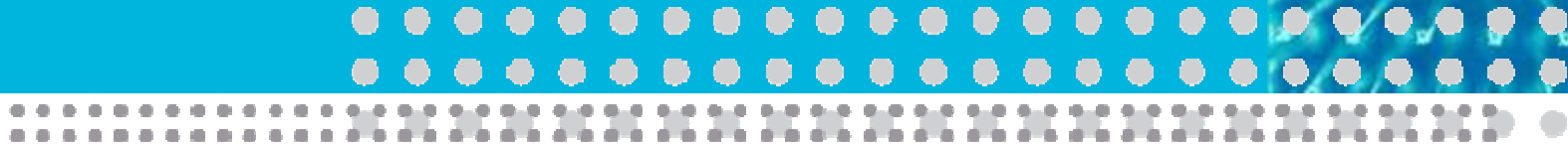
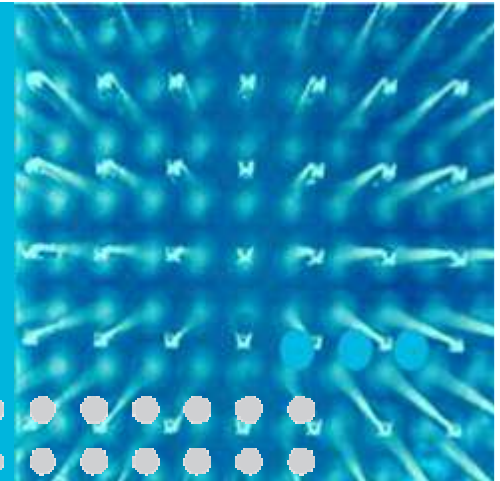


The Smart Grid vision and today's starting point in UK



Peter Johnson

May 2009

Topics for discussion

Alcatel-Lucent in the energy market

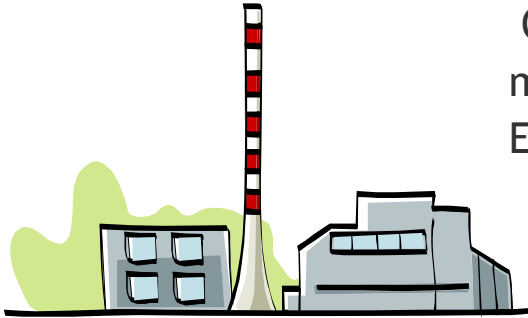
Why is smart grids important?

Experience elsewhere in the world

The challenges of smart grids

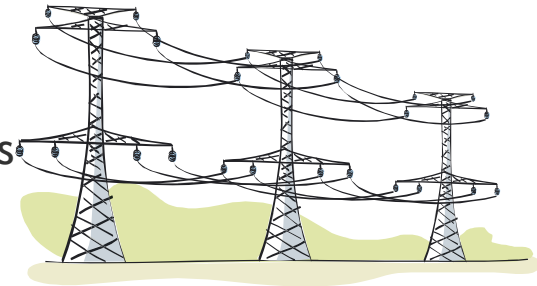
Communications is the key enabler

Alcatel-Lucent in the Energy market



Over 10 years experience as provider of mission critical communications to the Energy Industry

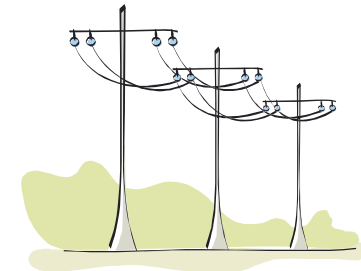
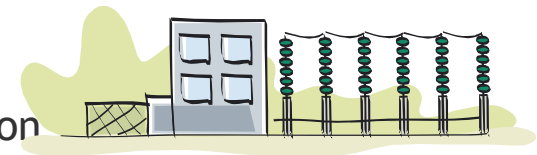
- Equipment supply, Solution design, Turnkey delivery, Managed Operations



Delivering a variety of communications projects supporting critical operations:



