

Challenges to Smart Meter Rollout

4th Annual Smart Grids & Cleanpower 2012 Conference
14 June 2012 Cambridge
www.cir-strategy.com/events



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Challenges to Smart Meter Rollout

- Drivers for Smart Grids and Smart Meters
- What are the Challenges?
- How can we overcome them?
- Next steps

Opportunities

- Saving of 20% of electricity consumption (£10bn) + reduction of carbon emissions
- Integration of higher proportion of renewables into energy mix
- Ability to charge lots of electric vehicles
- The lights will stay on...

Drivers for Smart Grids and Smart Meters

- “Smart meters are a key part of giving us all more control over how we use energy at home and at work, helping us to cut out waste and save money” - Chris Huhne

Drivers for Smart Grids and Smart Meters

Stakeholder Interests

- UK Gov-
 - UK Climate Change Act 2008*
 - Energy Bill, details released 22nd May 2012**
 - DECC Consultation Doc on Smart Meter Security
 - 31 May 2012***
- Energy Companies
 - Require a predictable market for investment
 - Want smart meters to avoid costs of customer visits
- Meter vendors
 - No legal comebacks regarding security risks
- Customers want
 - Low prices for energy
 - A sustainable energy supply with low environmental impact
 - Privacy and Security

*http://www.decc.gov.uk/en/content/cms/legislation/cc_act_08/cc_act_08.aspx

** <http://www.decc.gov.uk/en/content/cms/legislation/energybill2012/energybill2012.aspx>

*** <http://www.decc.gov.uk/assets/decc/11/consultation/smart-meters-security-risk-assess/5434-cons-smart-meters-security-risk-assess.pdf>

What are the Challenges?

- Who pays to meet DECC 2020 targets?
 - 15% energy from sustainable sources
 - 100% homes and businesses to have smart meters
 - British gas aims to have 2M installed by end of 2012
 - *DECC say savings for Smart meters outweigh the costs!
- Do we need a universal communications solution?
 - Flexibility (Electricity Gas, water etc)
 - Networks and future proofing
 - Standards and interoperability
- Convincing the customer
 - Privacy
 - Control
- Security, security, security...

