Requiring real time communication
- Requiring predictable and constant communication channels

The utility communication network helps to achieve reliable energy transmission and distribution and accordingly it needs to fulfil the requirements defined by the applications without compromise

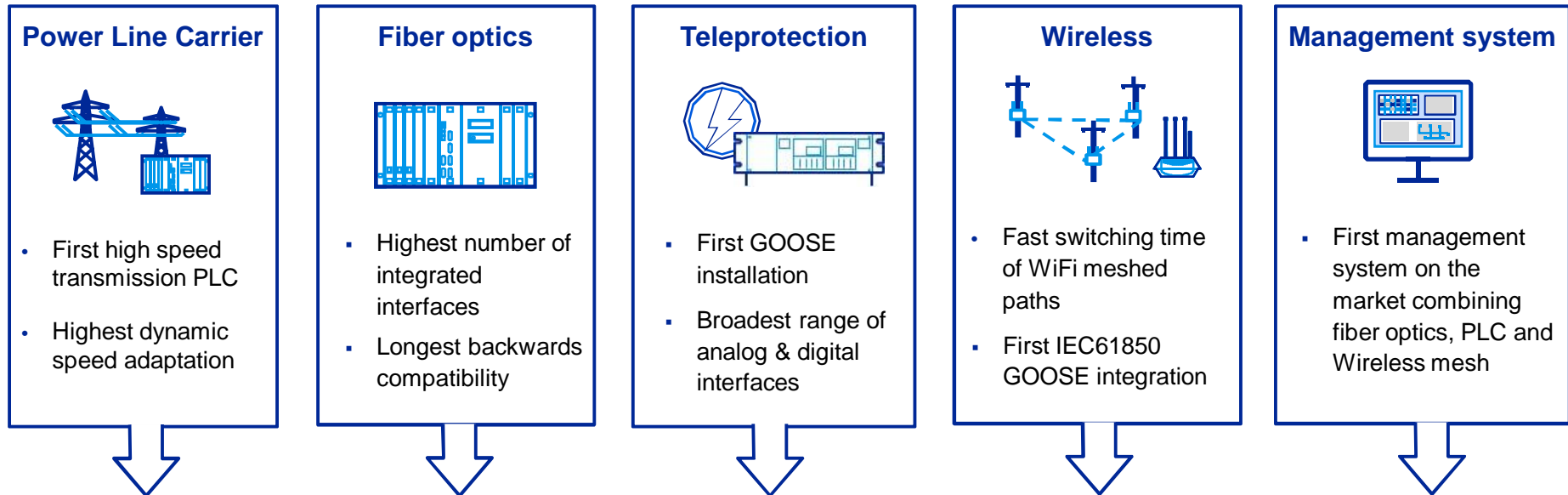
Our knowledge is your power

State-of-the-art solutions for more than 70 years

Continuity
Functionality
Investment protection



Our knowledge is your power



We are technology leader in utility communications

Innovation based on utility standards



- ABB is committed to actively participate in international and national industry standardization bodies, study committees and working groups
- Our innovations are build on these standards
- ABB is one of the drivers of IEC 61850
- Our products are verified and tested by independent laboratories and quality auditors

Our offering

Our offering

Innovative systems designed with passion

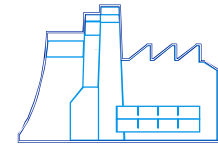


Experience

We have designed ingenious communication systems for customers worldwide for

more than 70 years

Type-tested and certified



Our communication solutions are **rigorously tested** for optimum performance at substations worldwide



