AMI Topology and its Security

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Overview of Electricity Grid

- Generation
- Transmission
- Distribution

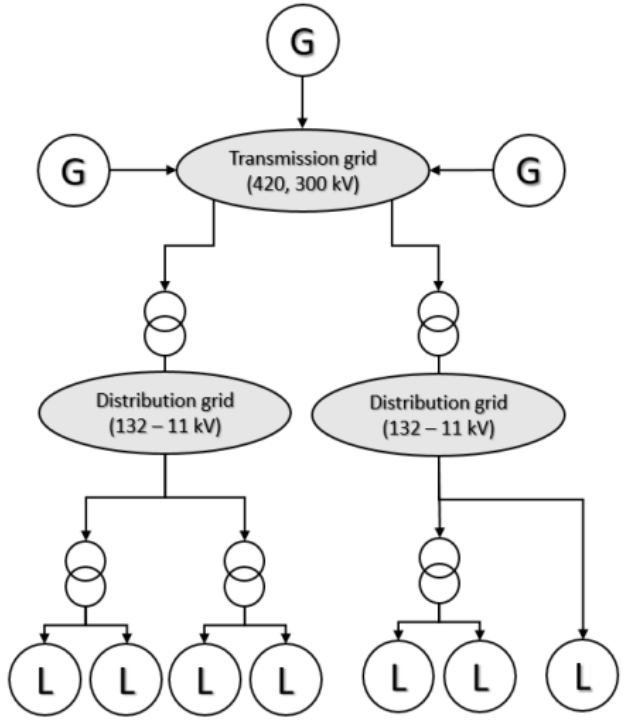
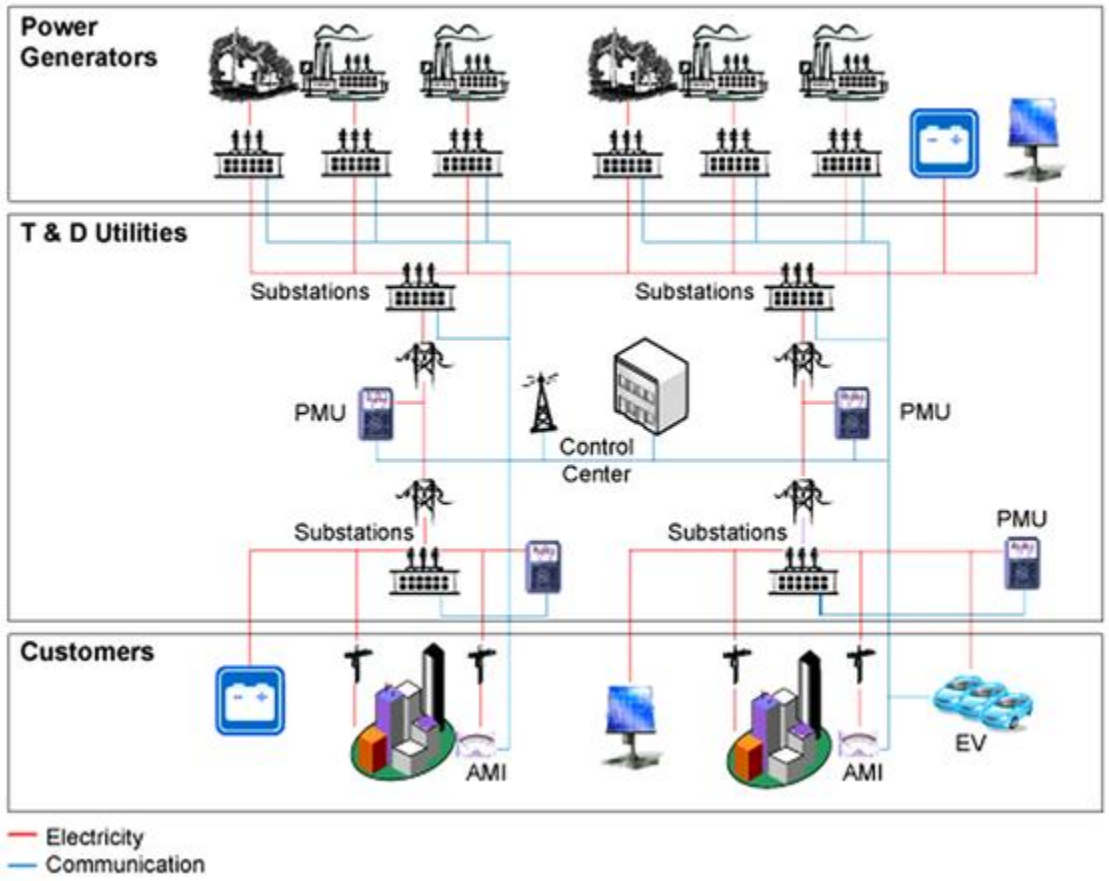