The Smart Grid Ecosystem

Technology providers

Value chain participants

Local management

Vehicle-to-grid

Home energy management

Smart building management

Analysis and services

Integration

Security

Grid monitoring

Demand response

Data management

Measurement and communication

Backhaul

Networking infrastructure

Smart Meters



End users

Institutional

Residential

Commercial

Industrial

Markets

Carbon

Arbitrage

Wholesale

Retail

Energy services

Efficiency

Demand response

Ancillary services

Ops

ISOs

RTOs

T&D

Distribution

Transmission

Generation

Centralized

Renewables

CHP

Renewables

Fossil, nuclear, etc



Policy and standards

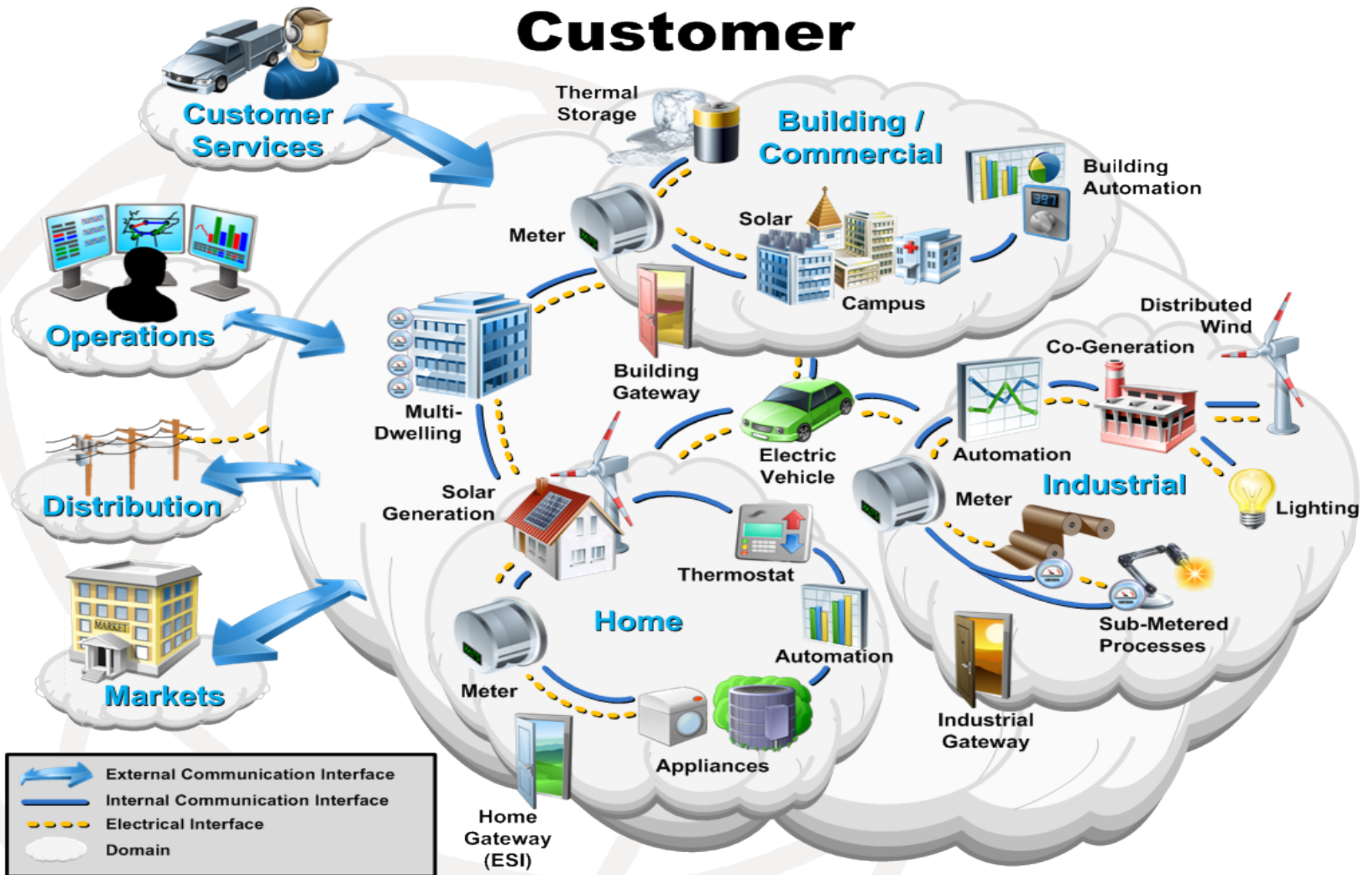
Governmental regulatory bodies

Industry trade groups and NGOs

Standards bodies



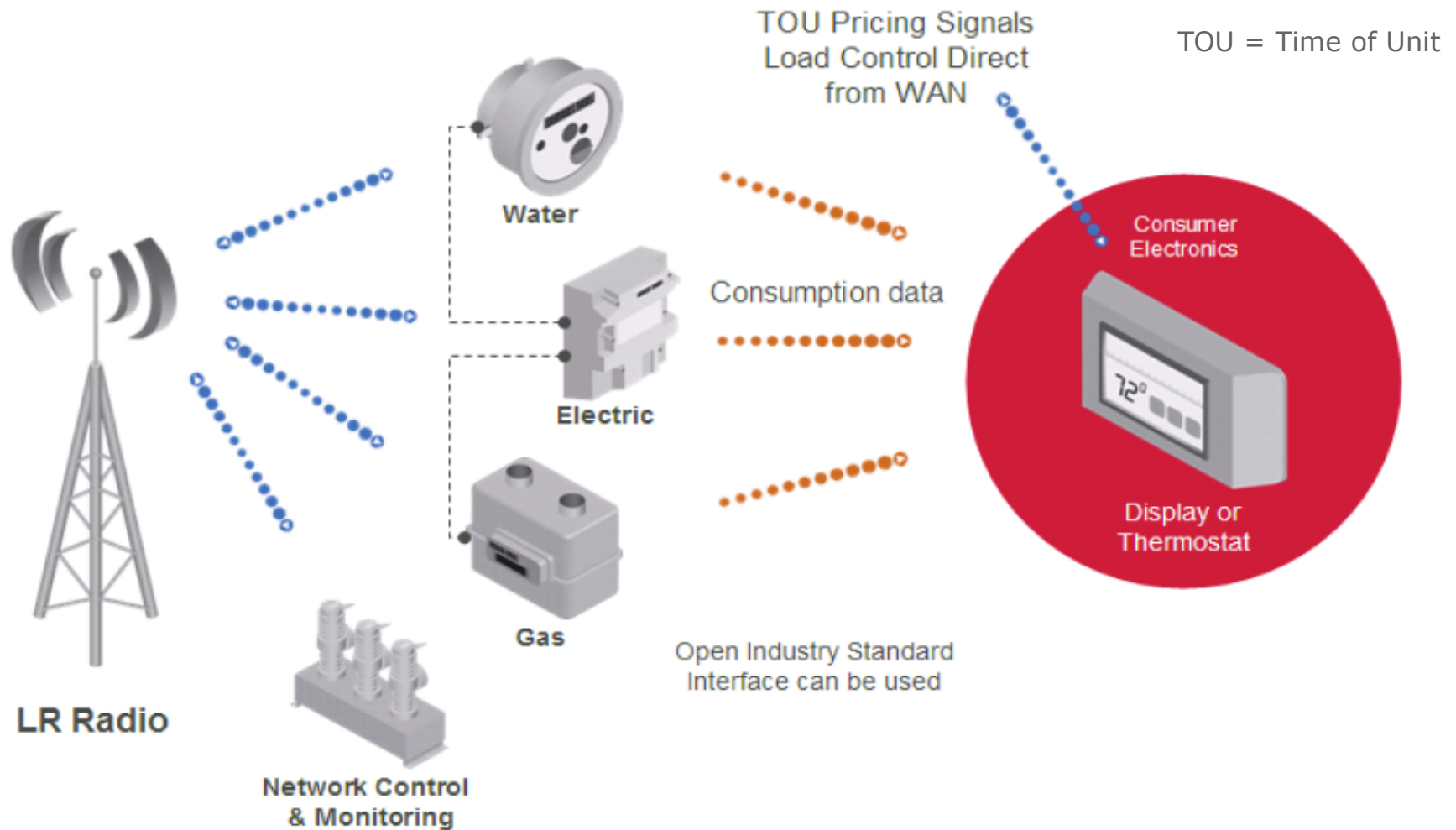
Customer



Communications Requirements

