

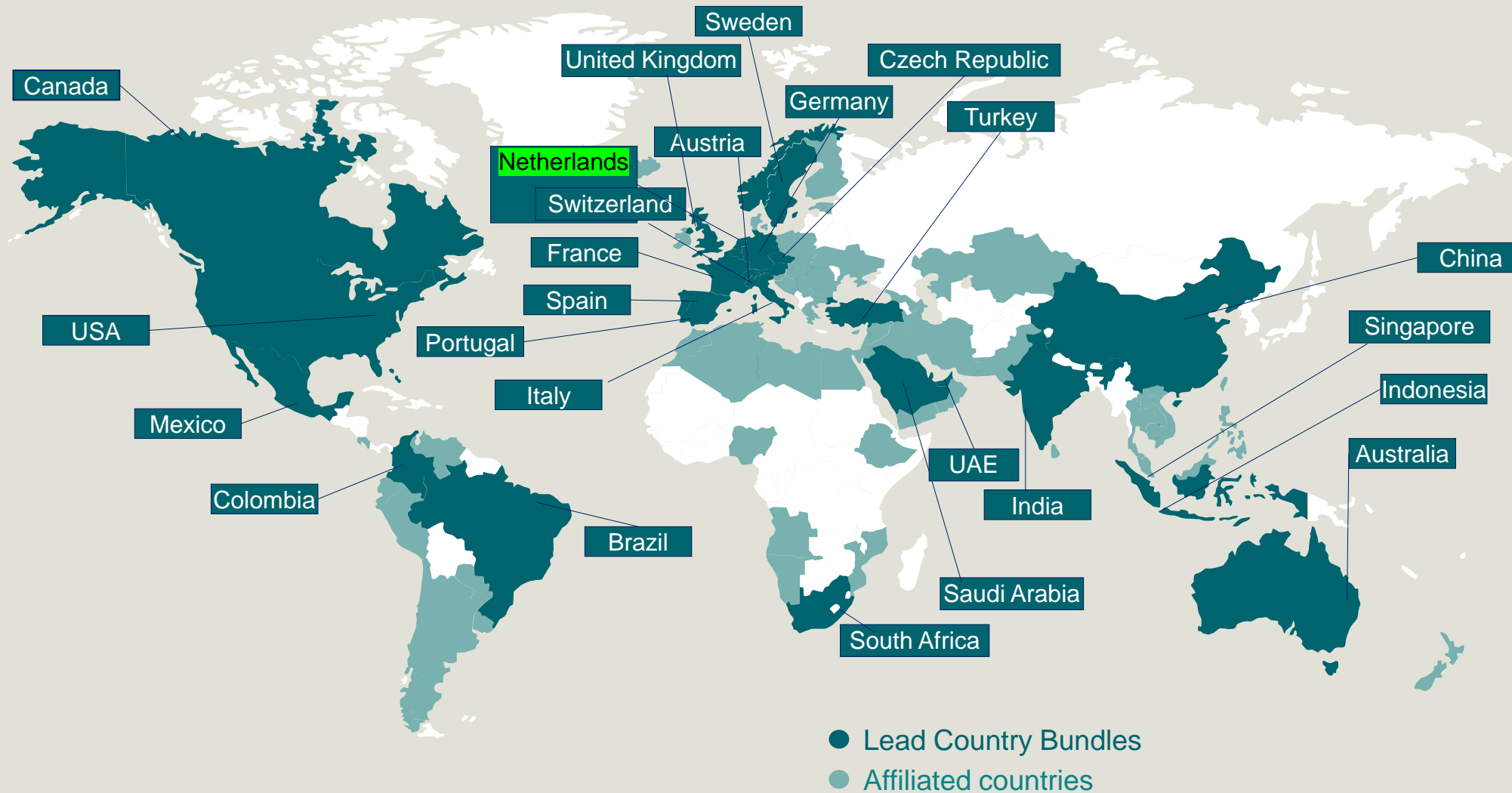
Digitale Assets in hoogspanningsstations:

Is er nog onderhoud nodig of doen we het op de predictive manier?

Global Footprint

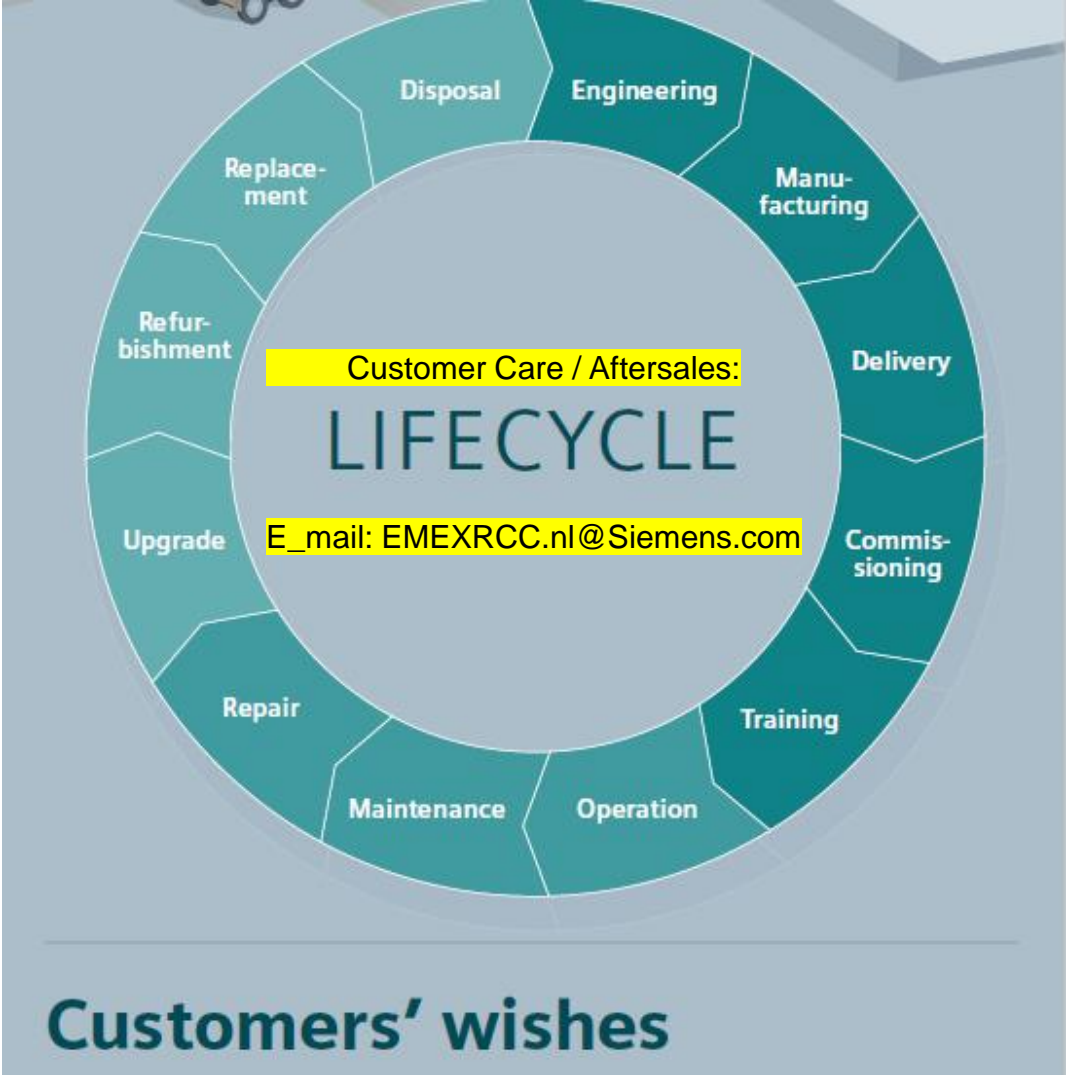
Global competence provided locally

SIEMENS
Ingenuity for life



- 26 customer service set ups
- More than 700 service employees to serve the customer.
- More than 500 Field service expert
- Several laboratories in Germany and Italy
- More than one million installed assets

Siemens Nederland Zoetermeer Customer Care / Aftersales Smart Infrastructure



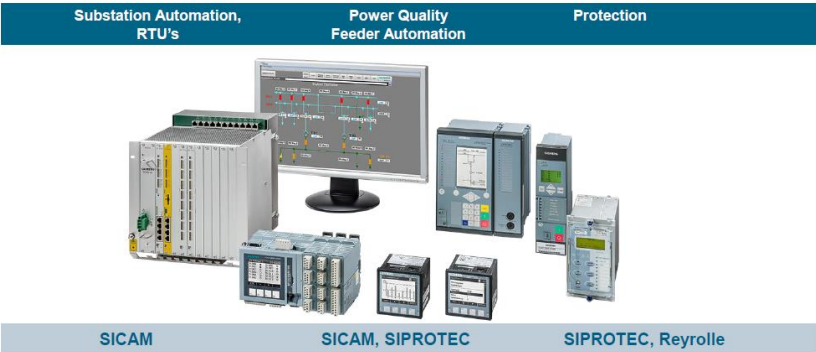
Restricted © Siemens AG 2017



NX Air



Digital Grid Products
Broadest portfolio – strong brands



Unrestricted © Siemens AG 2017
8.8 x 190.5 mm

Energy Management

Customer Services Portfolio



Field and Maintenance Services	Repair and Emergency Services	Spare Part Services	Modernization and Retrofit Services	Digital Services	Training Services	Support and Consulting Services	Service Programs
Supervision	Repair Services	Spare Parts	Modernization and Retrofit	Monitoring & Diagnostics	Product Training	24/7 customer support	
Erection and Commissioning	Emergency Services	Strategic Spare Part Program	Refurbishment	Remote Services	Customized Training	On-site Condition Assessment	
Project Management		Spare Part Management	Upgrade & Uprate	Asset Management	On-site Training	Asset Audits	
Preventive Maintenance		Obsolescence Management	Extension	Cyber Security	Certification & Qualification	Asset Consulting	
Air insulated switchgear Gas insulated switchgear Circuit breakers Generator switchgear SIPROTEC Protection Relais' Siestorage Low voltage switchgears and breakers							

Field and Maintenance Services

Keep assets reliably available, leverage OEM expertise

WITH

time- and condition-based maintenance, following OEM recommendations, by local qualified experts

Accident Prevention Regulation & Labour Protection

Maintenance free doesn't mean service free



The safe operation of all electrical plants and products can only be ensured if the orderly condition is verified according to the national accident prevention regulations.