Figure 1.1. Simplified representation of the physical electric power system

Smart Grid


Power Generators
T & D Utilities
Substations
Substations
PMU
Control Center
PMU
Substations
Substations
PMU
Customers
AMI
AMI
EV
Electricity
Communication

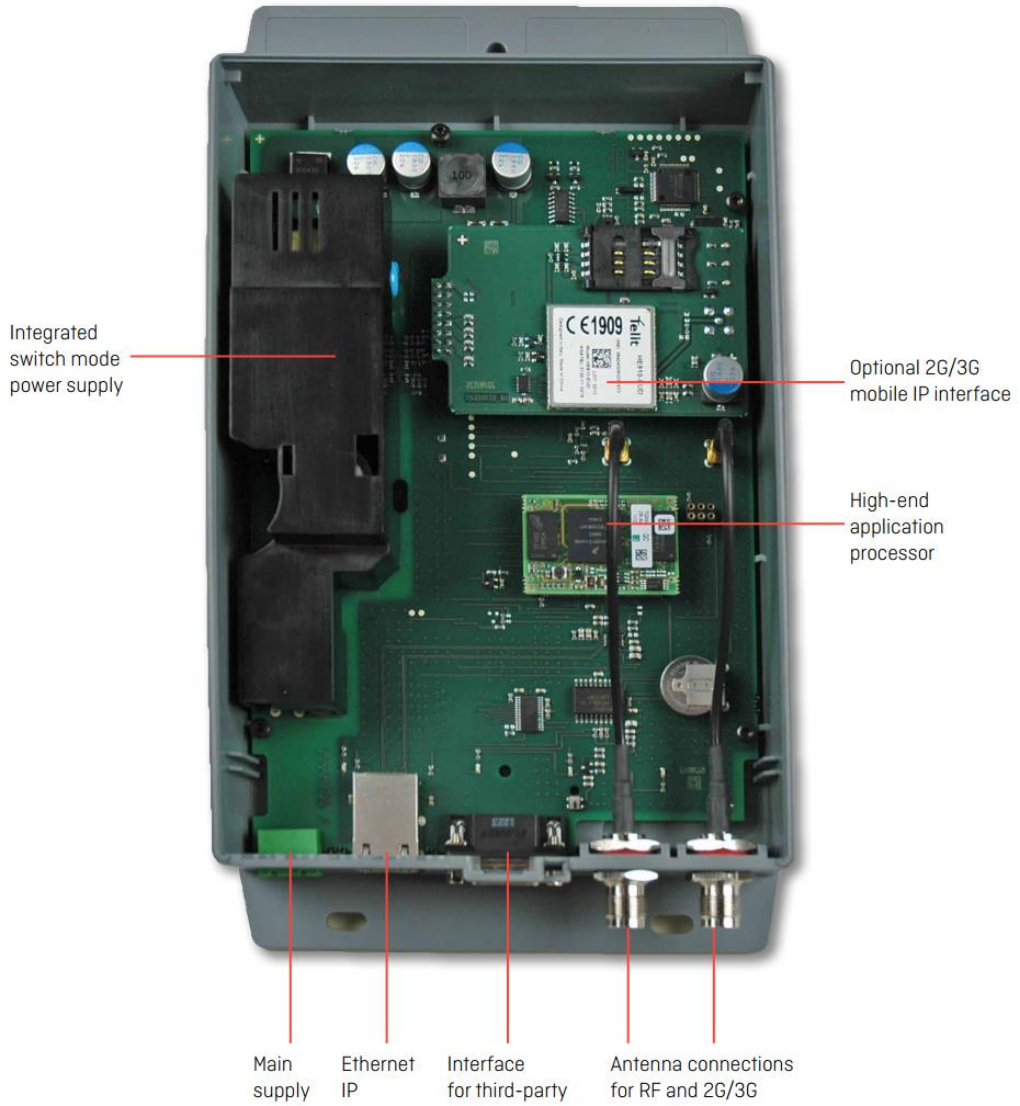
Some Communication technologies in Smart Grid