Innovation

Our communication systems meet **challenging requirements**

with customized designs and inventive realization

One point of contact

We are the certified premier single-point resource

for all your communication network challenges



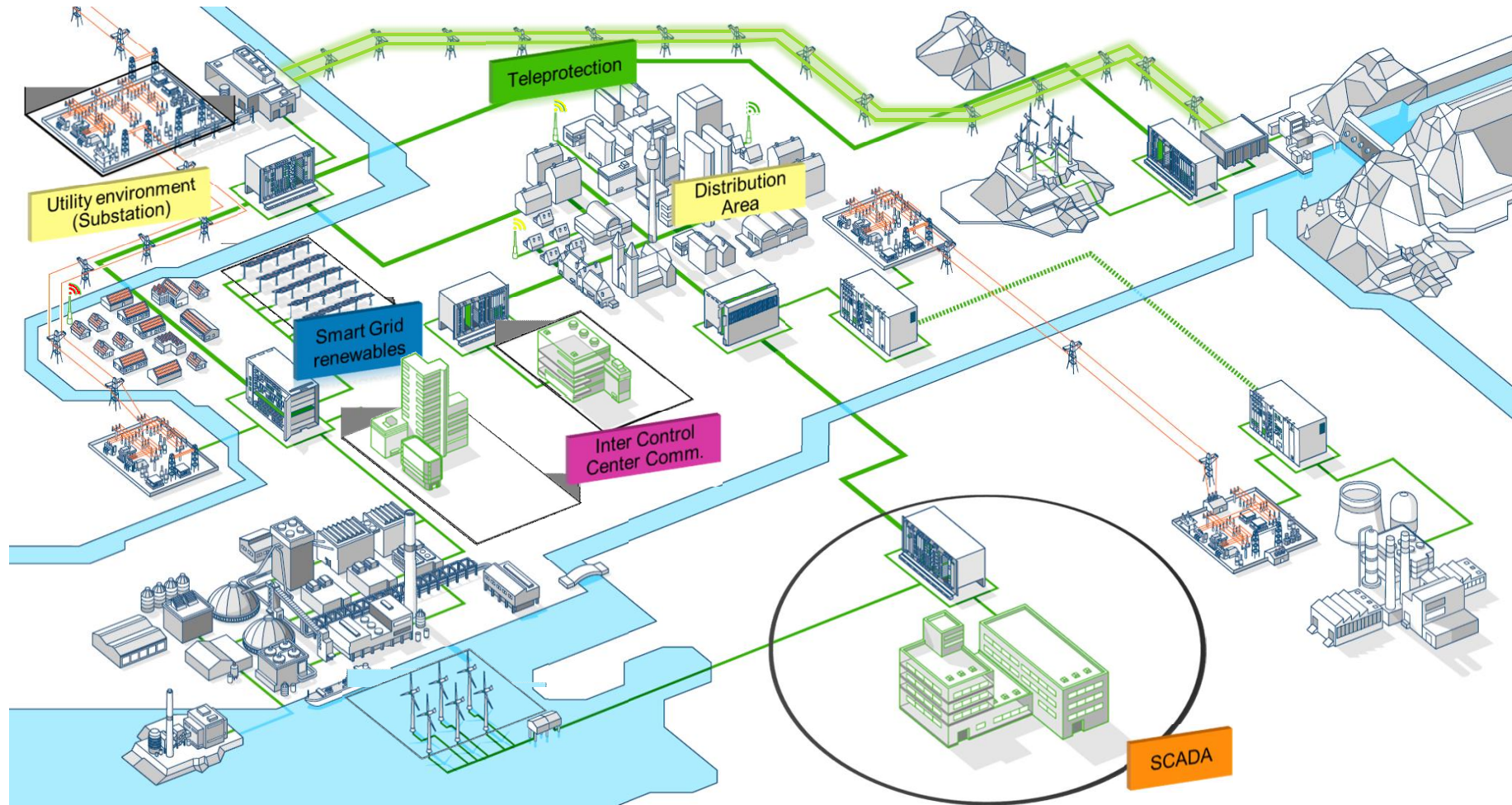
Full service range



We are with you from specification and system design to delivery and beyond.