Example Germany: Law requirements within the DIN VDE 0105-10 (DGUV Vorschrift 3) define:

- Inspection cycles of 4 years
- Implementing regulation of the examination
- Testing and measuring of safeguarding and operational reliability
- Test record

Provider is held responsible for the damages of persons and goods if the accident prevention regulations and labour protection laws are not obeyed.

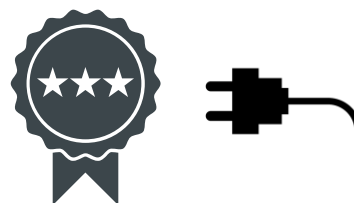
Customer Services Industry Challenges



Personnel and Operation Safety



Highly policy-controlled and regulated business environment



Unpredictable network reliability and fluctuating power quality



Increase Assets Reliability and Availability



Cost pressure



Production + Maintenance Synchronization

**Too many issues,
one single
answer...**

Asset Health check

1st phase

- Agree on visit plan with customer
- Perform SAFE® health check
- Create health check report

2nd phase

- Present results of health check to customer and start technical discussion

3rd phase

- Proposal based on experts input with options for customer showing risk evaluation
- Order from customer

4th phase

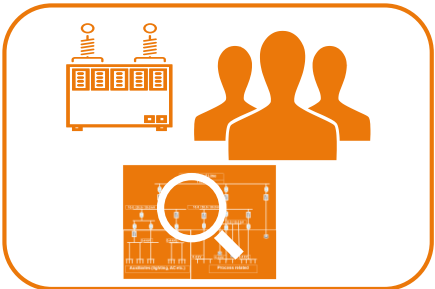
- Create strategic spare parts (fall back scenario)
- Execute side works based on contract

Energy Management Customer Services

Customized Service Programs



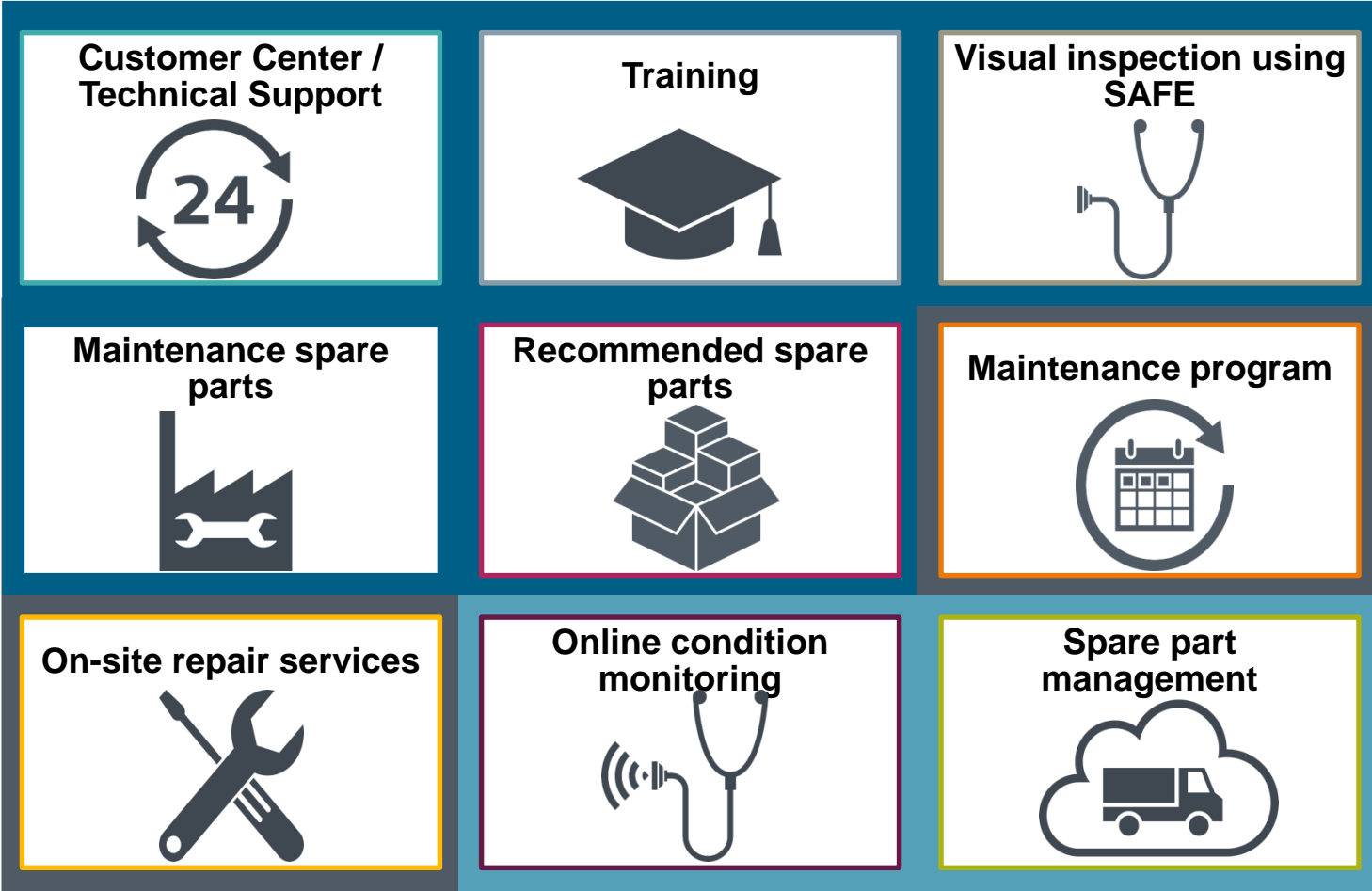
How do we do it?.....



Assets
Health check



Analysis



Customized Service Proposal

Service scope

8DA/B Gas insulated switchgear (Maintenance FREE)



Switchgear (panel)		
		1. General/ Visual check External/ambient conditions, lubricant condition, reading operation counter
		2. Measurements of SF6-filling <ol style="list-style-type: none"> Measurement Pe, SF6 content, dew point, SO2 content in all gas compartments (busbar, VT, breaker, three position switch, disconnecter, etc); gas tightness test → (8DA: Breaker, VT, BB always) Remove SF6 gas Evacuate air & refill SF6 gas
		3. Filter bags Replace filter bags
		4. Three position switch <ol style="list-style-type: none"> Check main contacts Check mechanism, functional test incl. test operation
		5. Disconnector <ol style="list-style-type: none"> Check main contacts Check mechanism, functional test incl. test operation
		6. Interlockings Check mechanical or electrical interlockings

Benefits:

- Certificated field service expert
- Report
- Test report
- Lifetime extension
- OEM approved maintenance material

Circuit breaker		
		7. Circuit breaker drive mechanism. Condition check General informations, tightness of all parts, cleaning and greasing of necessary parts
		8. Grease lubricants Clean breaker, replace grease, exchange bearing wheels
		9. Operation release test Determine the minimum operating voltage required for opening and closing of the circuit breaker
		10. Motor test <ol style="list-style-type: none"> Check if the spring charging motor operates correctly Measure the charging time
		11. Test operation and functional test Mechanical and electrical test operation
		12. Mechanical interlocks Check the mechanical and/or electromagnetic interlocks to control the operation of the circuit breaker
		13. Check mechanical and electrical connections Check the tightness of screws and bolts

Basic

Advanced

Premium

Service scope

Air insulated switchgear (e.g. NXAIR, Simoprime) Less Maintenance



Switchgear (panel)			
			1. General/ Visual check External/ambient conditions, lubricant condition, reading operation counter
			2. Voltage indicator systems Function test
			3. Busbar compartment Check, clean busbar compartment with insulator
			4. Cable connection room Check cable compartment room
			5. Low voltage compartment i. Check of conditions ii. Function test of heater iii. Tightness of all screws
			6. Interlocking system Check mechanical or electrical interlocking system
			7. Fuses (if existing) i. Condition check of fuses and fuse assembly ii. Function test
Basis			Advanced
			Premium

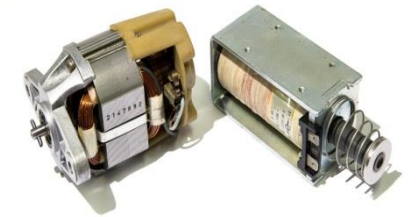
Circuit breaker			
			8. Circuit breaker drive mechanism. Condition check General information's, tightness of all parts, cleaning and greasing of necessary parts
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			12. Test operation and functional test Mechanical and electrical test operation
			13. Mechanical interlocks Check the mechanical and/or electromagnetic interlocks to control the operation of the circuit breaker
			14. Check mechanical and electrical connections Check the tightness of screws and bolts
			15. Switching time measurement before and after maintenance
			16. Voltage drop measurement between upper and lower contact before and after maintenance
			17. Vacuum tube high voltage test (integrity test of each pole)

Strategic spare parts

Example for a air insulated switchgear



Material Description	Qty	Check (yrs.)	Importance	Delivery time (weeks)
Voltage transformer (extention installation)	3	10	medium	8
Current transformer	3	10	medium	8
Ventilation system	3	10	low	10
Circuit breaker components (coils, motor, vacuum tubes, ..)	3	10	High	4
Interlocking coils	3	10	high	4
Contact arms and fingers set (3 phases)	1	20	high	8
Bushing set (3 phases)	1	15	medium	4
Withdrawable unit for circuit breaker	1	15	medium	10
Earthing switch	1	15	high	8
Spare breaker with all necessary assemblies (ready to use)	1	15	low	12
Shutter system	1	15	medium	8
Handtools set	1	15	medium	6
Voltage indicator system	3	10	low	4



SIPROTEC 5 – Maintenance



From the SIPROTEC manual:

No special maintenance is required for SIPROTEC 5 devices. The only maintenance measure is to replace batteries

All measurement- and signal-processing circuits are designed full-static.

