

JRC Autumn Seminar

Advanced Telecoms partnerships

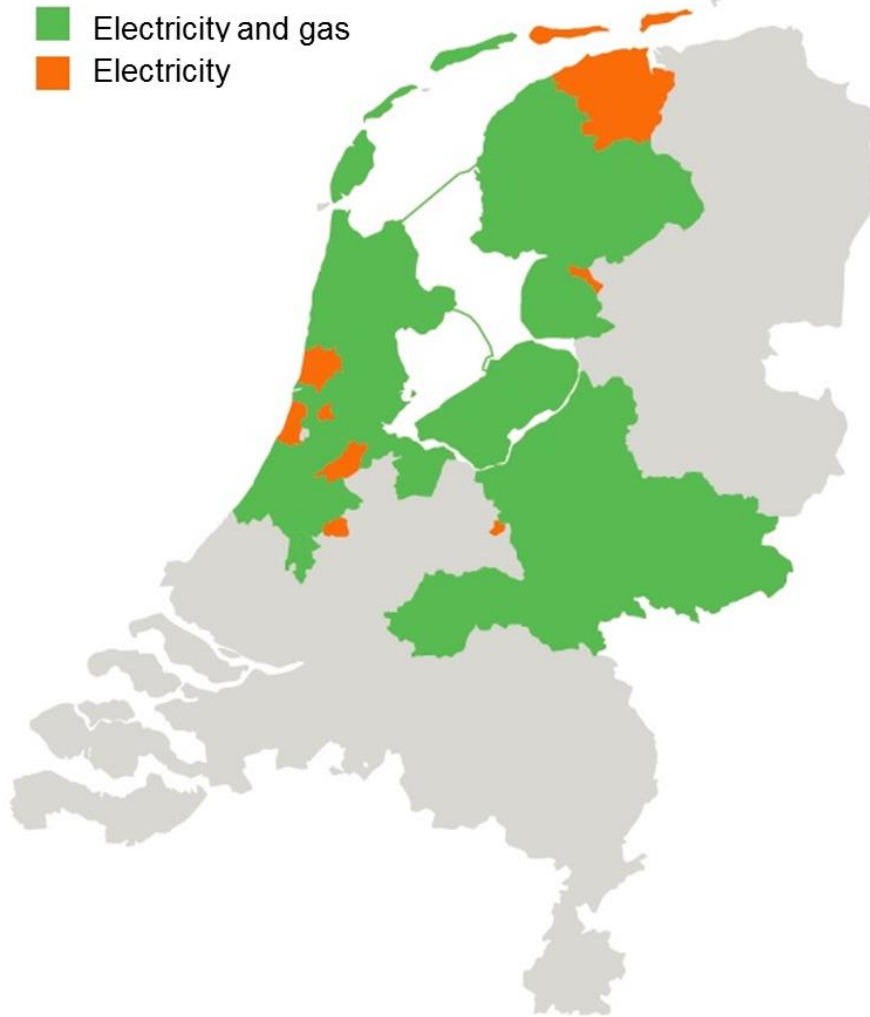
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Agenda

- ❑ Introduction: Alliander
- ❑ Background: Telecom for utilities
- ❑ Alliander's choices for telecoms
- ❑ Wired networks
- ❑ Wireless network(s)
- ❑ 450 MHz networks

Introduction: Alliander, DSO in the Netherlands



Figures	
Electricity customers	3,0 million
Gas customers	2,9 million
NL market share	36 %
Smart meters (E & G)	652.000
Employees (#)	7100

Need for telecom for utilities: different challenges for energy grid operators

Energy Transition

Supply & demand of energy are becoming more flexible

Societal dependency on energy increases

Increasing digitalization and intelligent management of grid: **Smart Grids**

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End of life of telecom solutions

