

Utilities and Telecom Operators: Collaboration for the future energy grid?

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1st Energise Workshop, Communication Infrastructure Strategies for Smart Grid Applications

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Things can go wrong



- Holborn 11kV cable fire, 2015
- If fault isolated in 100ms significantly lower impact

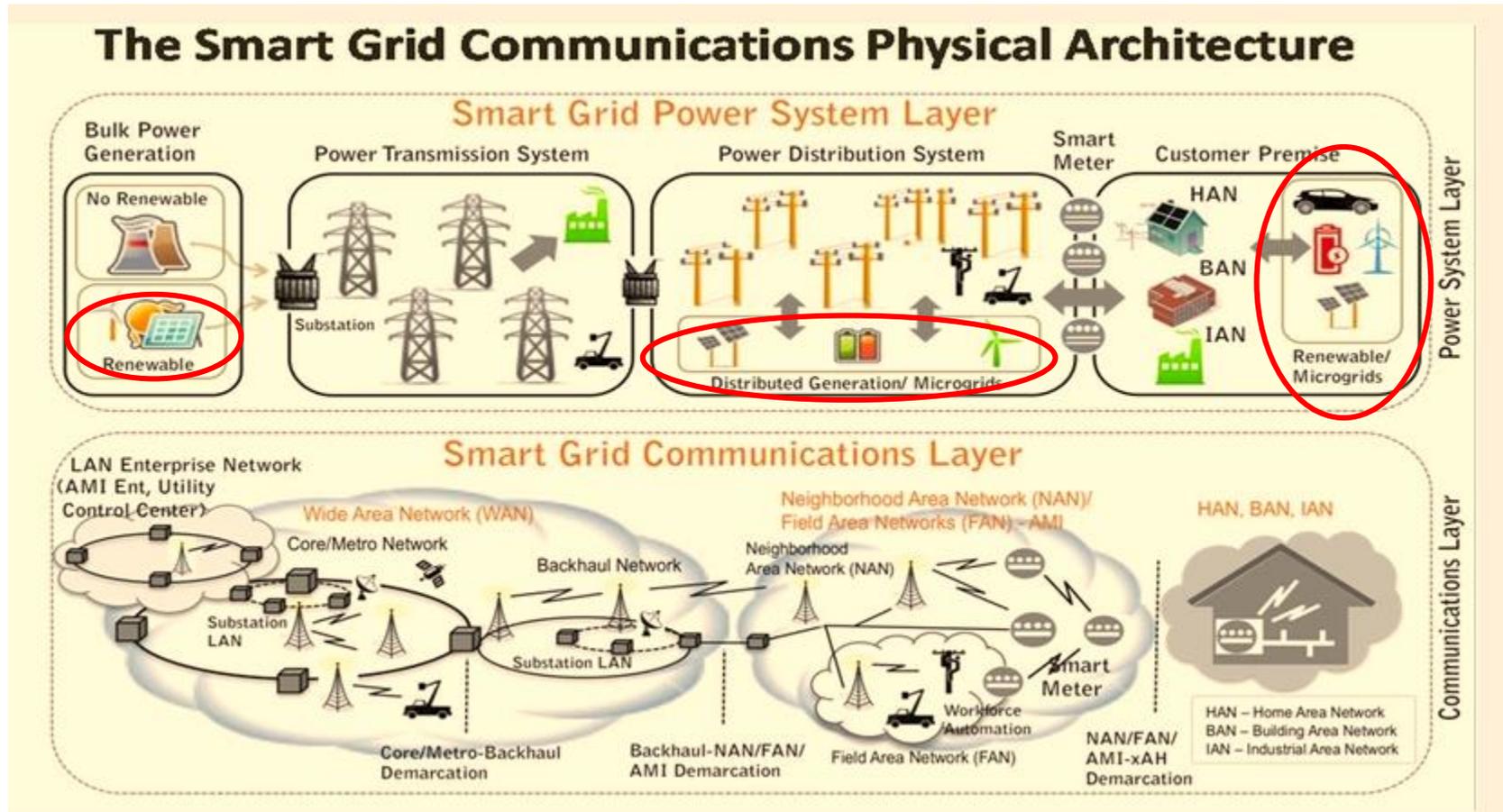


- Security of electricity supply increasing importance for manufacturing processes
- Unreliable supply suggests inherent flaw with country's infrastructure and impact on investor confidence