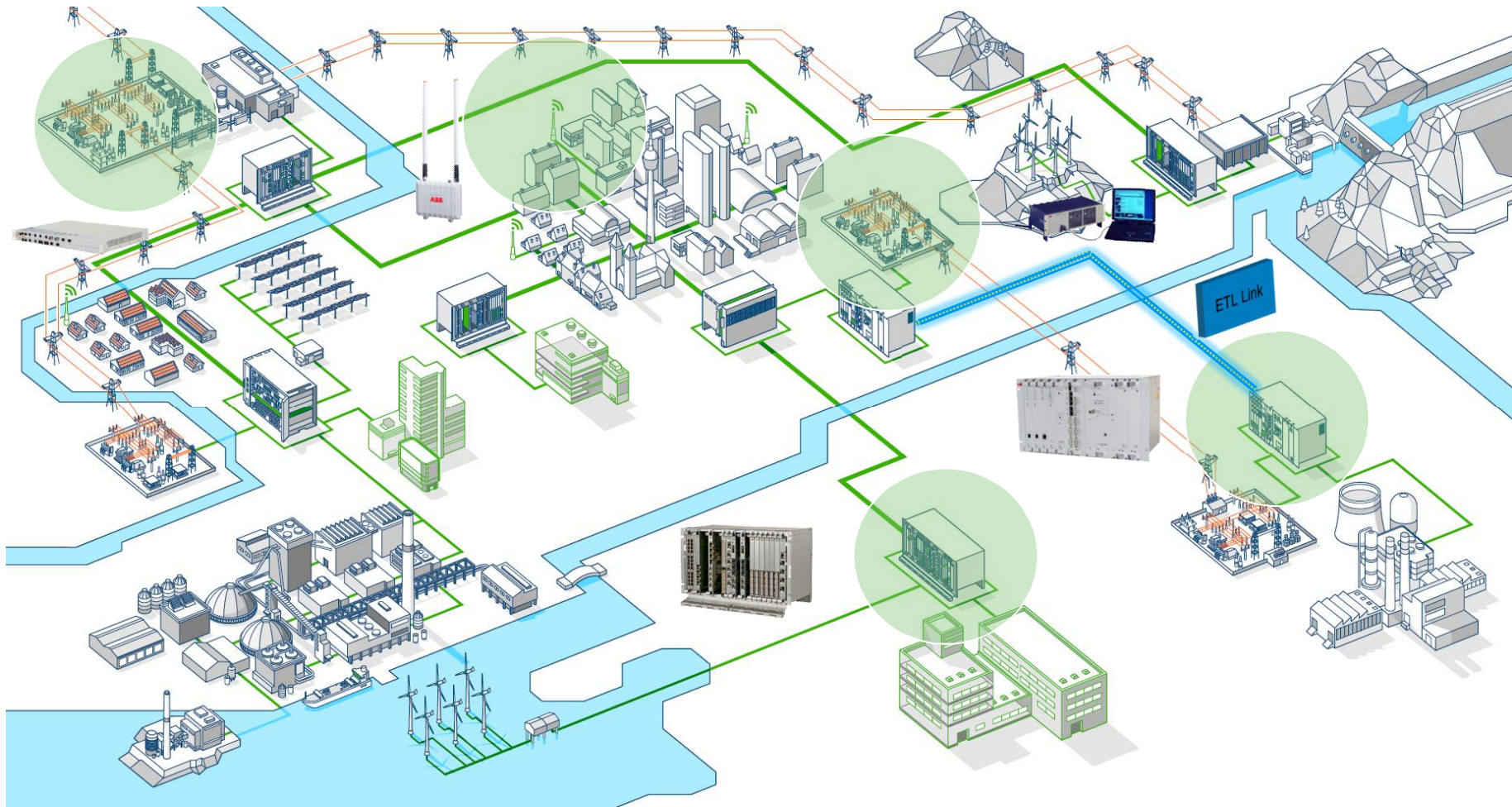
Our offering

Our products meet the demanding requirements of our utility customers



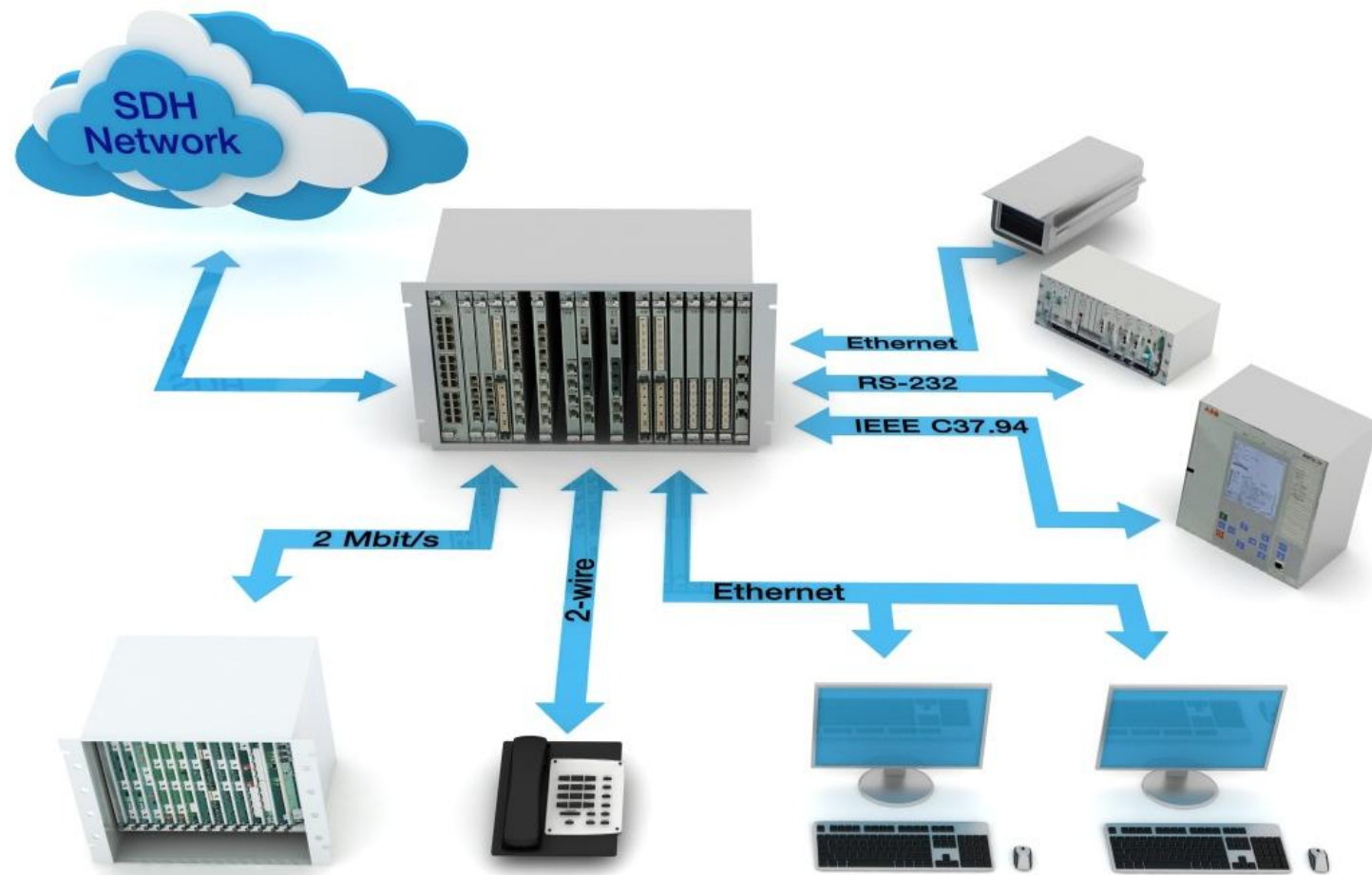
Our offering

Multitechnology solutions



Our offering

Multiservice platforms offering guaranteed performance



Application requirements

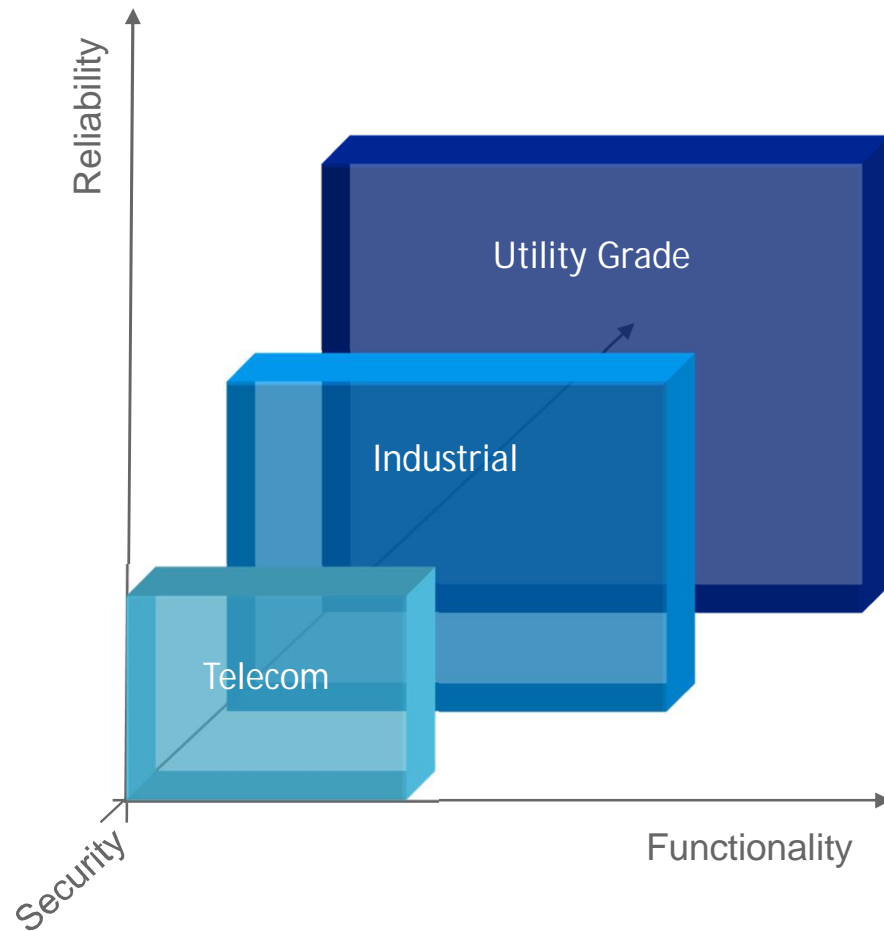
Overview about various applications

Service	Data rate	Acceptable latency [ms]
Voice	2.4 – 100 kbit/s per channel	< 100
Telecontrol		
SCADA	0.05 – 64 kbit/s	< 1000
ICCP	2 Mbit/s – 100 Mbit/s	< 1000
Distance Protection		
Blocking	< 64 kbit/s	< 4 - 8
Permissive	< 64 kbit/s	< 5 - 10
Intertrip	< 64 kbit/s	< 8 - 16
Line Differential Protection¹⁾		
EHV (Extreme High Voltage)	64 kbit/s – 2 Mbit/s	< 5
HV (High Voltage)	64 kbit/s – 2 Mbit/s	< 10
MV (Medium Voltage)	64 kbit/s – 2 Mbit/s	< 40
Video Surveillance	256 kbit/s – 10 Mbit/s	< 1000
Other operational data	64 kbit/s – 100 Mbit/s	< 1000

1) Line Differential Protection is very sensitive to Jitter/ Wander and asymmetrical delay