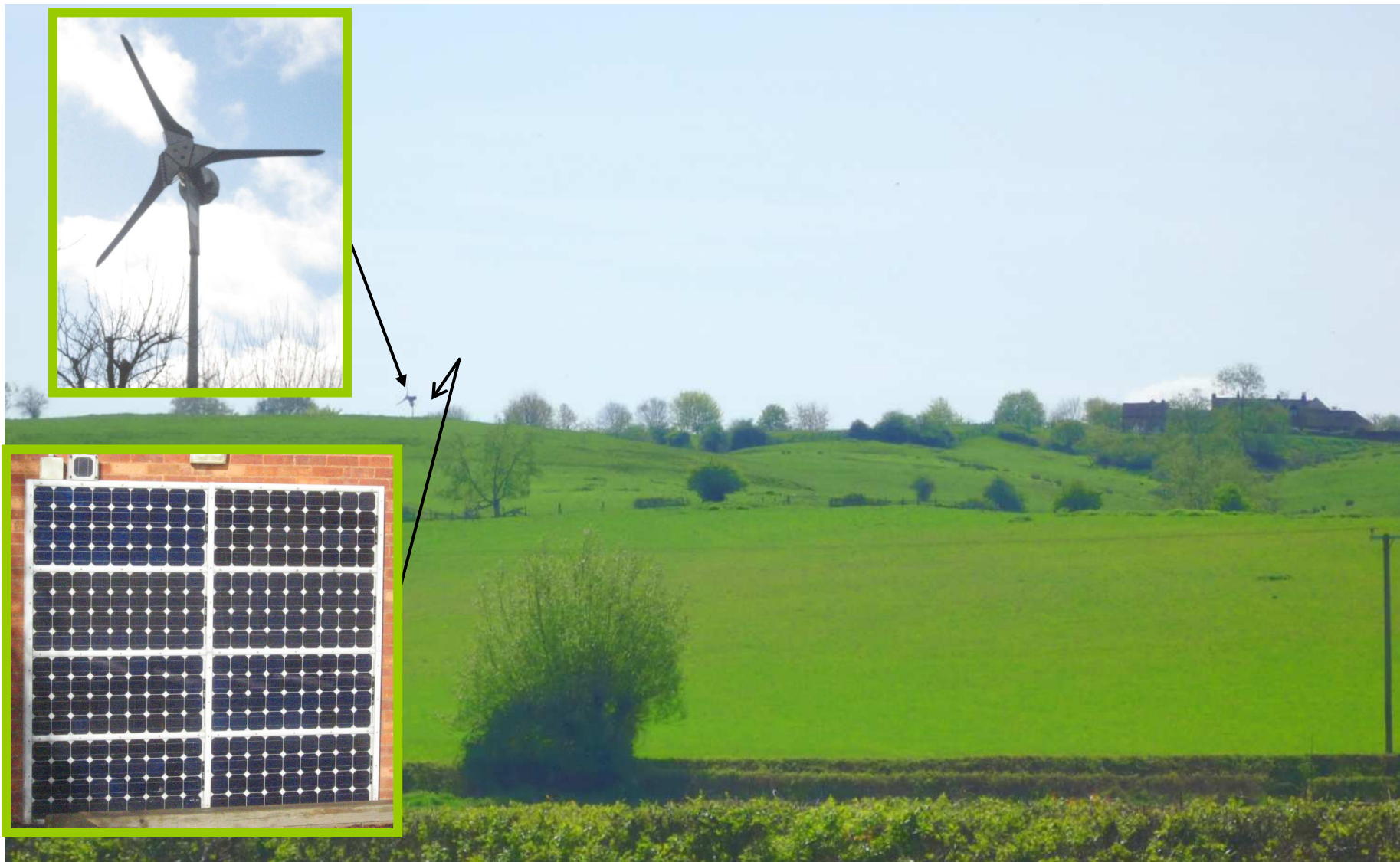
- Oil and Gas remote platform and pipeline monitoring and control
- Management of safety and reliability on electricity transmission grids
- Reliable and efficient operations of electricity distribution networks
- Trialling access to smart metering and smart grid technologies for the future