All input modules are also static, and the binary outputs are equipped with protective covers.

Since the device is mainly self-monitoring, hardware and software errors are automatically forwarded.

This action minimizes any downtime of the device.

It also eliminates the need for frequent maintenance inspections.



SIPROTEC 5 – Maintenance (2)



Commissioning

- Check physical connections (wires)

- Test protection functions

- Test I/O

- Check communication, registration of the alarms/trips in the device

Maintenance

- Battery replacement

- Trip to circuit breaker (via secundair test equipment)

- Check fault / trip / event logs,

- Analyses of the registered data in the device

SIPROTEC 5 – Maintenance (3)

Time interval of maintenance:

- 1 yr?
- 2 yr?
- 5 yr?

Termijnen voor verschillende typen van beveiligingen:

Elektro mechanische beveiligingen:	Elk jaar om de beveiliging wakker te houden
Analoge beveiligingen:	Elke twee jaar, afstelpotentiometers vooral
Digitale beveiligingen:	Elke 5-7 jaar let op batterij voor ondersteunde klok en RAM

It's up to customers philosophy!

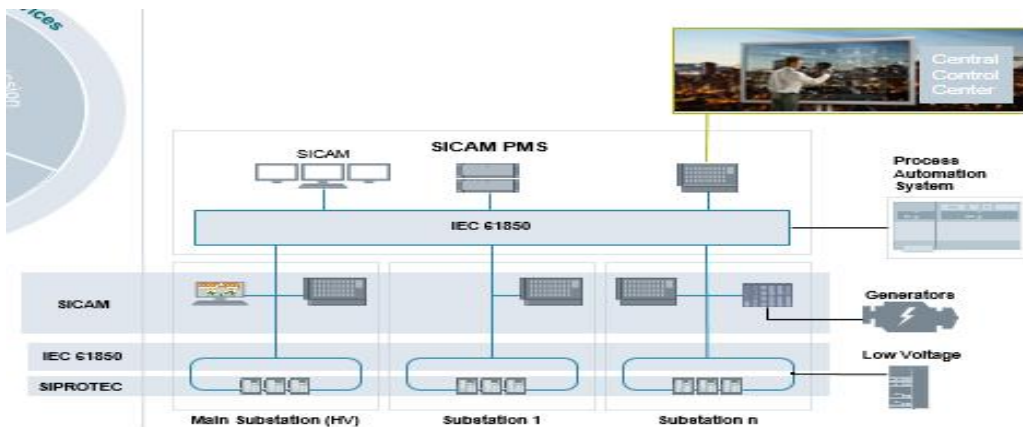
Why maintenance on protection devices:

- Certificates (test reports) that devices has been maintained (for insurance purposes)
- Stay up to date with protection devices
- Firmware update (yes/no?)
- Cyber Security

An Good Substation concept saves Money and gives a high reliability and availability.

It's saves money on maintenances and can be extended and upgraded in the right way.

So, it stays future prove.



IEC 61850 Fiber Optic Ring

Maintenance Free SF6 Switchgears

Condition based monitoring / stand-alone or in the cloud

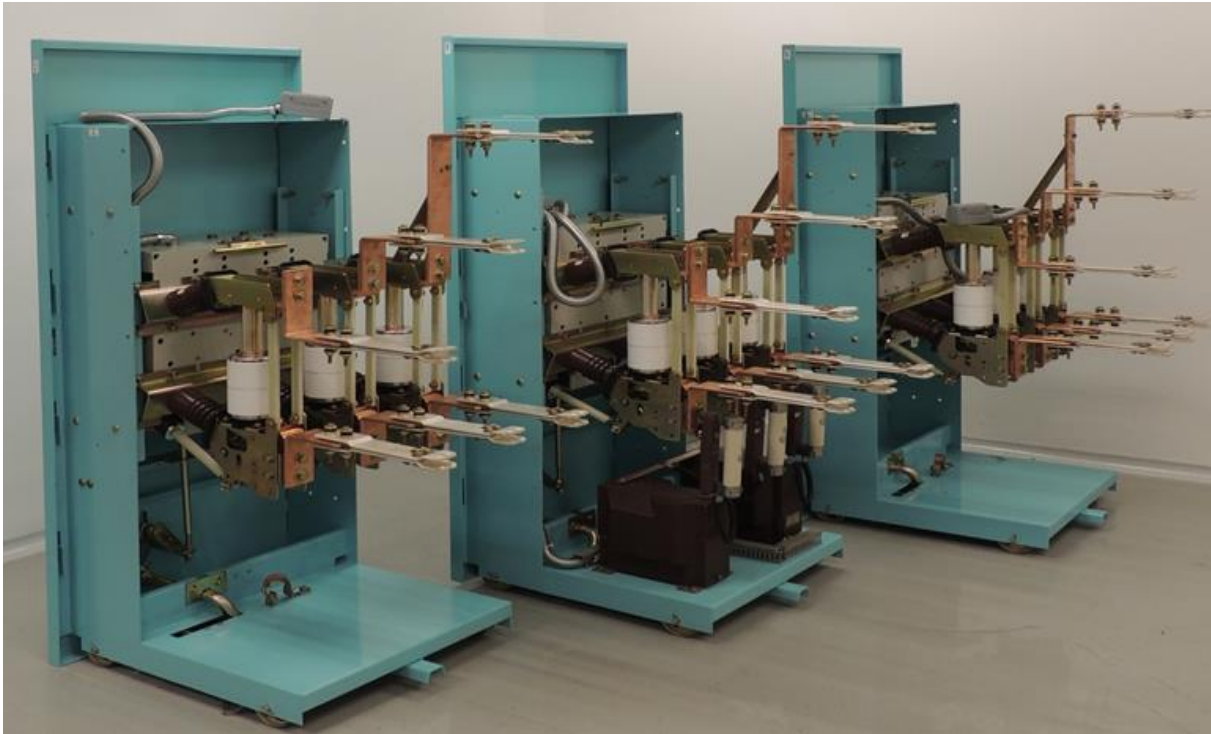
Modernization and Retrofit Services

Keep assets updated; extend useful asset life, avoid costly installation of new equipment

WITH

modernization of hardware and software, retrofits of individual components

What is Retrofit?



Retrofitting refers to the addition of new technology or features to older systems.
(Source: Wikipedia)

Retrofit of switchgears means upgrading of old circuit breakers with up-to-date vacuum circuit breakers.

Retrofit has the aim to extend the lifetime of a switchgear with increased availability, safety while reducing maintenance cost.