- Wireline technologies
  - PLC
  - DSL
  - Fibre Optic
- Wireless Technologies
  - IEEE 802.15.4 (Zigbee, ISA 1000.11a,...)
  - Wi-Fi
  - WiMAX
  - GSM (2G, 2.5G, 3G...)
  - EN 13757 (Wireless m-bus)

EN13757

EN 13757	Propose
1	Basic data communication between meters and collectors
2	Physical layer requirement for wired M-bus
3	Application Layer
4	Physical and Data Link Layers for wireless M-bus
5	Relaying and routing for range enhancement
6	Local bus for short distance wired links

- Smart meter
- Concentrator
- Head-end system
- MDM system
- NAN
- Cellular networks



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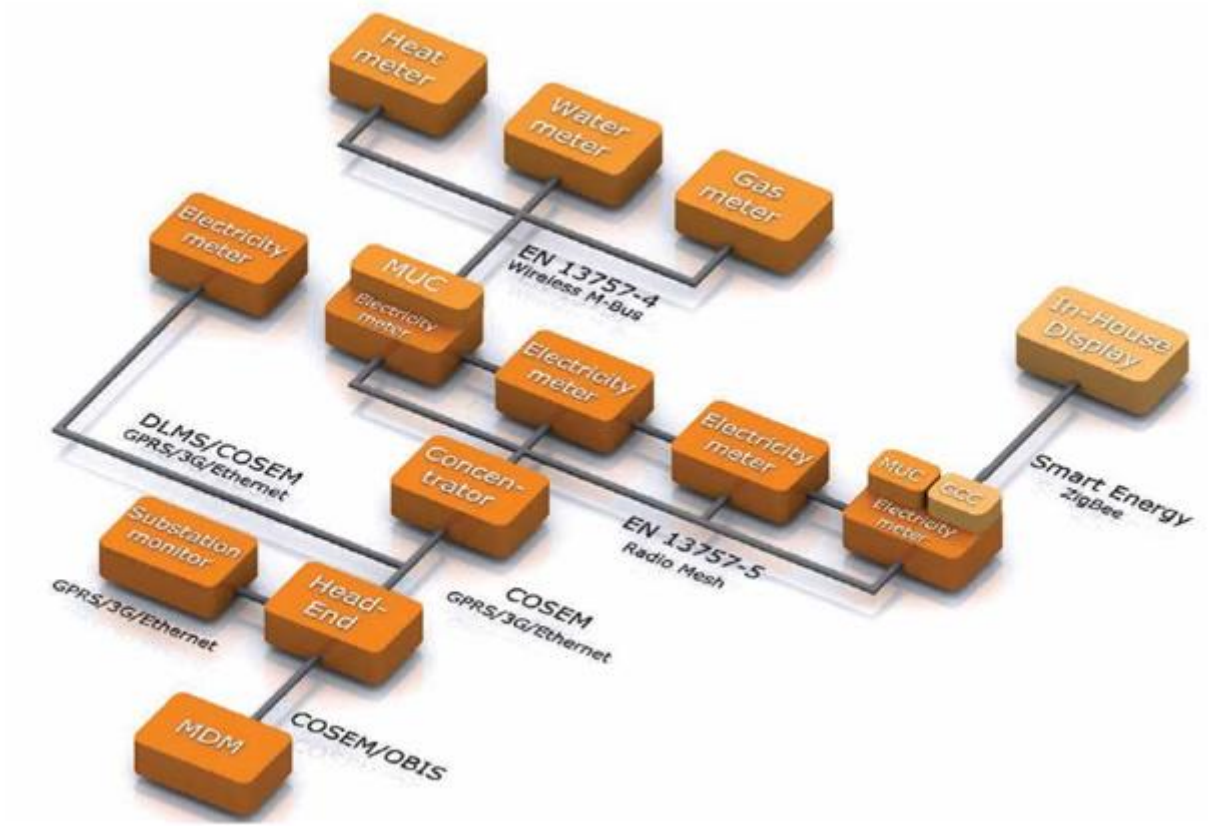
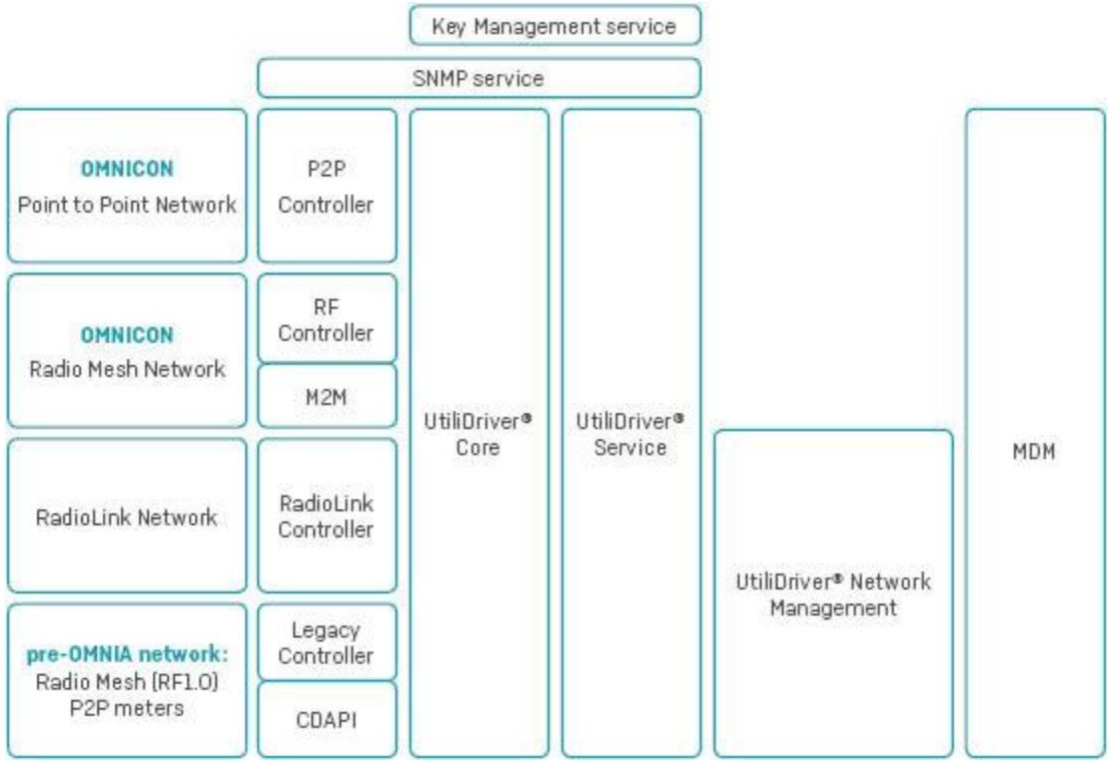
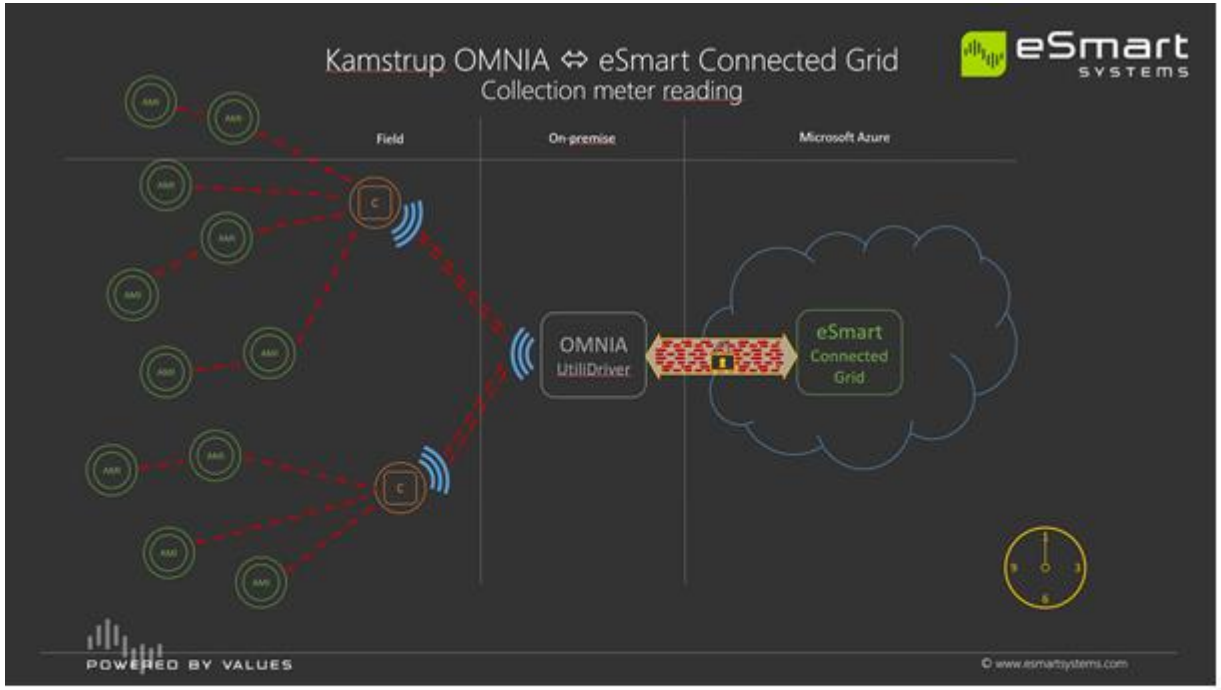
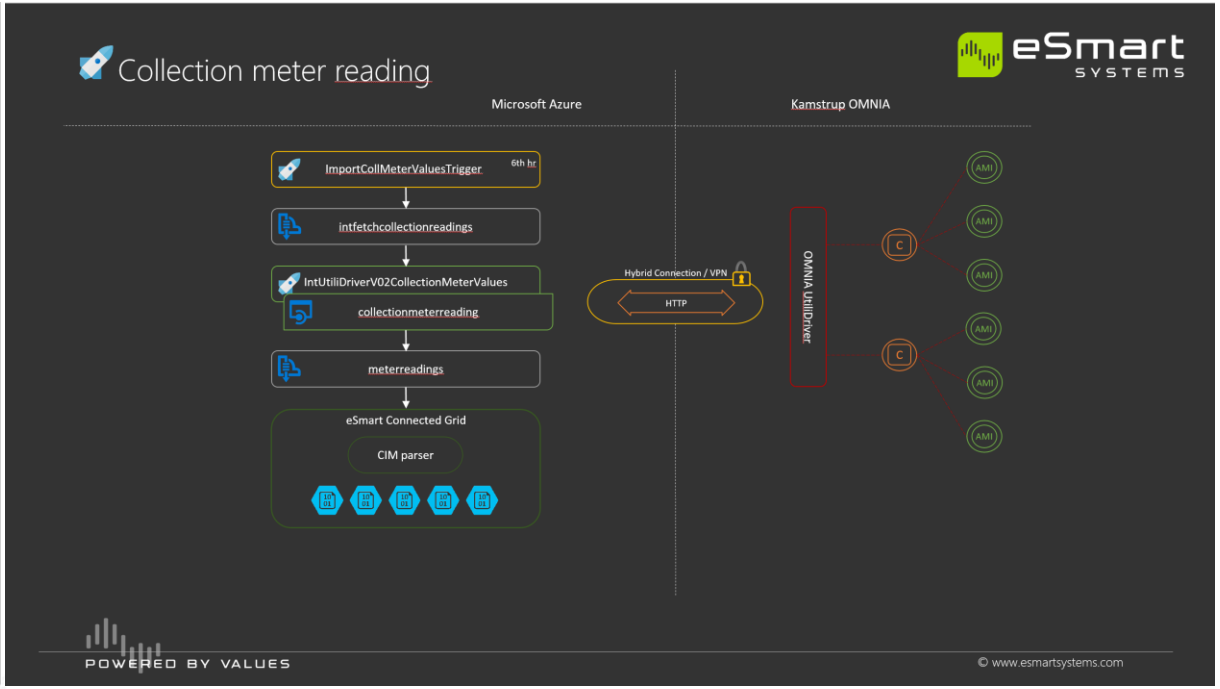