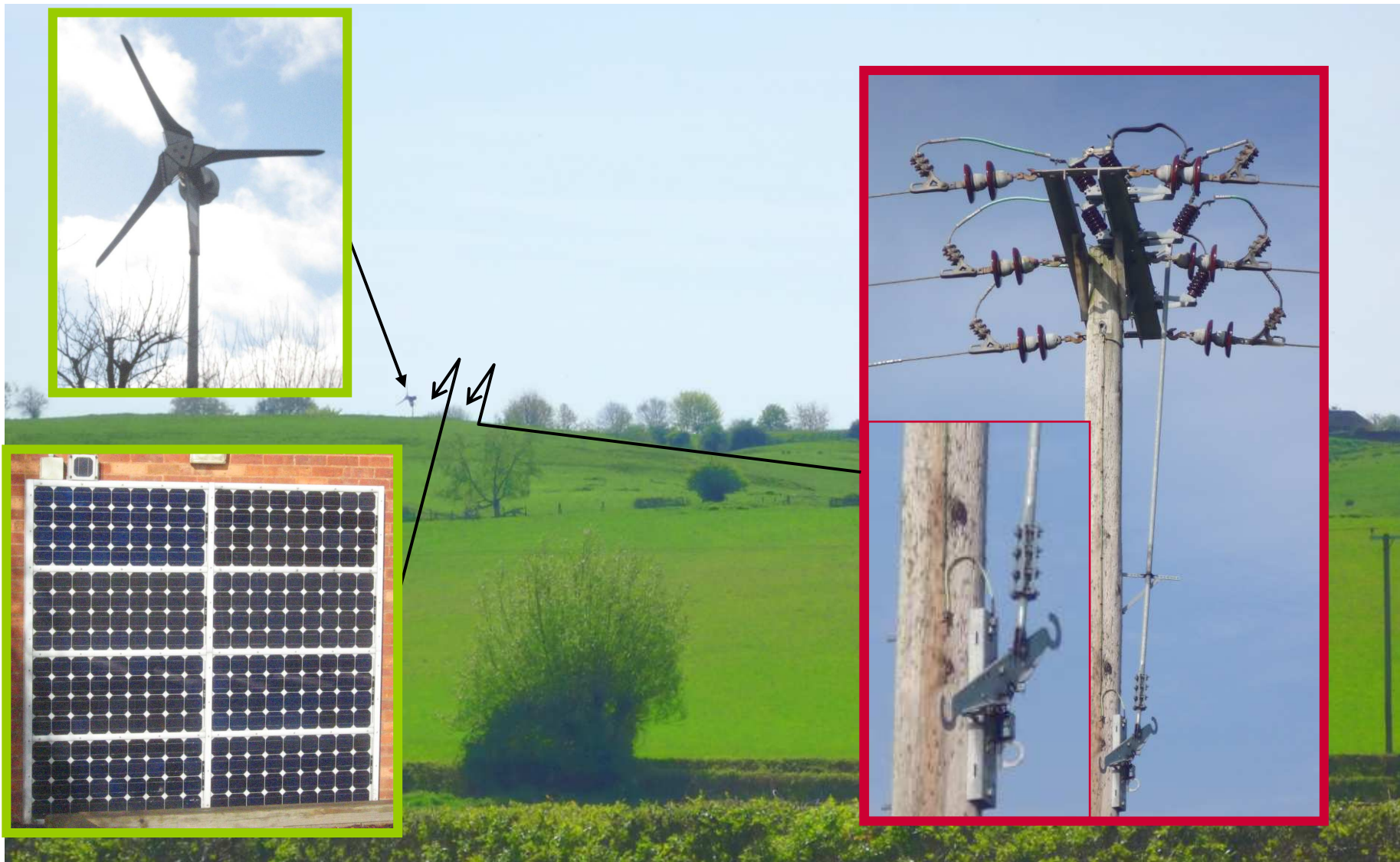
Rural England...



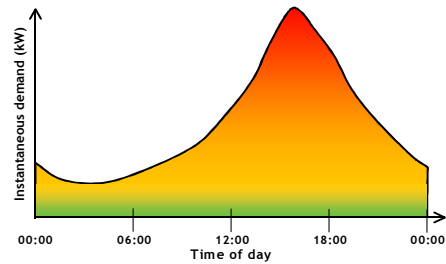
... with renewable energy embedded...



... using 1960s control technology



The dynamic challenge



Rapidly increasing demand peaks

- Rapid growth in intense energy demand peaks
- Putting new pressures on existing infrastructure
- Traditional investment will not be cost effective

Growth in renewable energy, distributed generation and micro generation

- Changes the dynamics of the grid and distribution hierarchy
- 20% renewables creates network instability
 - Witness Spain, South Australia

Ageing and inflexible infrastructure

- Unable to accommodate the increasingly dynamic nature of energy generation and consumption

Investment pressure

- Increasing demand for asset efficiency



High Level Business Drivers



Enhanced customer experience - The key objective is for our customers to gain a better electricity experience. This includes the ability for customers to have tools to understand their usage, reduced outage times and improved notification of network problems. An improved dialogue with customers will allow services enhancements and demand management initiatives.