Condition monitoring of medium voltage switchgears

Siemens Assetguard MVC stand - alone

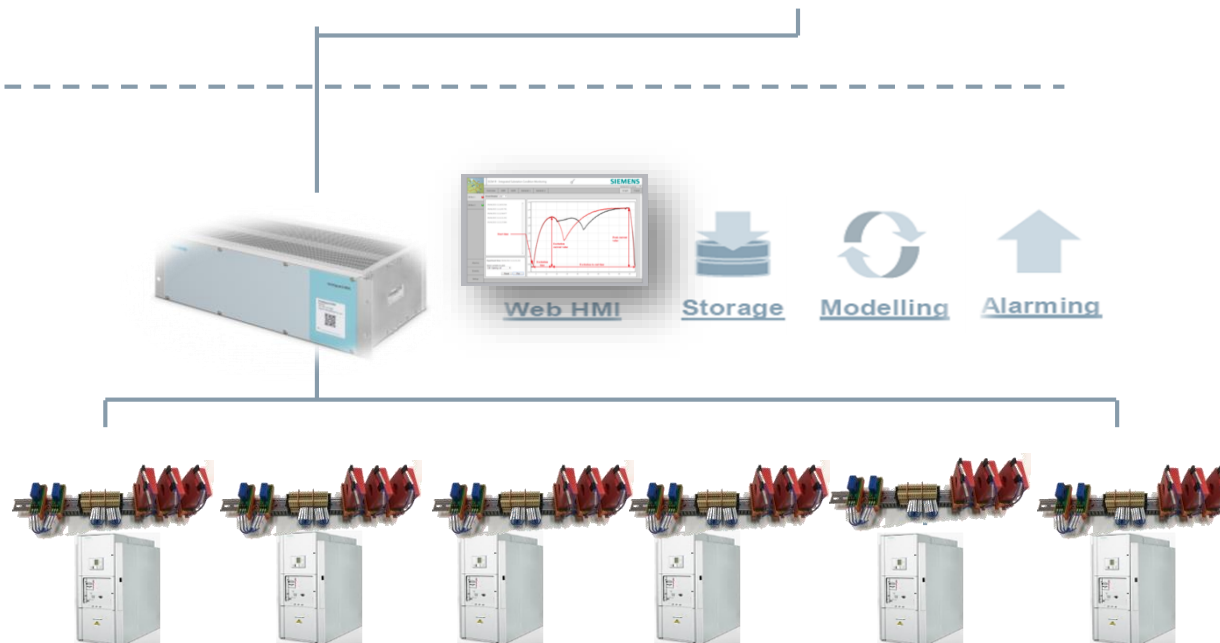
SIEMENS
Ingenuity for life

Integration Level C

SCADA

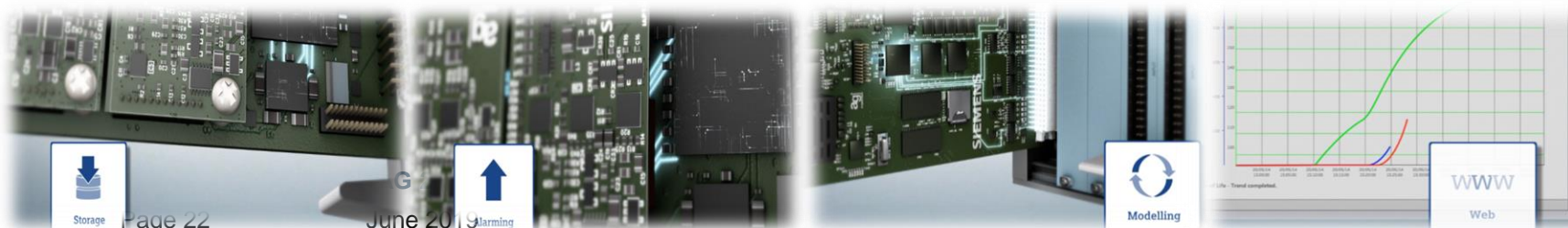
OTHER eg. PC, tablet

Central Unit
Assetguard MVC



Switchgear

- Electrical safety according to EN 60529, EN 61010-1 and EN 60255-5
- Electromagnetic compatibility (EMC) according to EN61000 and EN 55011
 - Level 3 electrostatic and electromagnetic immunity
 - 4 kV surge immunity-
- Environmental strength according to EN 60068
 - Operating temperature -25° C to 70° C
 - Humidity 10 - 95%
- Protection class IP 20
- Power supply port and each channel has a dielectric withstand capability of 3 kV_{RMS} and 5 kV 1.2/50 µs impulse
- Measurement resolution
 - Accuracy 0.5 % of range
 - 12 bit at 10 kS/s sampling rate
- Available communication protocols
 - IEC 60870-5-104, others on request
- Data storage
 - 2 Gigabit for each CB = 100 Operations for CB
 - Cyclical structure (oldest data is dropped first)
- Visualization
 - Web HMI as stand alone
- Dimensions w x h x d
 - Rack Version (477 x 125 x 210 mm)
 - up to 12 CBs



Condition monitoring of medium voltage switchgears

Siemens Assetguard MVC stand – alone film



Digital Service Monitoring & Diagnostic

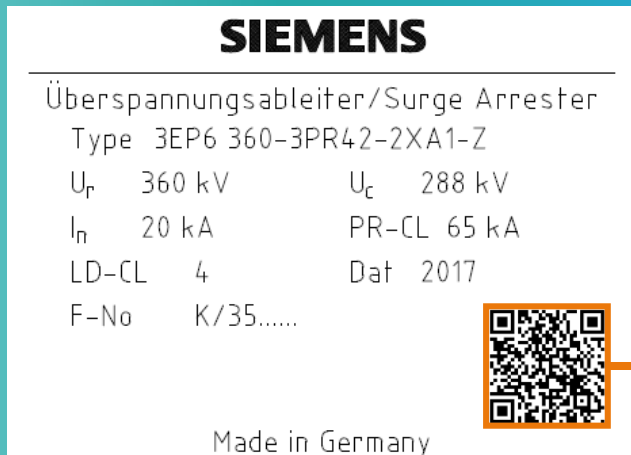
Quickly identify and address fast-moving faults

WITH

critical asset monitoring; real-time, dynamic analysis of asset conditions

QR code on rating plates is the link between assets and iBASE

QR code on rating plates



iBASE App



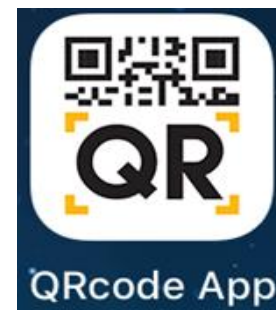
Search for asset
by unique ID

Detailed assets
information

iBASE
Energy Assets

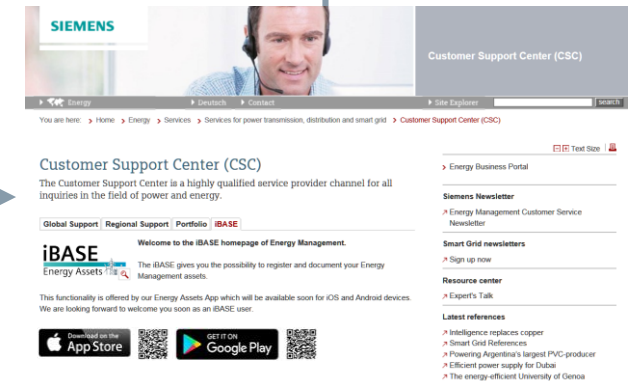
Log in to iBASE
via Customer Portal

iBASE Internet homepage

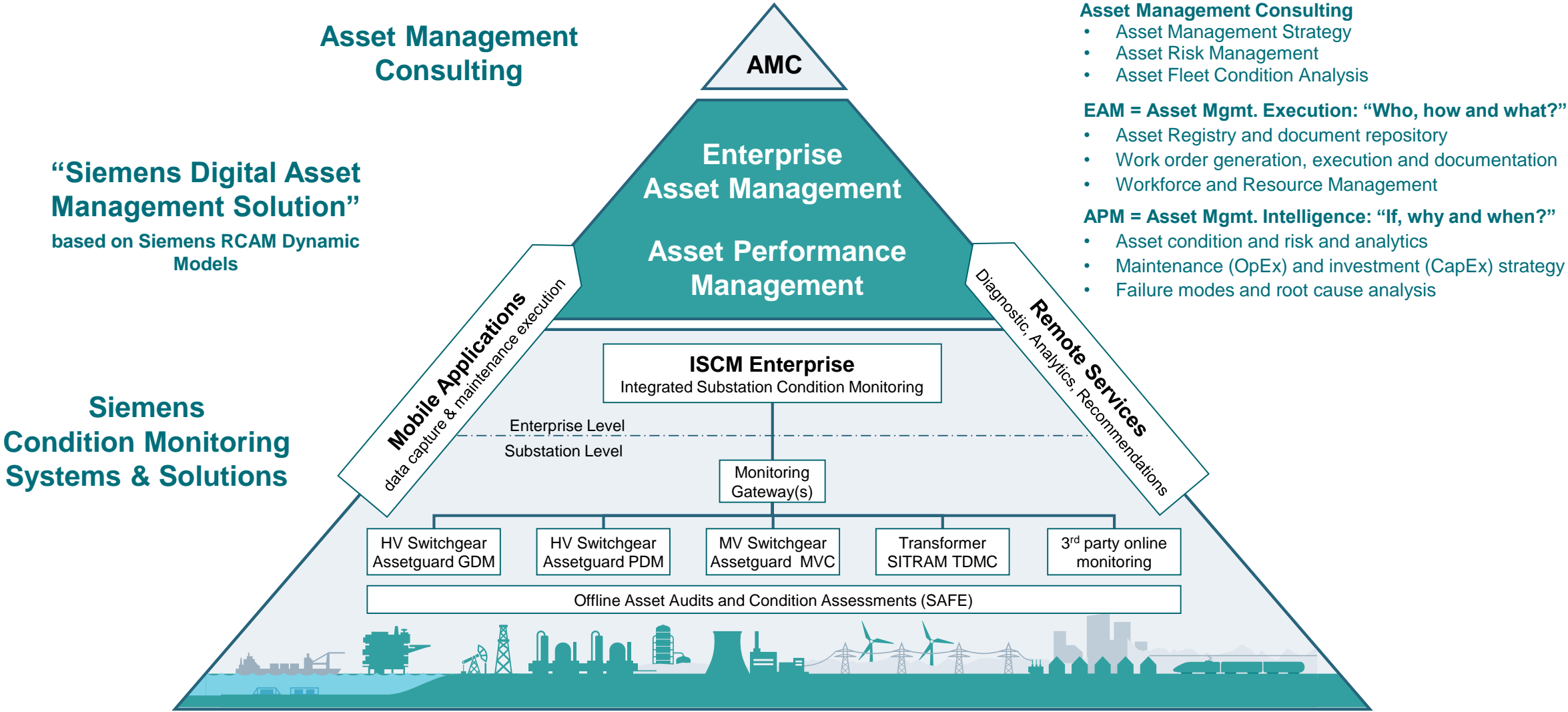


Directs to iBASE
internet homepage

[www.i-base.siemens.com/
?S=35&9D=2017&1V=K&H=Siemens&1P=3EP63603PR422XA1](http://www.i-base.siemens.com/?S=35&9D=2017&1V=K&H=Siemens&1P=3EP63603PR422XA1)