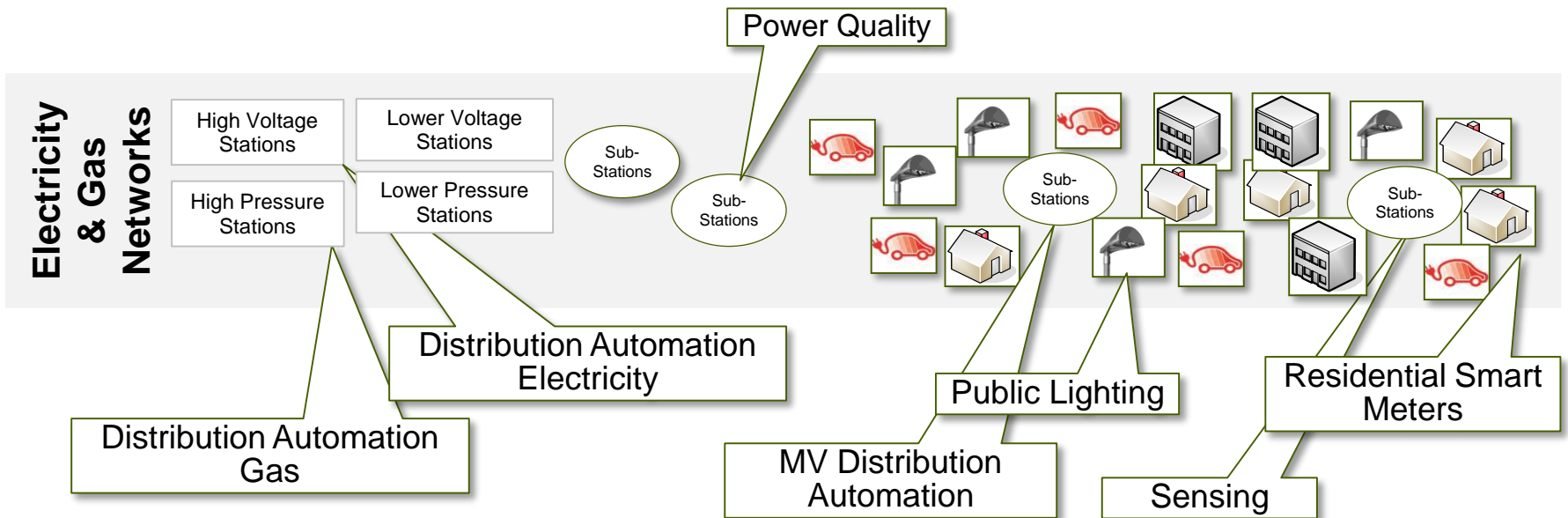
Legal obligations (i.e. Smart meter roll-out)

Growing need for performance information & remote operation: **Good reliable and secure data communication is necessary**



Secure, Safe & Reliable

Smart Grid



Alliander's choices for telecom: the requirements

Various **technical** requirements:

- Availability, reliability (redundancy, power autonomy, etc.)
- Bandwidth
- Average data volume
- Latency
- Coverage (indoors)
- Frequency of communication
- Etc.

Various telecom solutions available

Strategic considerations and requirements:

- Total cost of the total solution (total design)
- Lock-in effects
- Life cycle & eco-system of technology
- Future-proof
- Standardised & proven technology
- Privacy & security

Need for control

Typical utility telecom requirements

- Guaranteed longevity and supply over long period
- Guaranteed low cost per asset
- A-typical functional specifications
- High level of control on quality and security applications
- Mission critical



Typical commercial offers

- Fast changing technologies
- Standard products and service aimed at (smartphone) mass market
- Utilities are relatively small customers