Productivity - A more intelligent network will provide short term productivity improvements in the way our staff perform their current duties (eg through workforce scheduling or remote video facilities) with longer term benefits coming from the 'fly by wire' operating regime. These gains in productivity will help to reduce the operating costs of the network.

Improved asset utilisation - An intelligent network will provide better information to allow us to improve our network asset investment decision making and management of electricity distribution network at all levels.

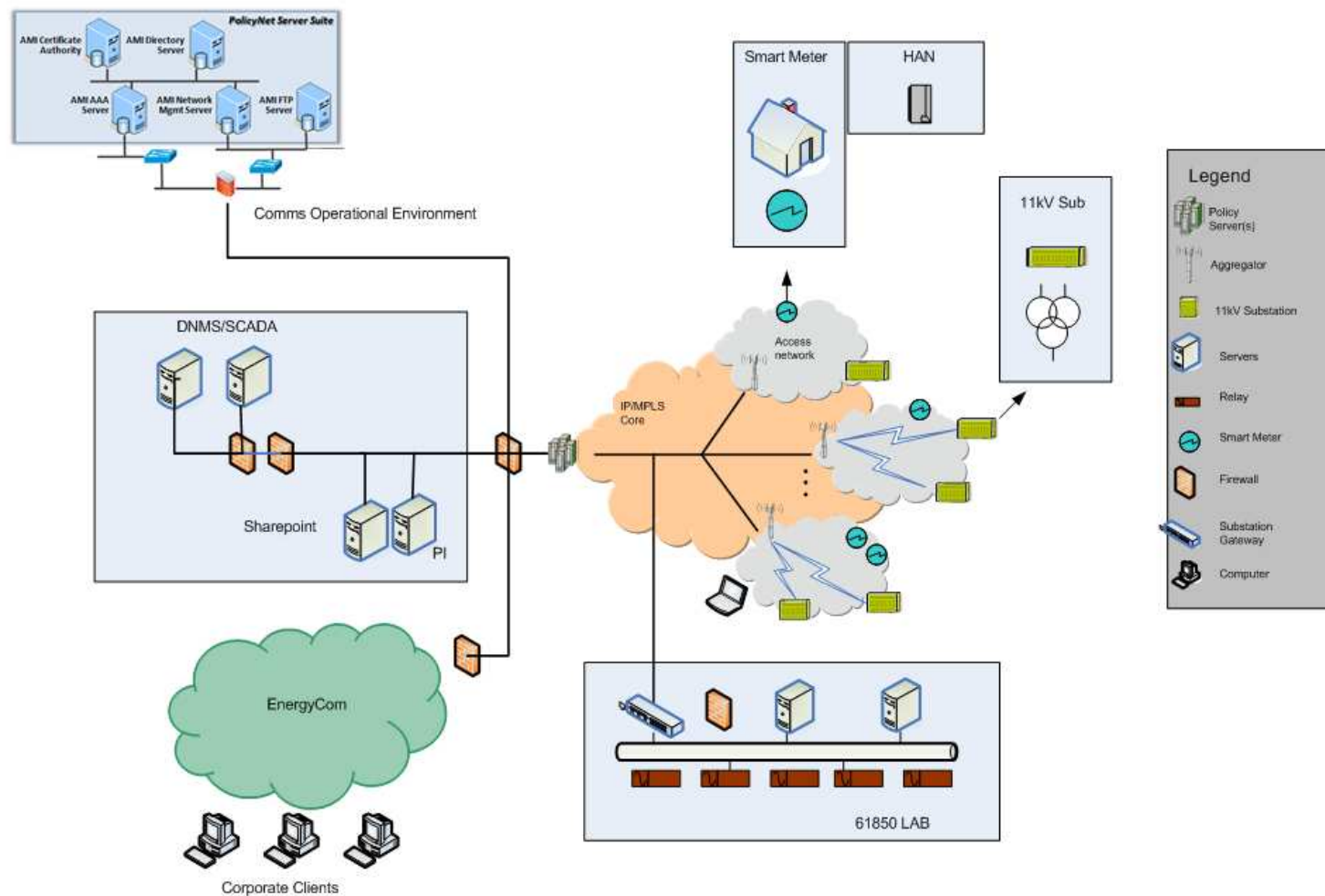
Greenhouse – Minimising network losses and network demand, due to embedded monitoring of the LV network. Enable options for embedded generation options and provide customers with the awareness and capabilities to reduce consumption.