Our offering

Our products meet the demanding requirements of our utility customers



- **Harsh environment**
Our products are specifically designed and type tested for utility standards
- **Network design**
We offer different communication media and technologies
- **Operation**
We guarantee and support the interoperability of our products
- **Life-time**
We ensure long-term support of proven technologies and invest in future-proof development

Our offering

We offer customized communication solutions which meet the specific requirements of our customers



- Project: Repeater stations for reliable communication for an ultra long haul link in Africa
- Customer needs:
 - New and robust grid system to supply power from Mombasa to Nairobi (new 400 kV power line over a distance of 480 km)
 - Fiber optical communication system that suits the topographical circumstances
- ABB response: complete package
 - Project management
 - Engineering
 - Cabinets including
 - FOX612 – fiber optic multiplexer as a repeater for STM-4 communication link
 - Self-sufficient power system with solar panels, chargers and batteries
 - Passive cooling installation for repeater station

Our offering
Our products meet the demanding requirements of our
utility customers



Our offering

We protect and control power systems along the grid

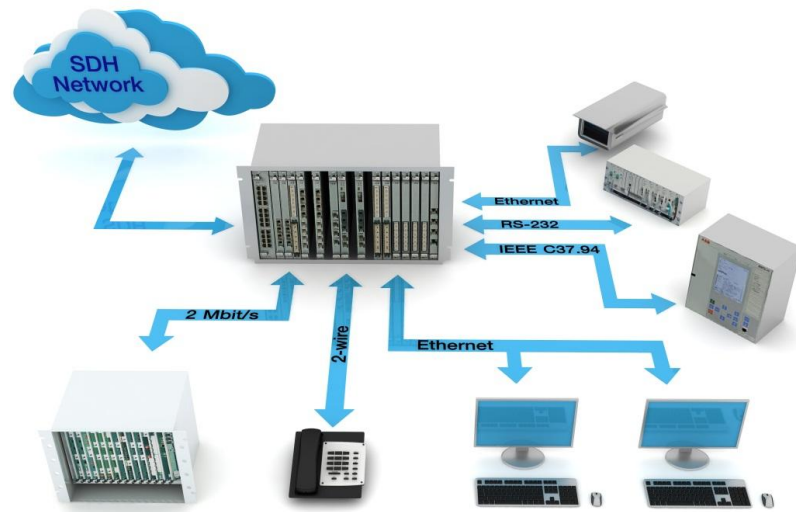


Electrical grids

- Our communication solutions are the backbone of transmission networks
 - Monitor and control the network
 - In status updates and operational data
 - Command messages which must be delivered in milliseconds
 - Keep the grid stable
 - Protection of primary equipment
 - Enable communication with extremities
- We offer different types of communication media which guarantee the performance of mission critical applications

Our offering

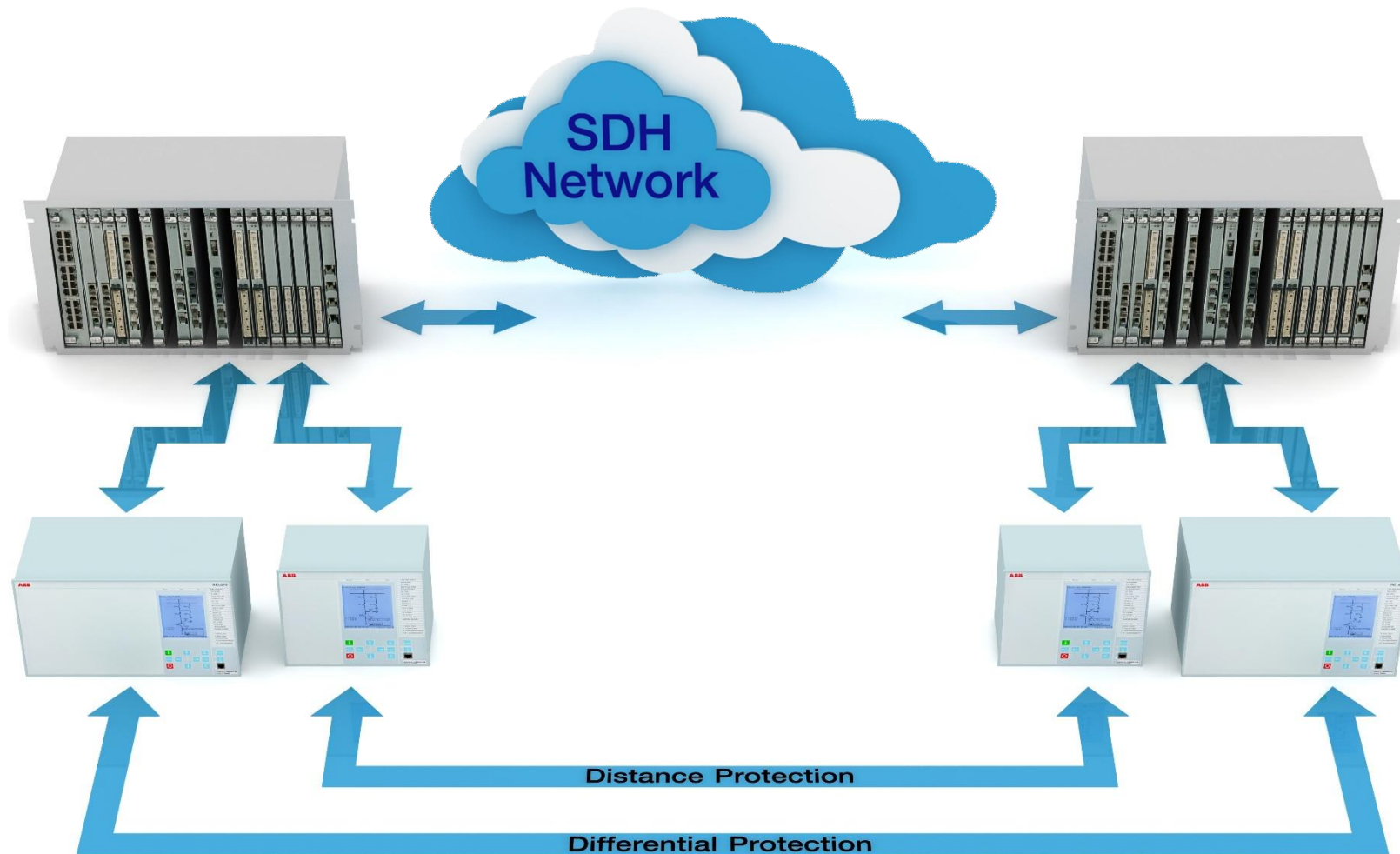
Our fiber-optical solutions are flexible and scalable to customers' requirements