Customer Services Digital Tools



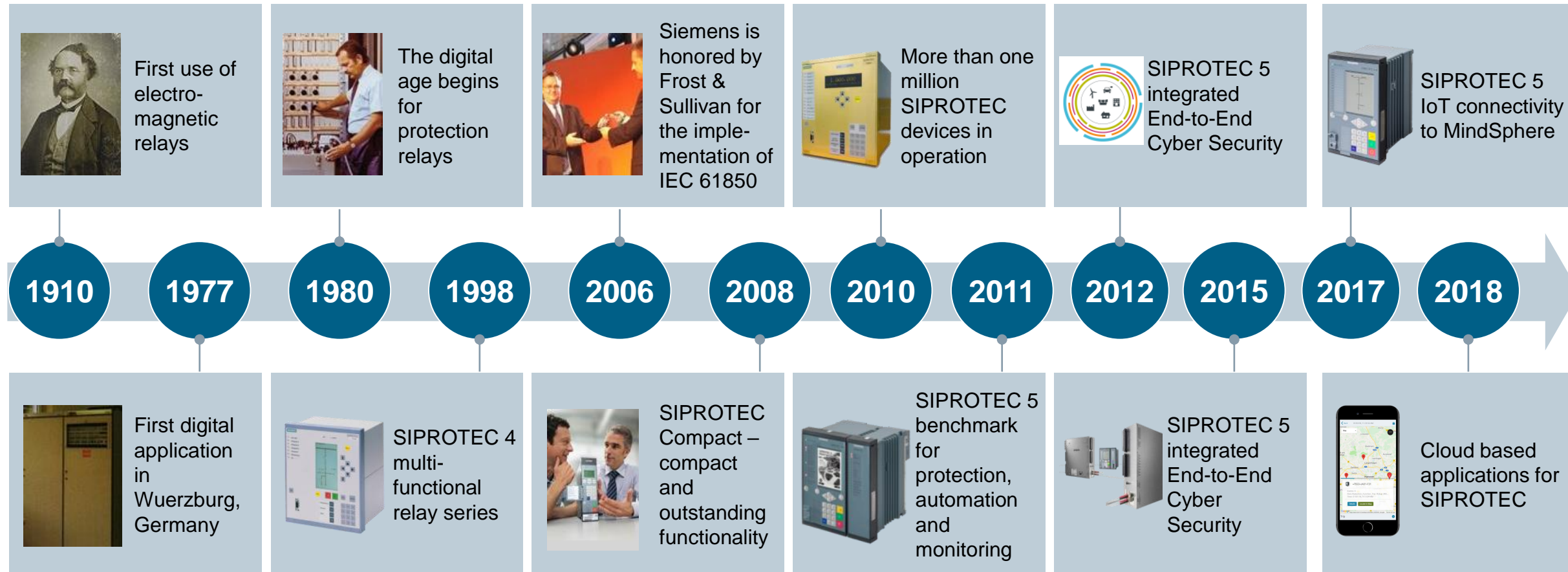
SIPROTEC 5 now and future

Protection, automation and monitoring
for digital substations

SIPROTEC – Synonym for the world's leading protection technology



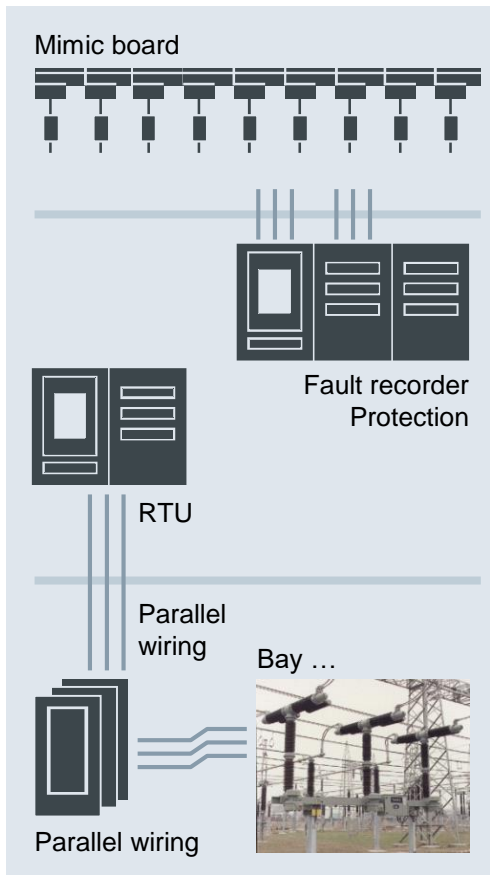
More than 1.6 Mill. devices installed therein >500,000 with IEC 61850



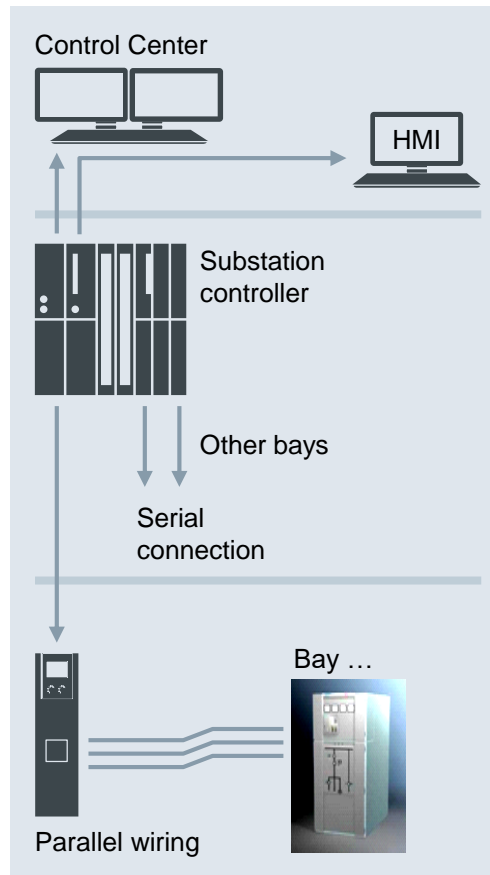
Evolution in Substation Automation – SIPROTEC 5 - the core of Digital Substation 4.0



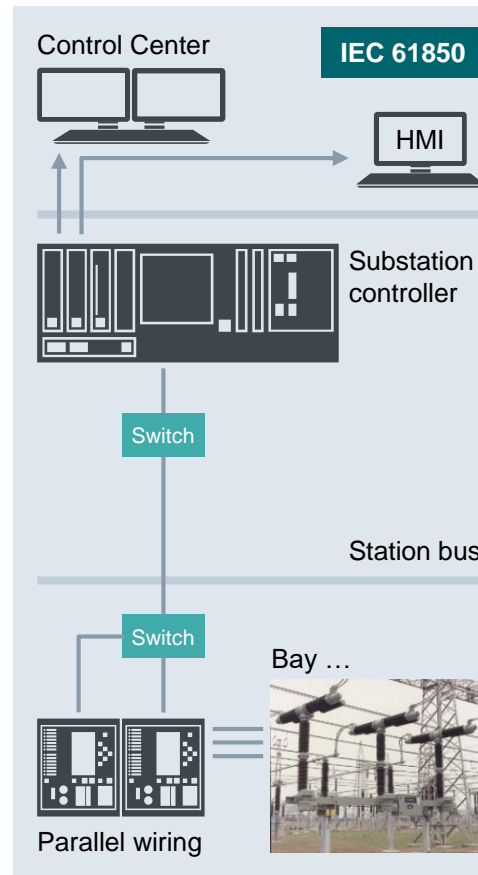
1st generation – Standard cabling



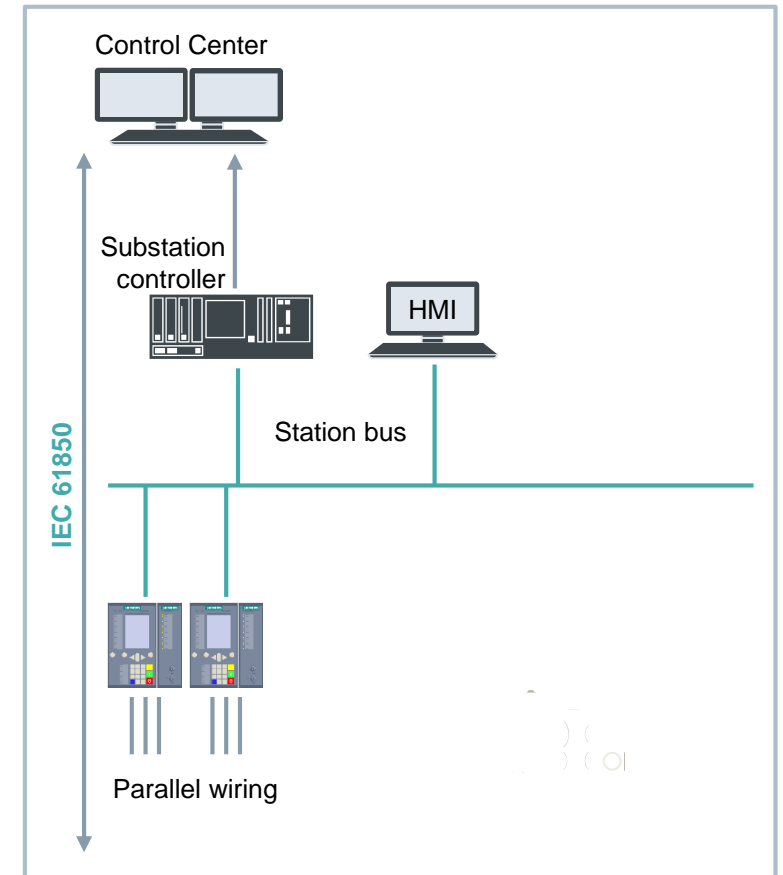
2nd generation – Point- to-point connections since 1985