Control is needed

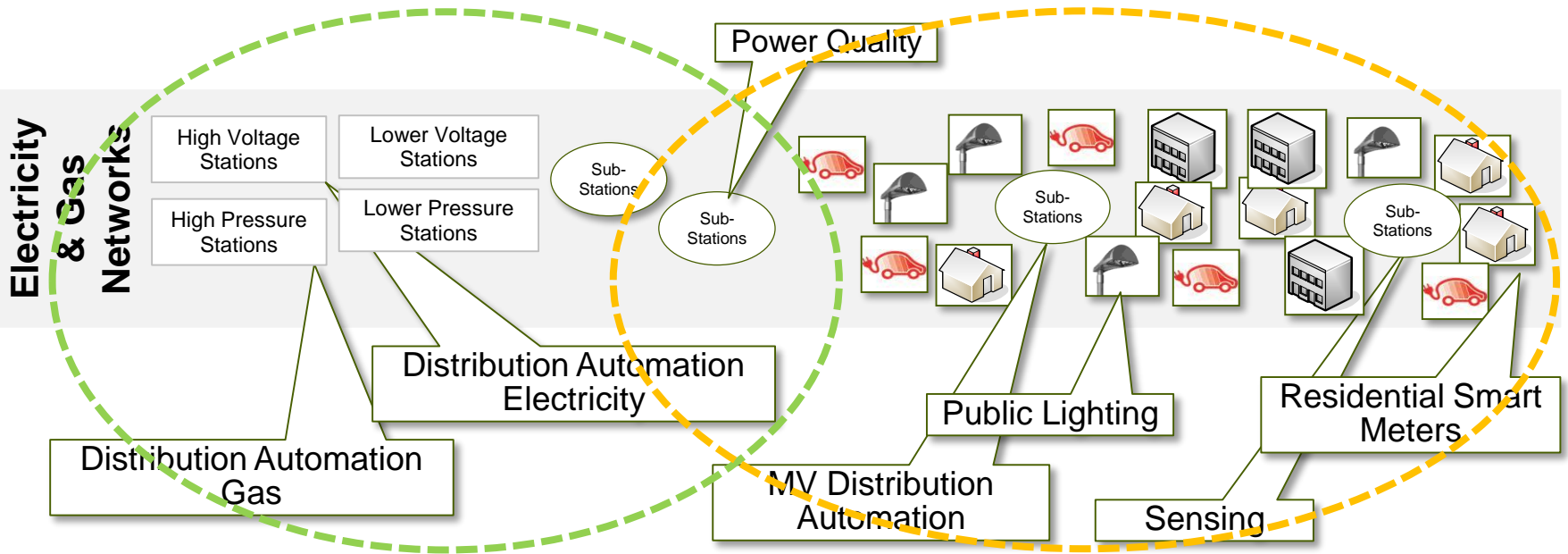
- Communication is becoming mission critical so control is needed;
- A private dedicated telecom solution is needed (reliable, safe and secure)

Private wireless (CDMA) & private wired (fibre optic)

Strategic criteria are as important as technical requirements

Secure, Safe & Reliable

Smart Grid



Wired

Copper migrating to fiber optic

Wireless

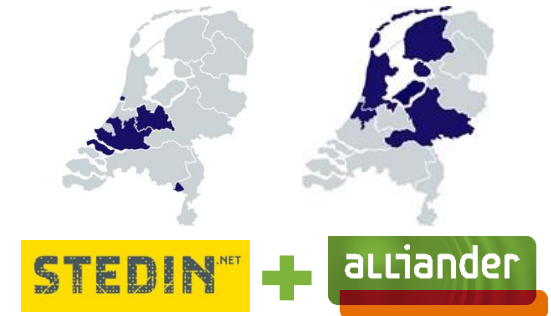
450 MHz: CDMA possibly adding LTE

Phasing out copper, migrating to fiber optic

- Old legacy copper networks are replaced by fiber networks
- Fibre optic network is composed of **privately owned** (often last mile connections) and **leased dark fibres**
- Technology:
 - SDH for short term (5 – 10 years): low risk and satisfies the short term demand;
 - Supporting underlying optical layer which allows introduction of next generation technology (MPLS);
 - Study future technology (MPLS-TP / IP-MPLS)
- Private (owned) active equipment
- In house monitoring and control of network



Dedicated **450 MHz network**: currently CDMA, migration to LTE is being studied



- Joint venture between Dutch DSO's Stedin & Allliander;
- Designed and built based on specific utility M2M requirements (longevity, coverage, power autonomy, etc.);
- Spectrum license ownership (450 MHz);
- Ownership of infrastructure (antenna's, masts, core systems, etc.);
- Operated by telecom operator (KPN);
- Currently using CDMA-technology, considering migrating/adding LTE-technology (LTE-M, 1.4 MHz);
- Customers: Stedin, Allliander, Westland + pilots (waterboards, etc.)

450 MHz network(s)

Advantages of 450 MHz networks

- Propagation characteristics of the 450 MHz band
- Possibility to roll out a network at a relatively low cost
- 450 MHz already part of ITU global mobile spectrum assignments
- Mass market, proven technology available (CDMA)

The 450 MHz band in Europe



- Networks active in:
 - Germany (450connect), Hungary (MVMnet) & Austria (Argonet) - oriented towards critical/M2M communications focused on utilities.
 - Finland, Sweden, Norway, Denmark, Poland, Czech Republic, etc.

Technology availability

- in addition to CDMA also LTE available for 450 MHz band;
- Major network vendors active with LTE in 450 MHz band (Huawei, ZTE, Nokia, Ericsson)
- Growing availability of products as chipsets, modules, devices, etc. (ATEL, Intelliport, Robustel, etc.)
- Specific LTE developments in 450 MHz band: Standardisation (LTE-M, NB IoT), 3GPP bands 31, 72 & 73