- Hybrid and modular platform with TDM and Ethernet functionality
 - Investment protection
 - Future migration scenario from TDM to packet-switched networks
 - Integrated teleprotection
- Combined backbone and access multiplexers
- Full support of legacy data, voice and utility-specific interfaces
- Utility-specific functionalities
- Robust and type-tested

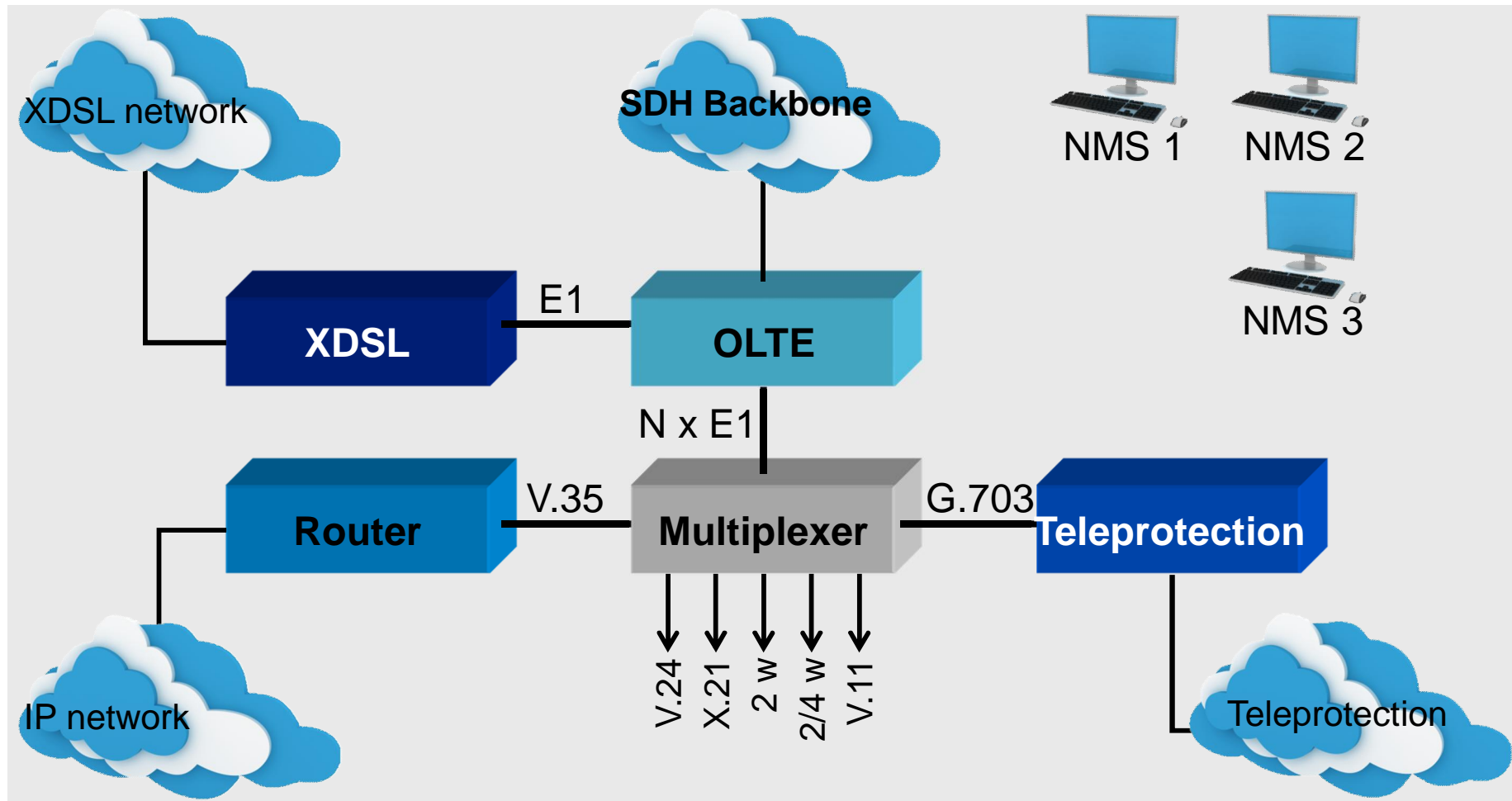
Our offering

Integrated solution for mission critical applications



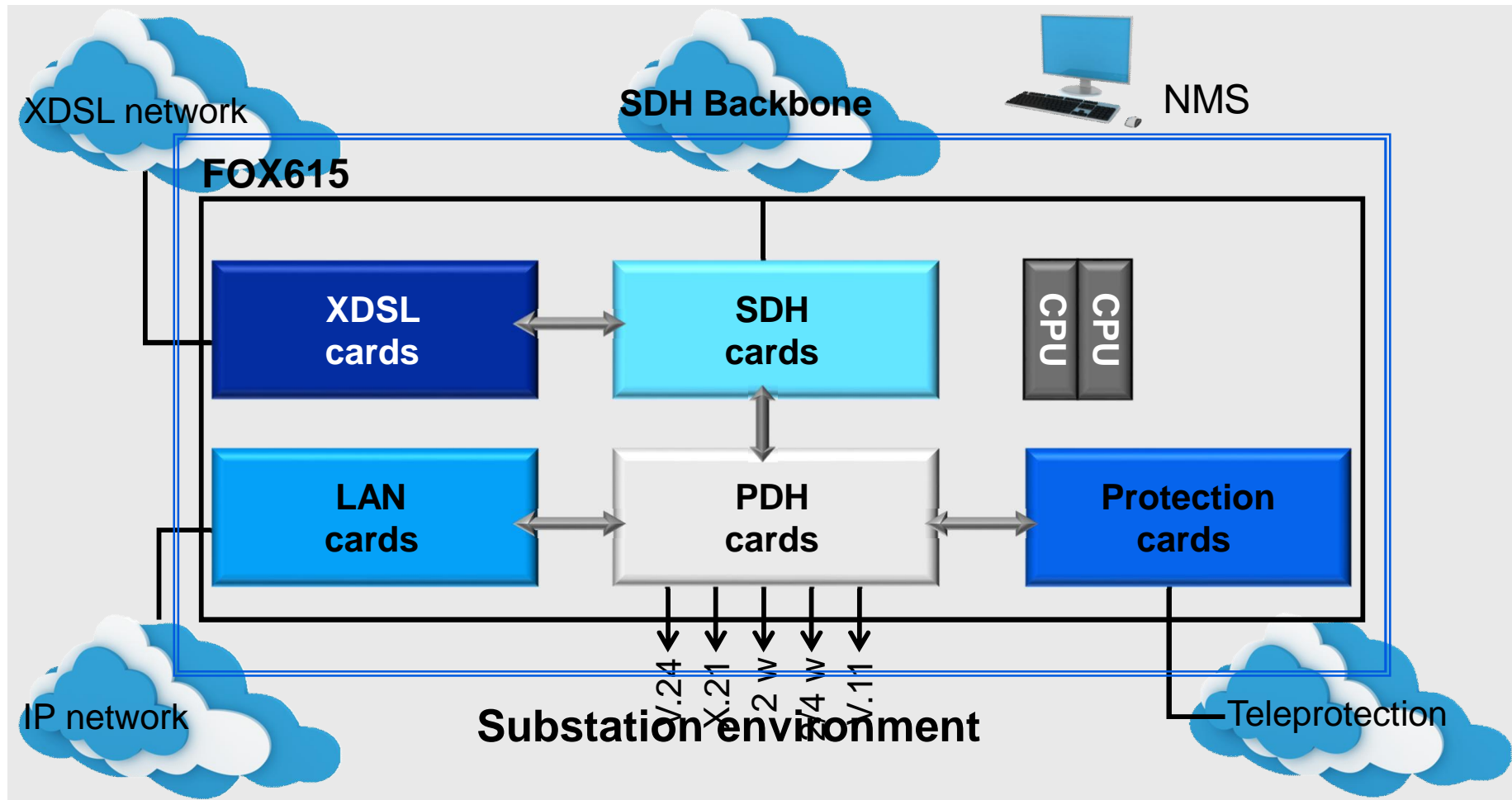
Multiservice platforms

Competitor's offering



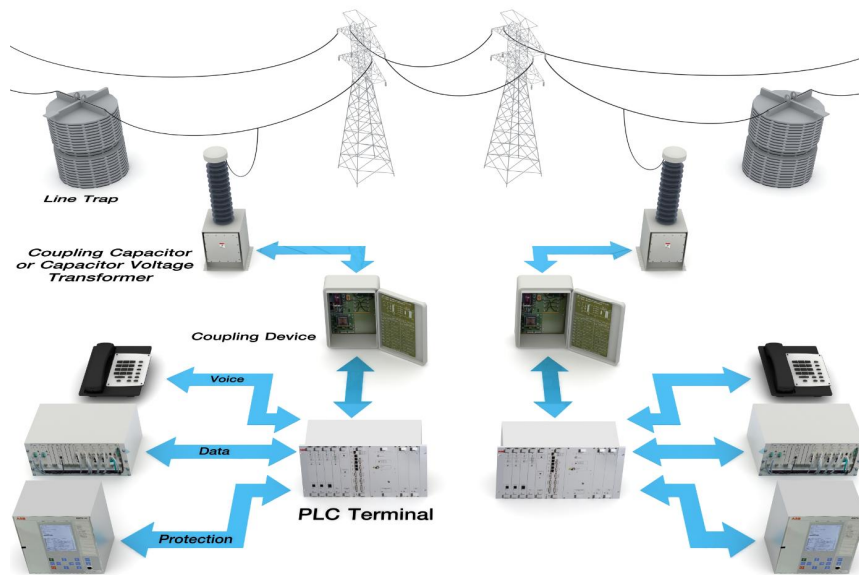
Multiservice platforms

ABB's offering



Our offering

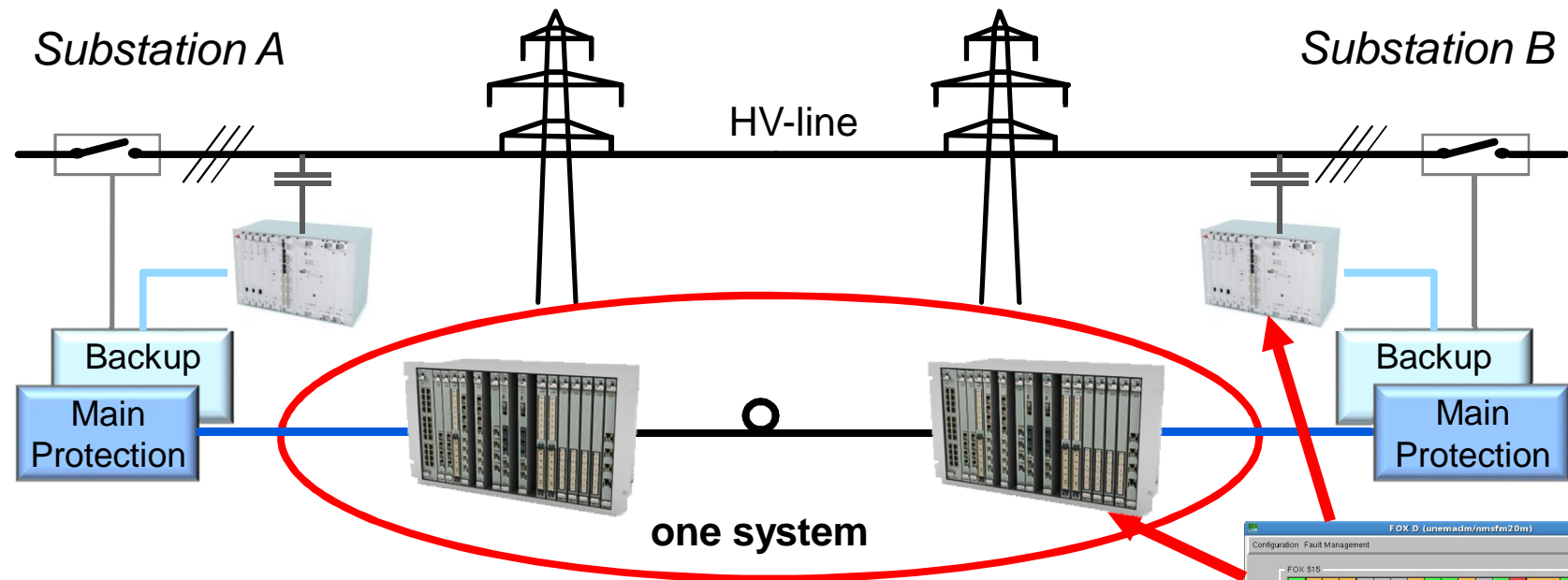
We ensure reliable transmission even over long distances



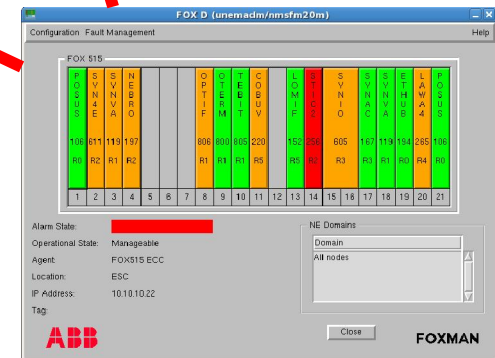