3rd generation – Digital Station Bus since 2004

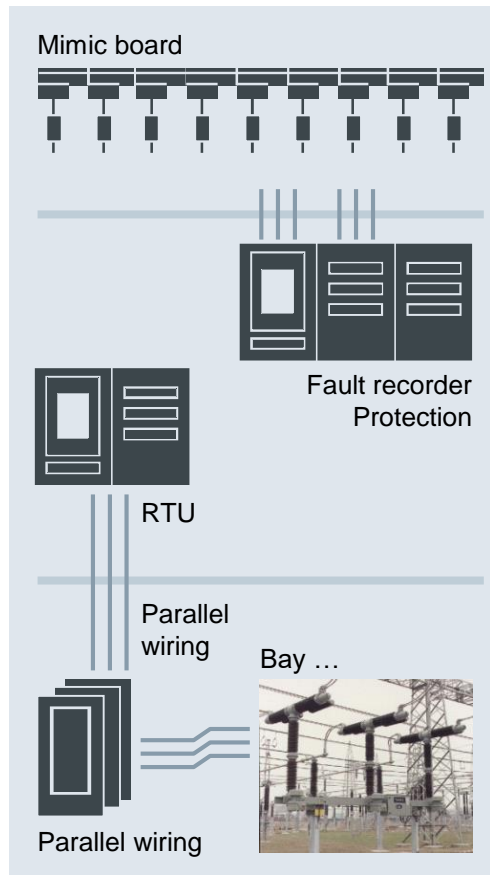


Digital Substation 4.0

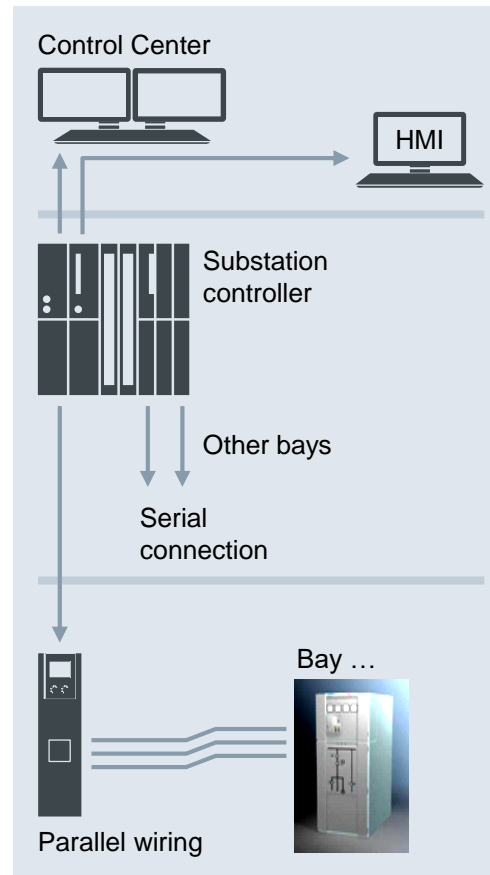


Evolution in Substation Automation – SIPROTEC 5 - the core of Digital Substation 4.0

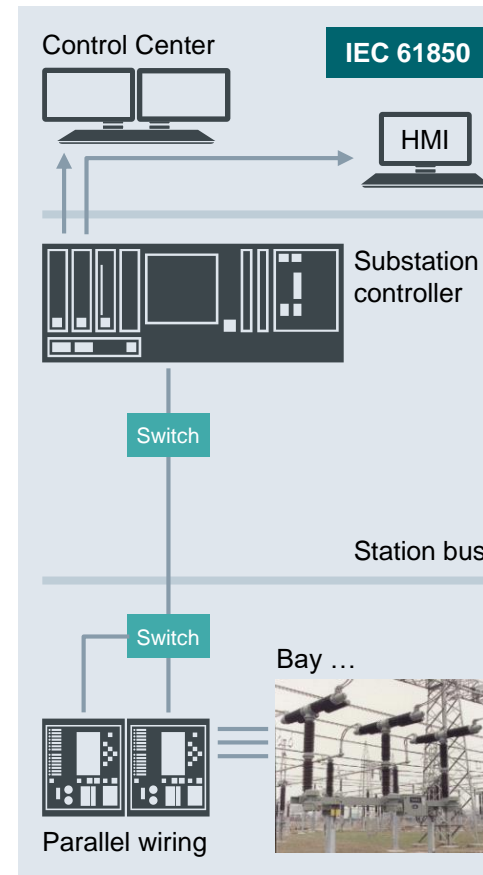
1st generation – Standard cabling



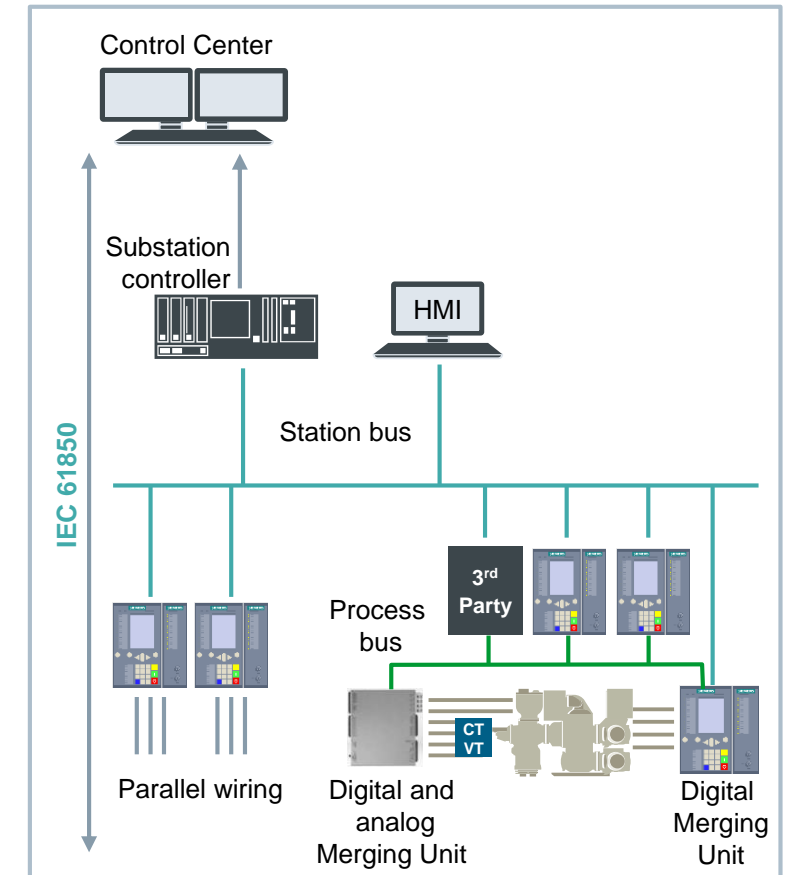
2nd generation – Point- to-point connections since 1985



3rd generation – Digital Station Bus since 2004



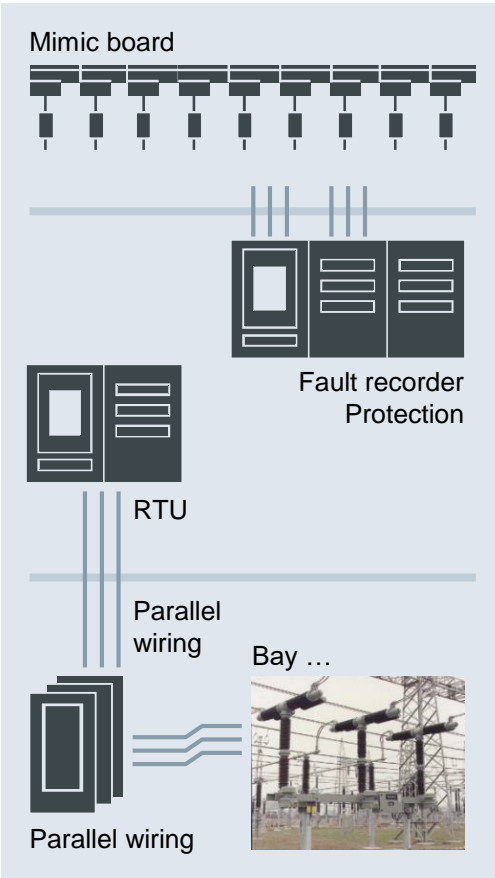
Digital Substation 4.0 - Process bus



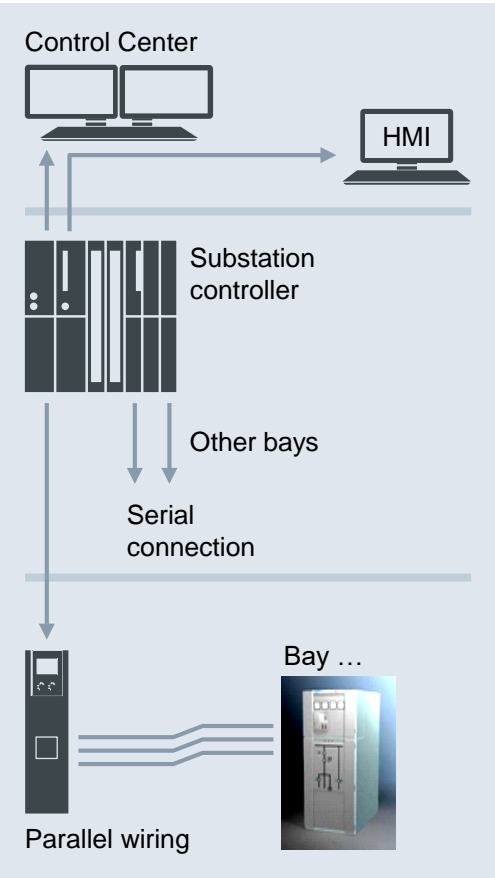
Evolution in Substation Automation – SIPROTEC 5 - the core of Digital Substation 4.0