See <http://www.raeng.org.uk/publications/reports/counting-the-cost>

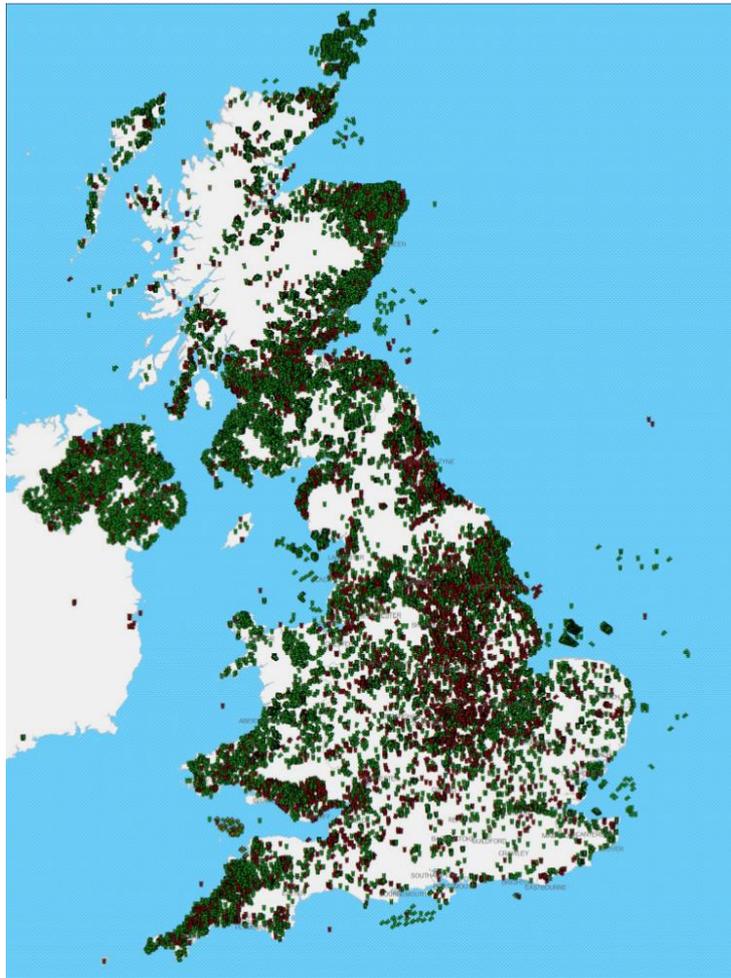


The Smart Grid Communications Physical Architecture



Diagrams courtesy of IEEE

Challenge is to manage the new world of distributed power generation



Wind Turbine locations in UK



Figure 1.3 There are currently ten nuclear power stations operating in the UK. These provide around 18% of our electricity. Source: DTI.

How do the services differ?



IEC 61850 – design of electrical substation automation defines latency requirements by mapping protocols on IP networks. Requirement of total transmission time < 4ms for protective relaying (trips and blocking) and ≤ 10 ms for releases and status changes.

Potential options



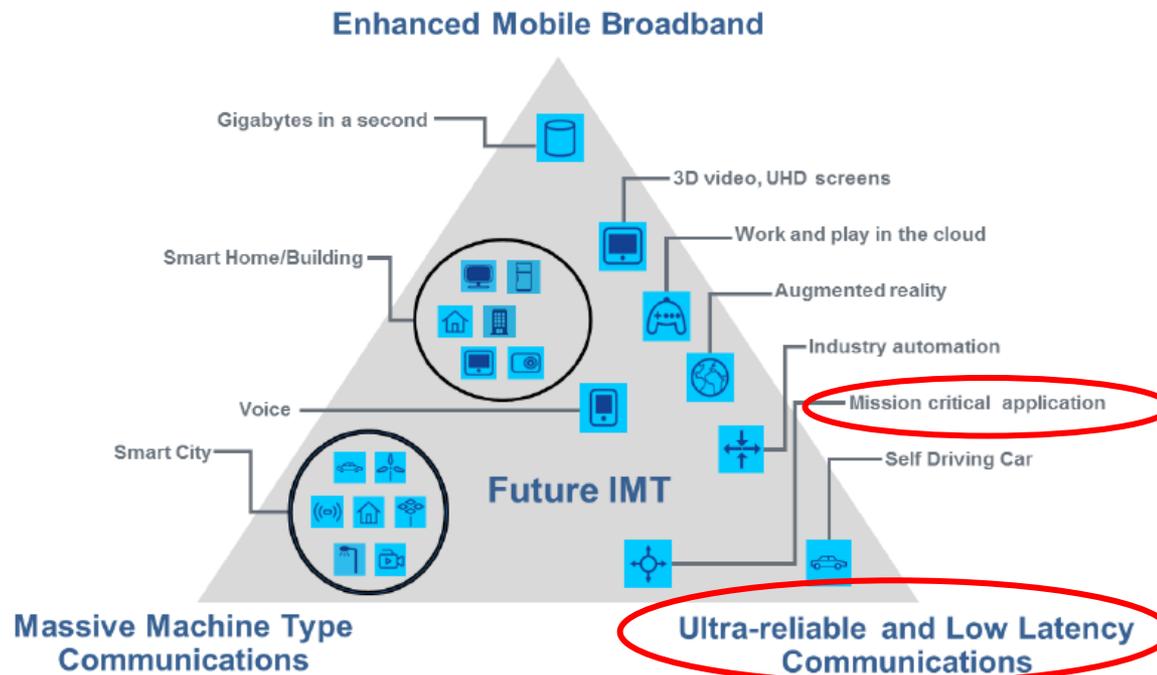
One solution does not fit the requirements of all communications in the smart grid

Shared networks with cellular operators

Advantages	Disadvantages
Significant geographic coverage	Patchy coverage in rural areas
Operate in frequency bands with useful propagation characteristics (large cell sizes, in building penetration)	Coverage not typically targeted for inside utility style buildings (e.g. power stations)
Cost to the utilities – cheaper than deploying own network	How to provide guaranteed access (no blocking) 24/7
	Cost of providing required resilience – standby power – up to 5 days
	Automation requires edge of network processing – not possible currently as networks hierarchical
	Need for guaranteed latency (LTE-A > 10ms)
	Cyber security – easier to secure your own network
	Utilities constitute very small fraction of total traffic carried

5G in the future?

ITU: “*IMT for 2020 and beyond is envisaged to expand and support diverse usage scenarios and applications that will continue beyond the current IMT.*”



What about fixed networks

Advantages	Disadvantages
Potential to share infrastructure	May share ducts with utilities – no protection in case of fire etc.
Traffic can be prioritised	Access points unlikely to be where required
More reliable	Expensive to install to connect renewables in remote areas
Cost to the utilities – cheaper than deploying own network	No control over traffic routing
	Utilities constitute very small fraction of total traffic carried
	Time to repair in event of outages
	Arrangements for spare capacity in case of fibre failure

Anything is feasible but at what cost



Thank you

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