





IP in MV/LV: Expanding IP services to the medium and low voltage layers of the power distribution grid

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Energy transition and telecommunication

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The way forward

5 Practical experience

Conclusion



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Energy transition and telecommunication

Next generation ICT security solutions are required to securely operate today's interconnected energy system



Energy transition and telecommunication

The energy transition takes place in the distribution grid and requires additional telecommunication services specifically in the medium and low voltage layers. Black-out resilience is required for system restart.



Source: BMWi Verteilernetzstudie 2014

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2 The way forward



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Grid topology Germany Medium voltage grid (10 kV, 20 kV) ~500,000 km ٠ Low voltage grid (0,4kV) ~1,000,000 km ٠ **Power line**

DSL

Directional radio

Cellular radio

Public (4G, 5G)

Private (LTE 450)

The way forward Each communication technology option for the medium and low voltage levels has its own challenges

Some Technology options

Fiber





communication



The way forward

Development of the telecommunication technology mix for the medium and low voltage levels of the smart distribution grid







3 Practical experience



Practical experience

The use of a combination of public standard telecommunication services improves service availability at reasonable cost, the use of the NGF delivers state-of-the-art protocol security



Practical experience

The Next Generation Firewall implementation comprises the whole set of the IEC 60870-5-104 protocol which can be used to design specific firewall rules for effective filtering



Practical experience State of the art firewall technology to secure grid control centers



Industry

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Conclusion

The availability of power supply increasingly depends on the availability of telecommunication services used to control the grid



The scalable IP platform in HV

- Basis for all future utility TC services
- Scalable, Real-time and non-real-time
- Built-in blackout resilience

Implement state-of-the-art ICT-Security solutions

- Security certification of DSO's in GER
- Next Generation Firewalls
- SCADA network monitoring
- Specific SIEM for OT environments

Telecommunication solutions for MV and LV

- Public cellular radio and fixed line DSL
- Complementary use of power line
- Future utility specific PMR solutions

Keep your teams curious and hungry for innovation

- Business integrated project teams
- Show the way not the solution
- Empowering people



Thank you!

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