Key Strategic Considerations

- The asset investment cycle within utilities is long, but must capitalise on major programs. Ultimately an intelligent network is only as good as the equipment in the field, so investments today make an intelligent network tomorrow.
- Staff development is a key because there is a significant skills shift and change management required to operate within a digitalised and automated environment.
- To enable an 'Intelligent Transformation' requires a critical mass to get an initial core amount of intelligent infrastructure in a useful operating capacity. EnergyAustralia is using this model to effect with the telecommunications rollout.

Our Homebush Blueprint

Testing intelligent network technology – EnergyAustralia has setup a demonstration that represents the key elements of our vision, at Homebush.



Alcatel-Lucent's activities in EnergyAustralia

Transmission automation

- Deployment of IP/MPLS core network connecting all HV substations
 - Supporting all operational functions except Protection
- Deployment of WiFi in each HV substation
 - Supporting workforce mobility

Distribution Network

- Trialing WiMAX to support DA and AMI
- With Energy Australia and their switchgear vendor, testing of IEC 61850 inter-substation protection

Another utility

(Anonymous since this is subject to a RFP)

Problems

- Regulator demanding smart metering
- Embedded undispatchable generation
- Quality of service / time to react
- Air conditioning

Solution

- Phased approach
 - Smart metering is the starting point
 - Intent to integrate into EMS / DMS / OMS
 - Deploy communications to support
 - Smart metering
 - Workforce mobility
 - Smart grid IEDs at the remote edges of the network
 - Measure and control for energy reliability
 - Then for asset management

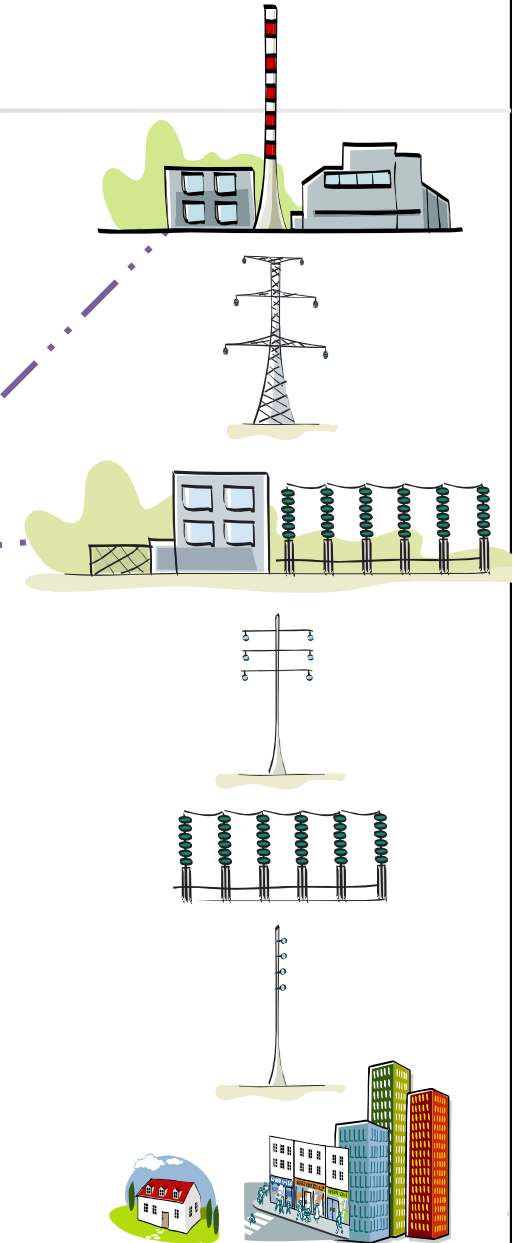
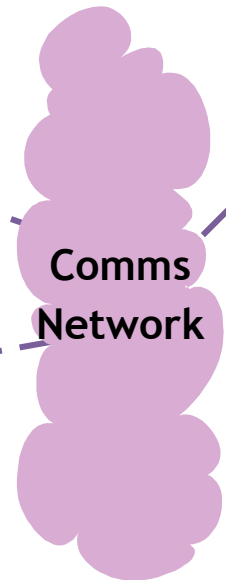
The challenge for utilities

Moving from...