Utilidriver



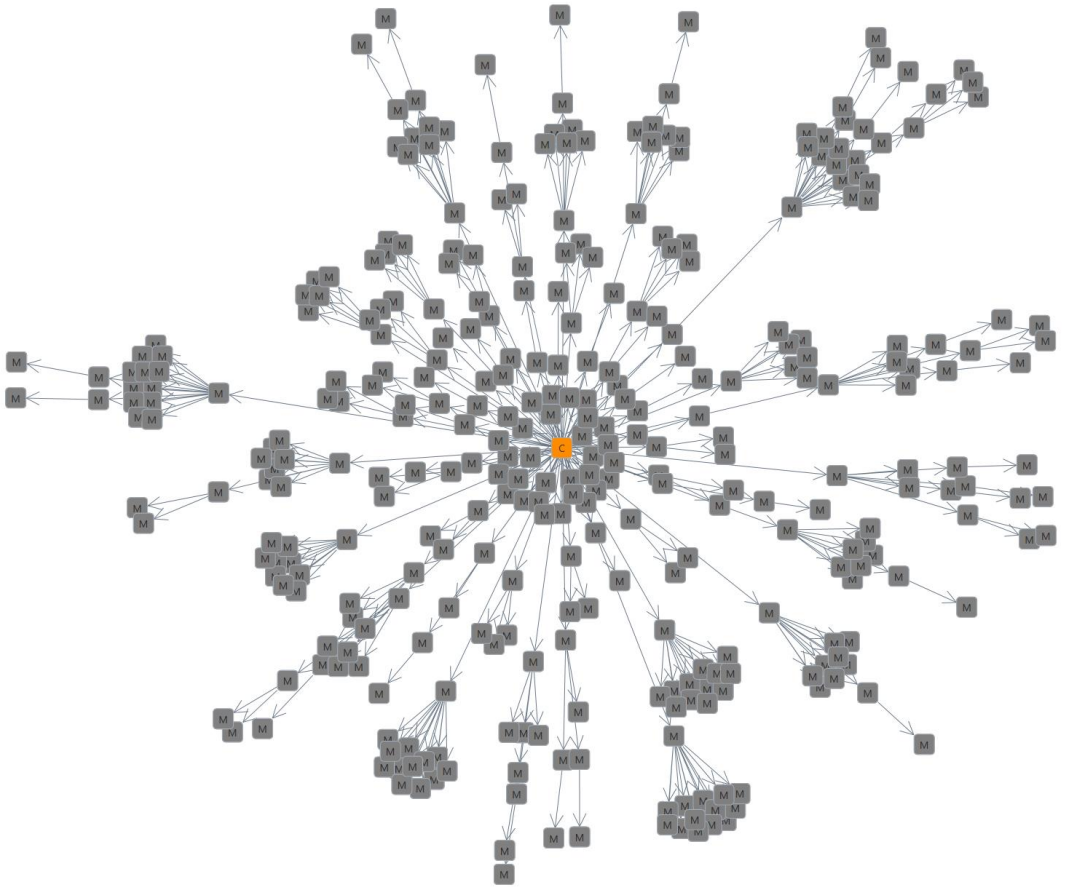
Flow of Information





Attack Interface

- Open Ports
- Default Settings
- Radio Network
- Cellular Network



Assets to protect

- Physical Ports
- Stored metering data (consumption, logs, alarms)
- Encryption keys
- Communication channel
- Firmware/updates
- API
- Physical location

What can we do?

- Proper key management
- Incident response, user training and awareness
- Use of private APN
- Physical Security and tamper detection
- Update/patch management
- Follow guidelines and best practices from designated organizations.
- Proper configuration
- Defence in Depth

Conclusion

- Several security risks exist
- Need of certification or minimum concrete standards requirements before choosing the vendors
- DSO collaboration with research institutions

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