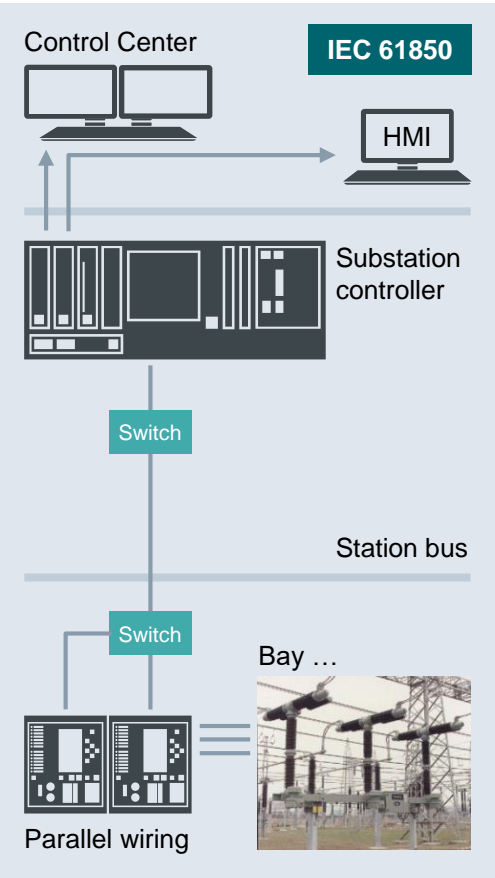
1st generation – Standard cabling



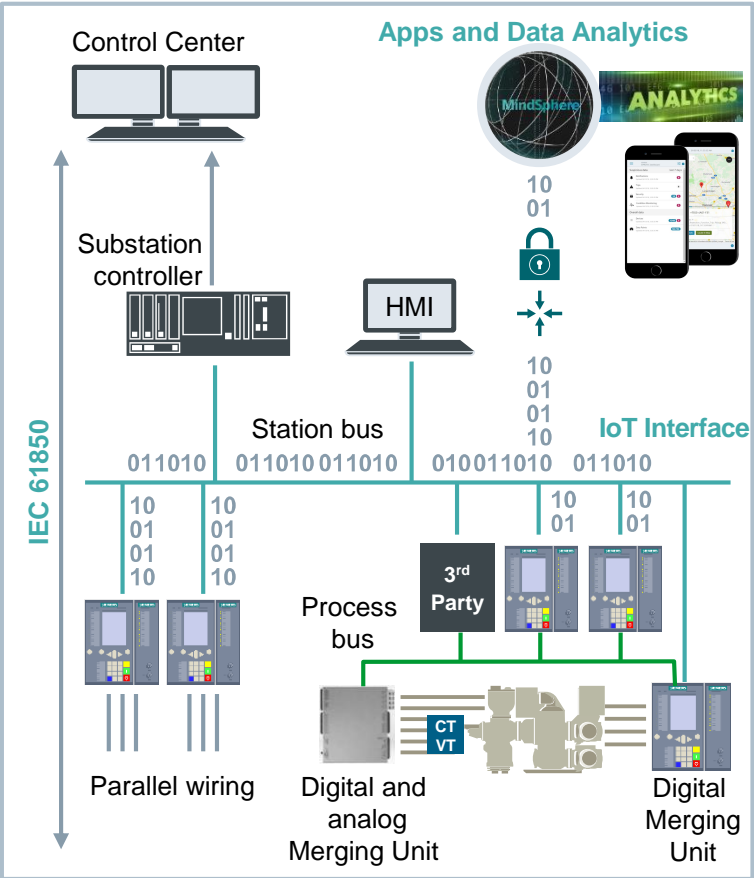
2nd generation – Point- to-point connections since 1985



3rd generation – Digital Station bus since 2004

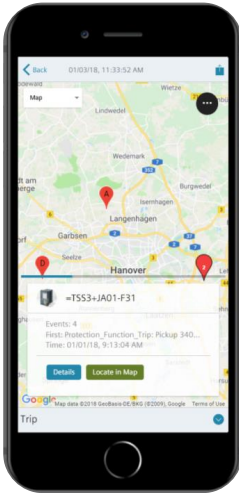
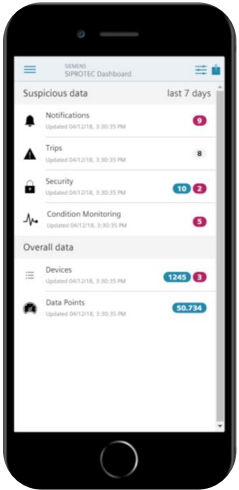
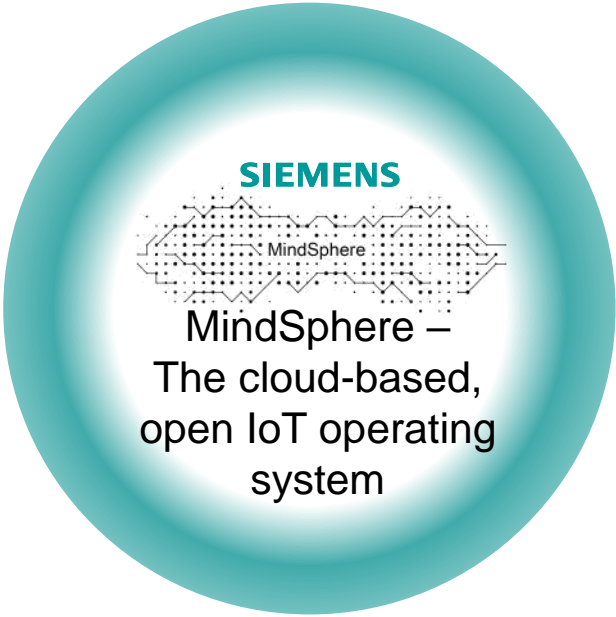
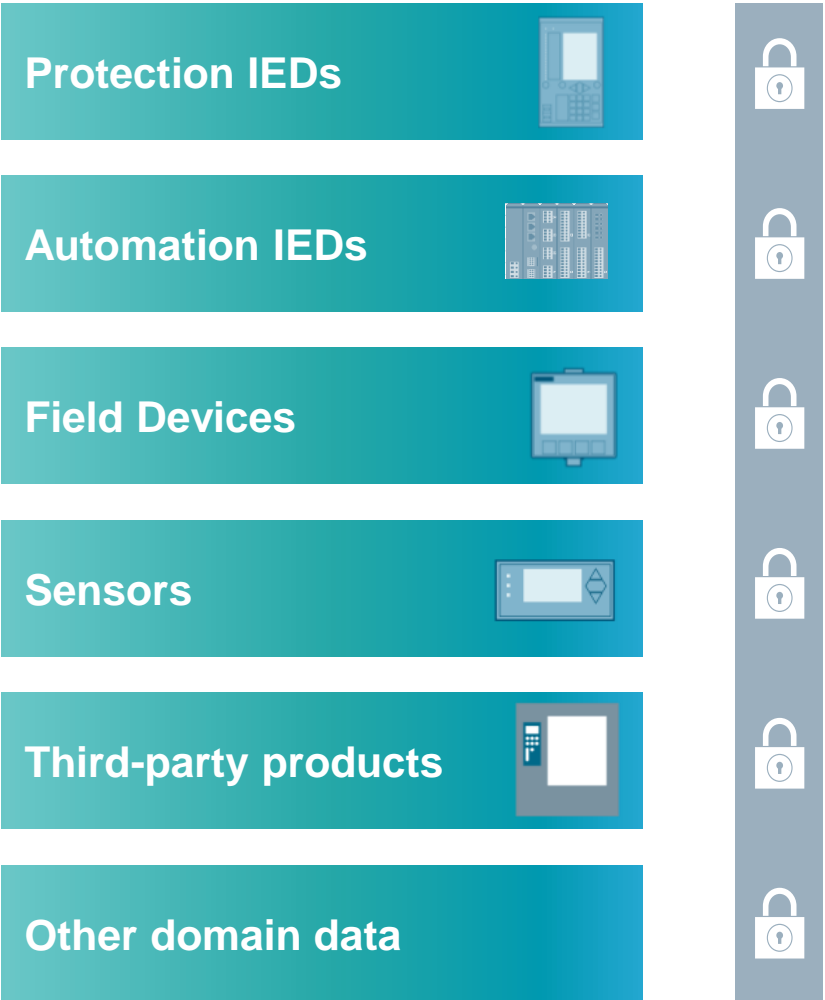


Digital Substation 4.0 - Process bus and IoT Connectivity



The future of process data acquisition and analysis

Benefit from data monitoring of electrical assets



Grid Diagnostic Suite SIPROTEC Dashboard – Data Visualization & Risk Detection

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Ingenuity for life



Applications



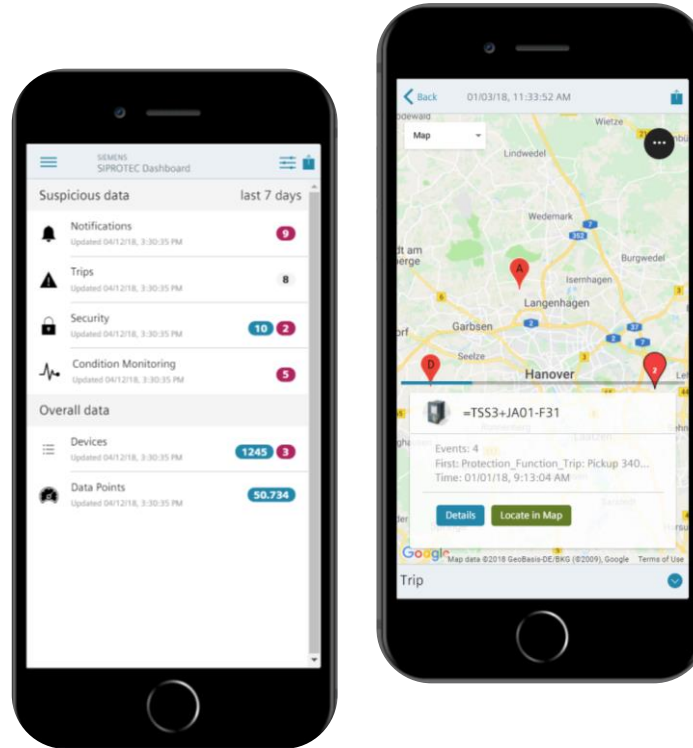
Platform



Connectivity*



IEDs, Sensors
→ “Things”



Mobile App with notifications
for iOS and Android

Zero Configuration

Quick overview about the
status of your grid assets

Risk detection

Additional features
like fault location etc.