- We have been leading the field of PLC technology for more than 7 decades
- Complete system out of one source: we supply all components, not just the terminals
- Our PLC solutions are a considerable and long-term investment:
 - Analog and digital operation in the same platform
 - Maximum transmission speed and bandwidth flexibility
 - Automatic transmission speed adaptation
 - Integrated adaptive multiplexer
 - Internal teleprotection

Our offering

Multi-technology solution for highest availability



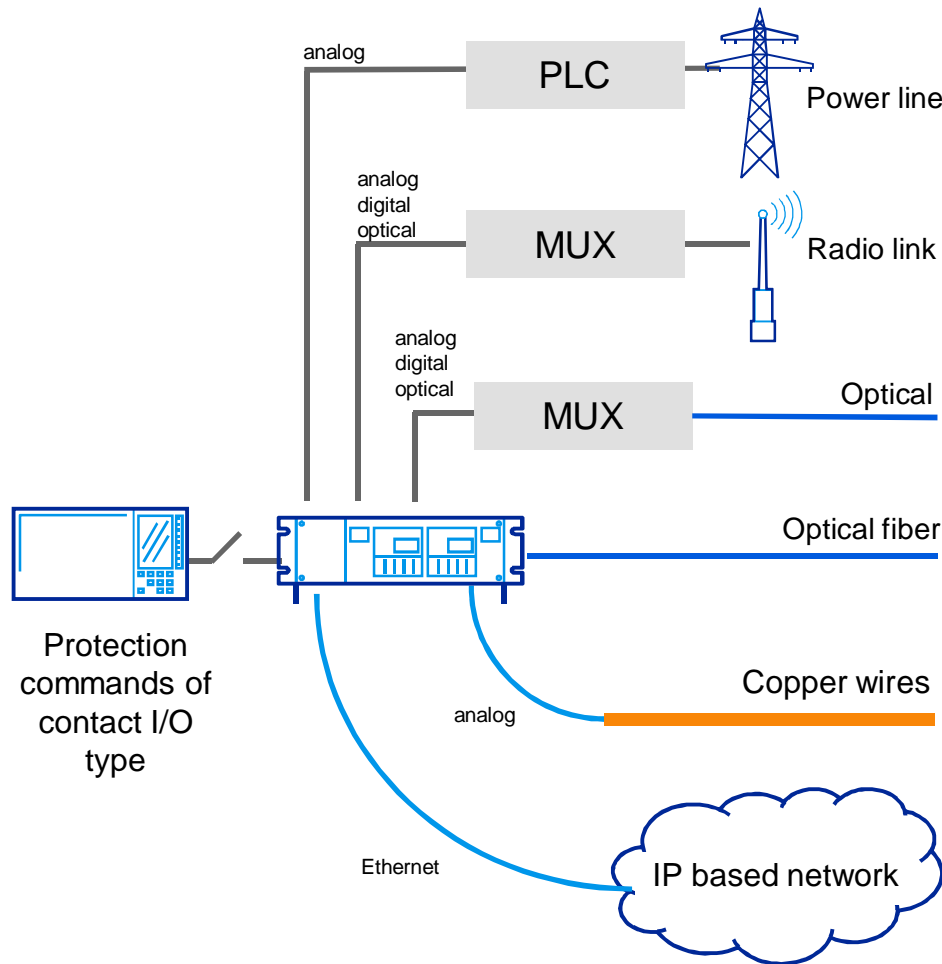
- Full NMS integration provides
 - Full visibility of communication system status
 - Fast reaction time, easy fault finding, fast troubleshooting
- Highest redundancy level due to diverse protection schemes and communication medias (FO and PLC)