- 100s of devices
- Centrally located in a few hundred locations
- Reasonable operational communications at transmission and HV distribution levels exists
- Next to non-existent operational communications at MV and LV distribution level

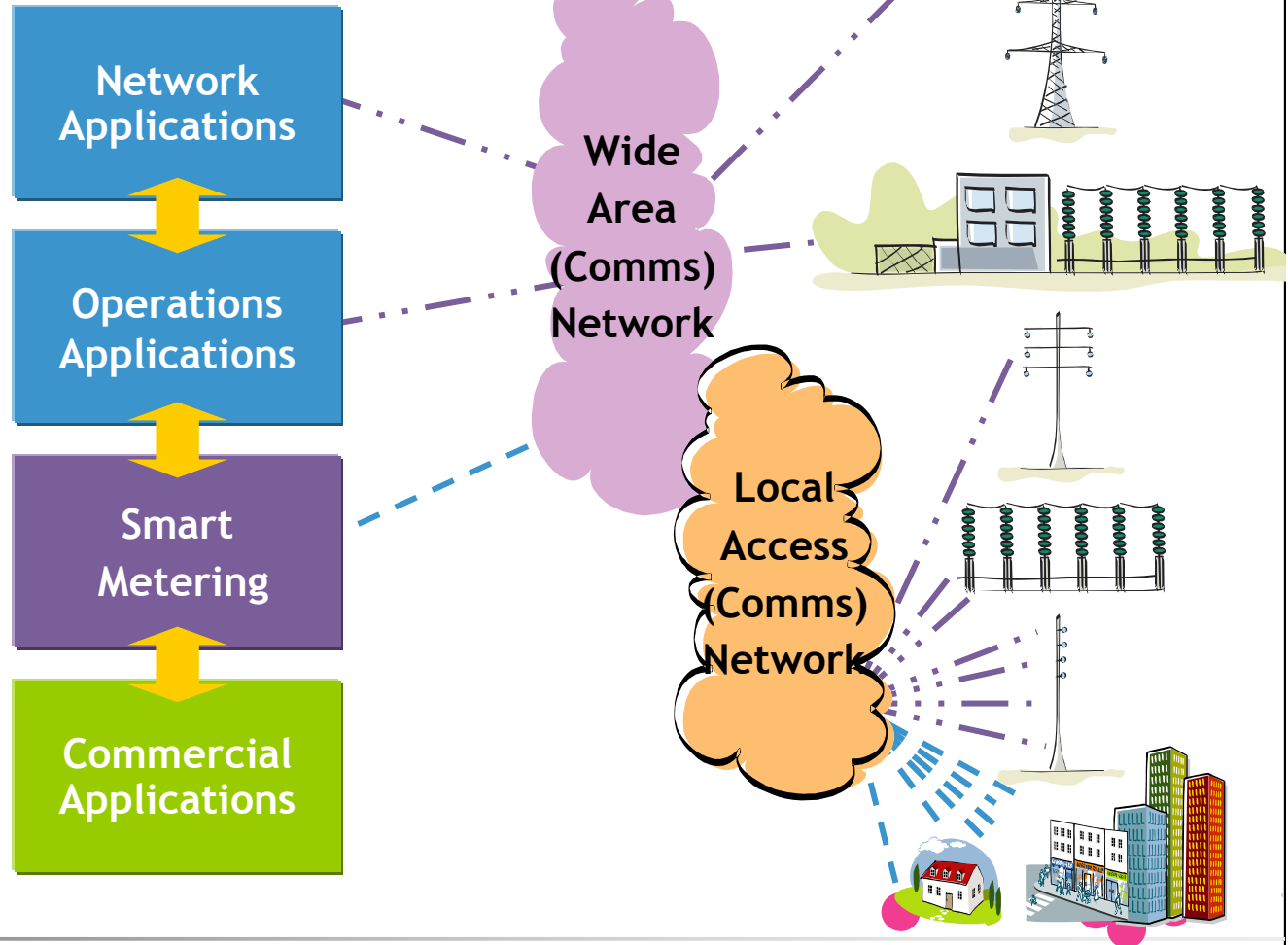
Network Applications

Operations Applications

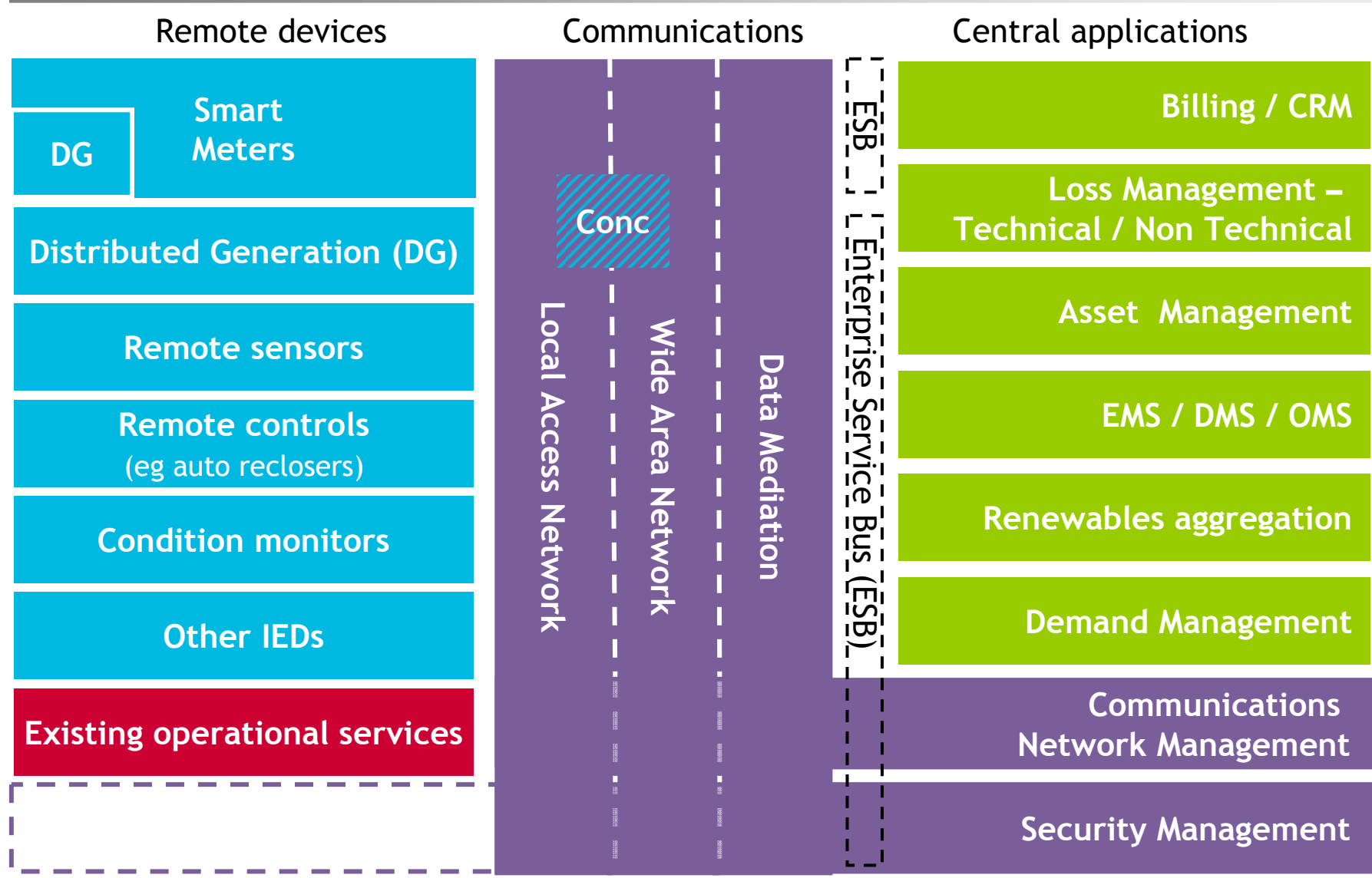


... moving to

- Tens of thousands of devices
- Remotely located in as many different locations
 - No existing communications
 - Going to the furthest reaches of the network
 - Using IP technology in the operational network
 - Must be reliable yet efficient
 - will be critical to the stability of future energy networks
- Smart meters being integral to smart grids



Communications is the key enabler



Conclusions

Embedded renewables and increasingly intense demand spikes risk will put today's transmission and distribution networks and systems under intense pressure

“Smart Grids” will be vital to achieving network stability and reliability

“Smart Grids” bring their own challenges of reach, volume and technology

Communications is the key enabler

Smart Metering is already about to happen

Smart Metering should be the starting point for smart grids

www.alcatel-lucent.com