* Additional IoT plug-in for DIGSI 5 V7.8
(in preparation)

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Grid Diagnostic Suite SIPROTEC Dashboard – Condition Monitoring



Applications



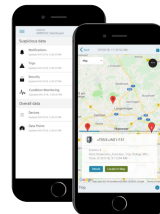
Platform



Connectivity*



IEDs, Sensors
→ “Things”



Use built in features of
SIPROTEC 5 family

Transformer Monitoring:
Hot Spot temperature

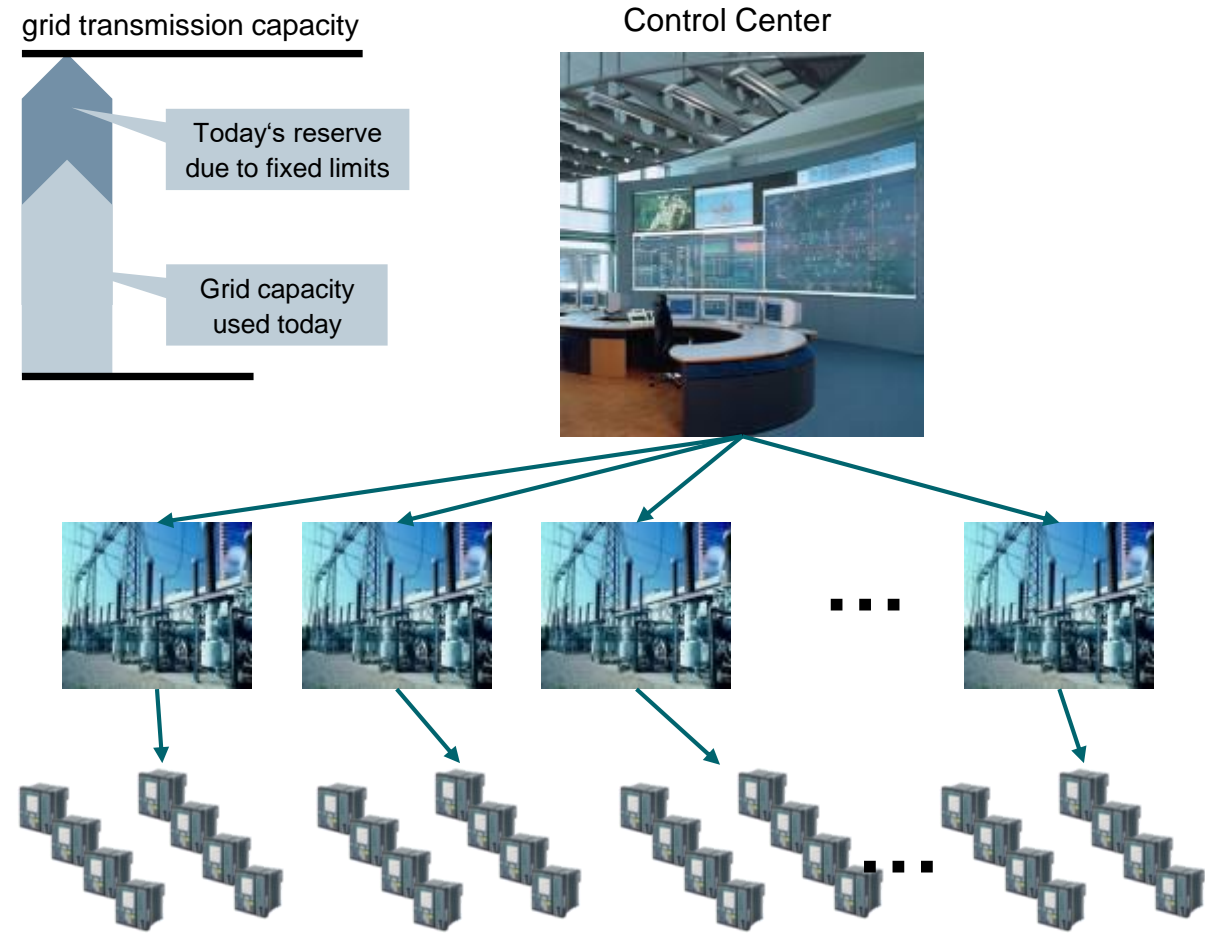
Tap Changer Monitoring:
Health check counter

Circuit Breaker Monitoring:
Sum I^2t ; Make time stage

* Additional IoT plug-in for DIGSI 5 V7.8
(in preparation)

SIPROTEC 5 – Substation Device Management

Firmware updates / Cyber security patches

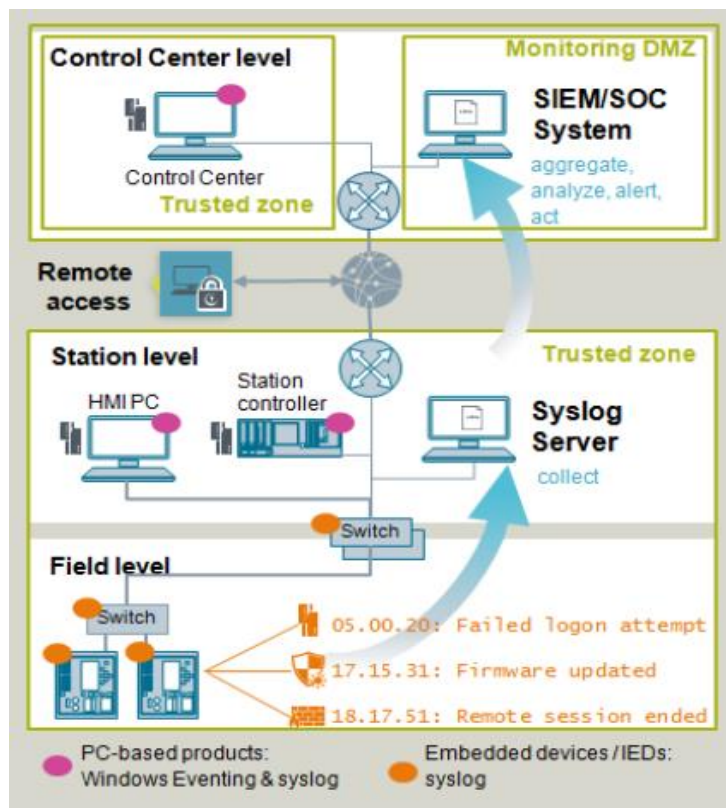


SIPROTEC 5 – Integrated Cyber Security

NEW V7.5

SIEMENS
Ingenuity for life

Central logging of security-relevant events



Digitally signed firmware

- Device-firmware is protected against manipulation
- Only firmware digitally signed by Siemens can be loaded and processed
- This is ensured via an integrated crypto-chip with secured key storage and signature technology



Don't want to be in the Bad Headline Club?



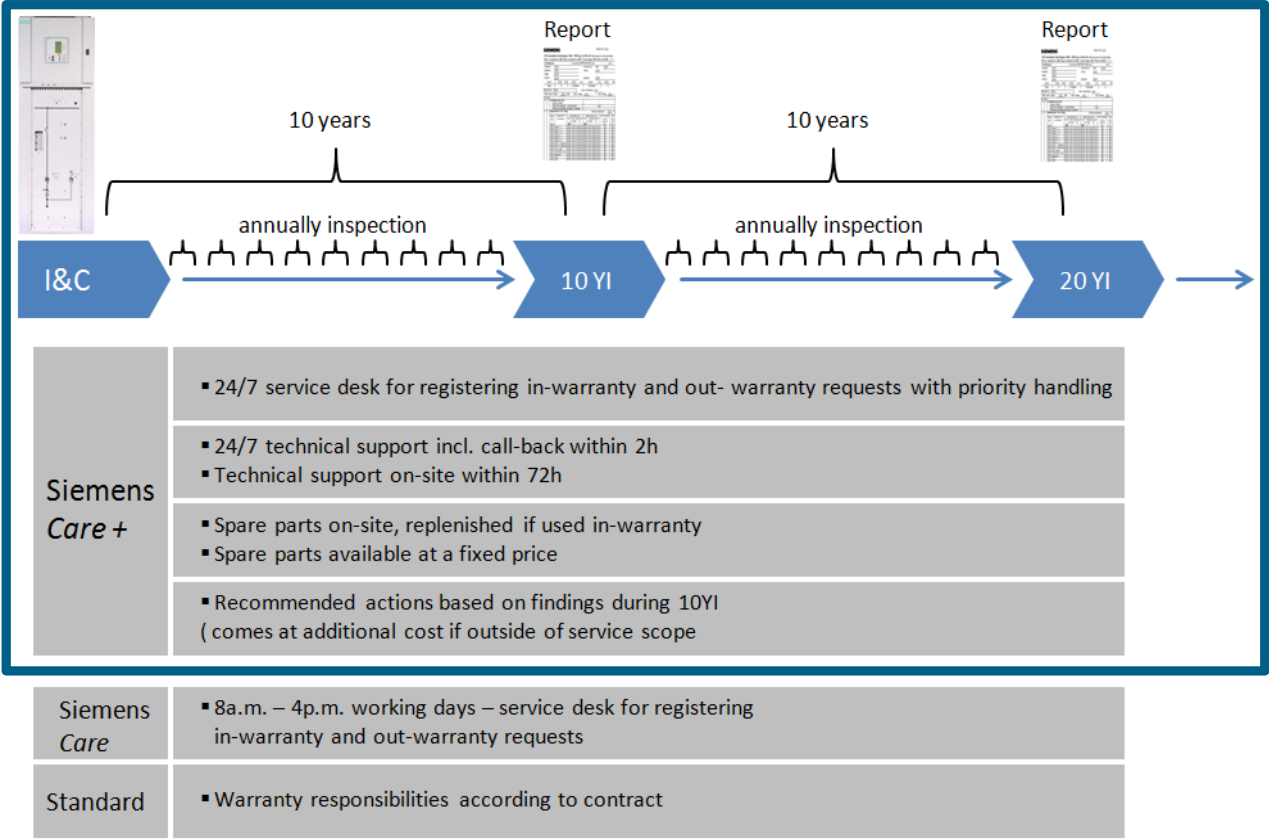
Siemens Energy Services!

Service contract

To support our offer, we have developed a service that complements our warranty.

With Siemens Service contract you as a customer will get:

- Strategically selected spare parts available at the facility
- Replacement program, possible using spare parts
- Around the clock priority support (24/7) 365 days a year
- Qualified AIS technicians on site within 72h
- Affordable discount on Siemens price list for work beyond the guarantee commitment
- Annual inspection on site by qualified technicians
- Maximized lifetime of delivered equipment
- Recommended action plans and reports for transparent planning of maintenance of the delivered equipment



Thank you.

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Remeo.Ramkisoen@siemens.com