Network Management

Our offering

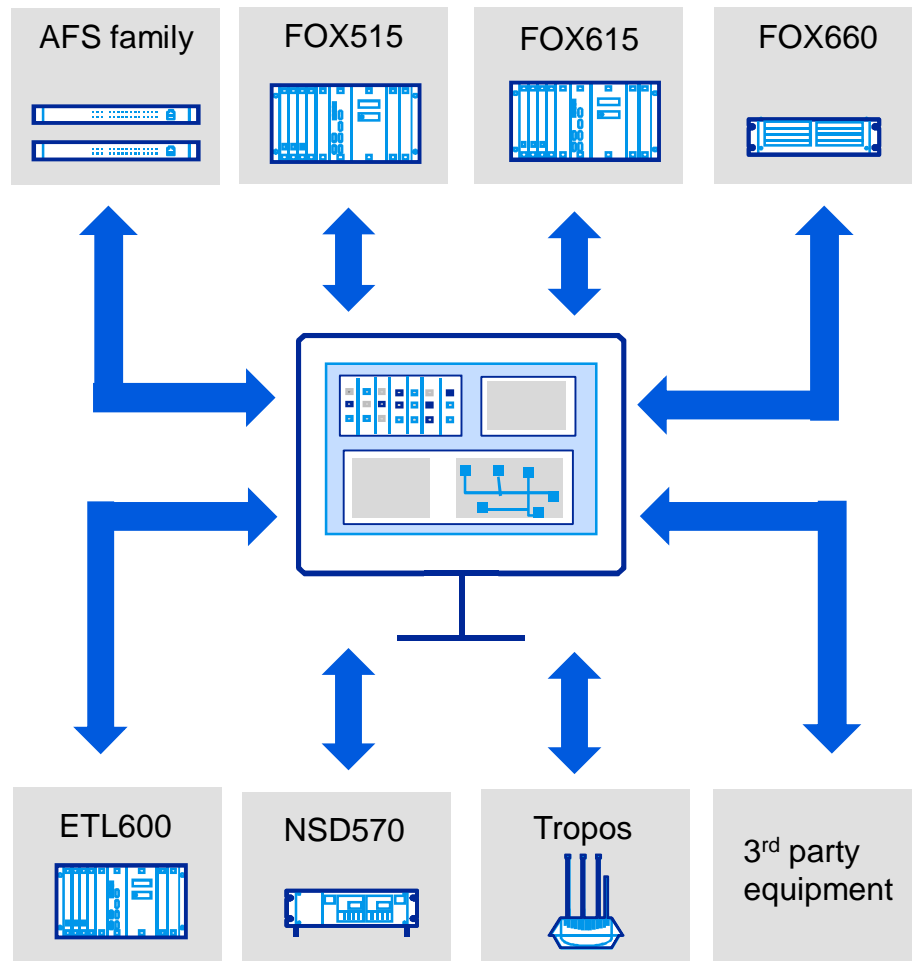
We safeguard the electrical grid



- Our teleprotection solutions control and protect the power system for a reliable power supply
 - Transmission of protection commands over any communication media
 - Transmission of GOOSE messages according to IEC 61850
 - Mix of analog, digital/optical and Ethernet systems in any combination is possible
 - Integrated and standalone solution
 - More flexibility in upgrades of protection applications and communication network

Our offering

We enable easy maintenance of the entire portfolio in one network management system



- Our network management system (NMS) FOXMAN-UN ensures optimized performance via a reliable, graphical overview of the complete network
 - One platform to manage our entire communication portfolio
 - Integration of all our products
 - Fault and alarm, configuration and performance and security management
 - Auto discovery agent for integration of new network elements
 - Interfaces with 3rd party products

References: Electrical grids

ESB Ireland

Customer:
Electricity Supply
Board (ESB) - Ireland



- **Customer's need**

- Renew and upgrade existing network
- Nationwide communication network to support the strong growth of the electricity grid

- **ABB response** (started in 2003)

- Supply of FOX515 & 615 multi-service PDH/SDH multiplexer for country-wide com network to more than 200 sites
- Network supervision with FOXMAN

- **Customer's benefits**

- FOX provide services such as voice and SCADA circuits, Ethernet traffic and teleprotection
- Network interconnects generation and transmission stations, offices and data centres.
- The FOX offers ESB a suitable medium for the HV environment in which it operates

References: Electrical grids

EKZ Distribution Network (< 66 kV)

Customer: EKZ

Elektrizitaetswerke
des Kantons
Zuerich -
Switzerland



Customer's need

- Reliable communication in one single network using fiber optics and copper cables (2Mbit/s, 8Mbit/s and STM-1)

ABB response

- FOX-Platform SDH/PDH (teleprotection, LAN, voice, data, HDSL communication)
- Management System FOXMAN

Customer's benefits

- Reliable power delivery
- Reliable communication for SCADA
- Reliable path for teleprotection and relays
- High integration in other SDH systems
- Flexible synchronisation schema
- Bundled E1`s from other utilities are transported over this network

References: Transportation

Metro Sao Paulo

Customer: CMSP

Companhia do
Metro-politano de
São Paulo



- **Customer's need**

- Upgrading network for more reliability and support for new services
- Integrating new metro stations

- **ABB response**

- Optical communication network with high capacity multiplexers for all stations.
- Highly available network with fast recovery and protection mechanisms
- Turn-key project
- Solution for harsh metro environment

- **Customer's benefits**

- Reliable, hi-cap communication network
- Ready for extensions and new services

Power and productivity
for a better world™