- Smart Meter must support multi-rate (Time of Day / Customer Peak Pricing / Dynamic Pricing) tariff structures and a configurable combination of register types
- At a national level this could involve addressing millions of meters within a 5 minute interval to reduce load on electricity networks
- Need more than one reading per day to meet needs of consumer and provider

Why do we need a universal communications solution?



Wide range of communications technologies for the Smart Grid

Communications technologies

Powerline carrier (PLC)

Broadband over powerline (BPL)

WiMax (700 MHz)

900 MHz RF mesh

Zigbee

WiFi

2.4 GHz mesh wireless

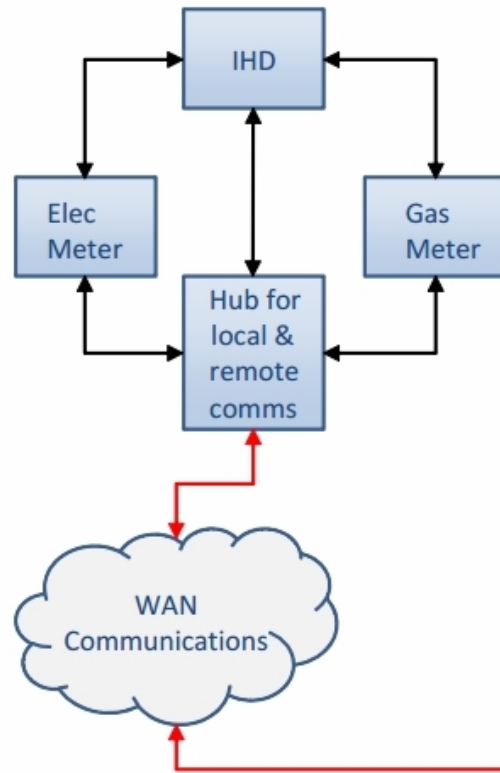
Digital subscriber line (DSL)

Fiber optics

Example companies that implement it



British Gas Smart Metering Architecture



IHD=In Home Display

↔ = Two way local comms

= 2.4 GHz Zigbee

↔ = Two way remote comms

= GPRS

396,754 installed so far*

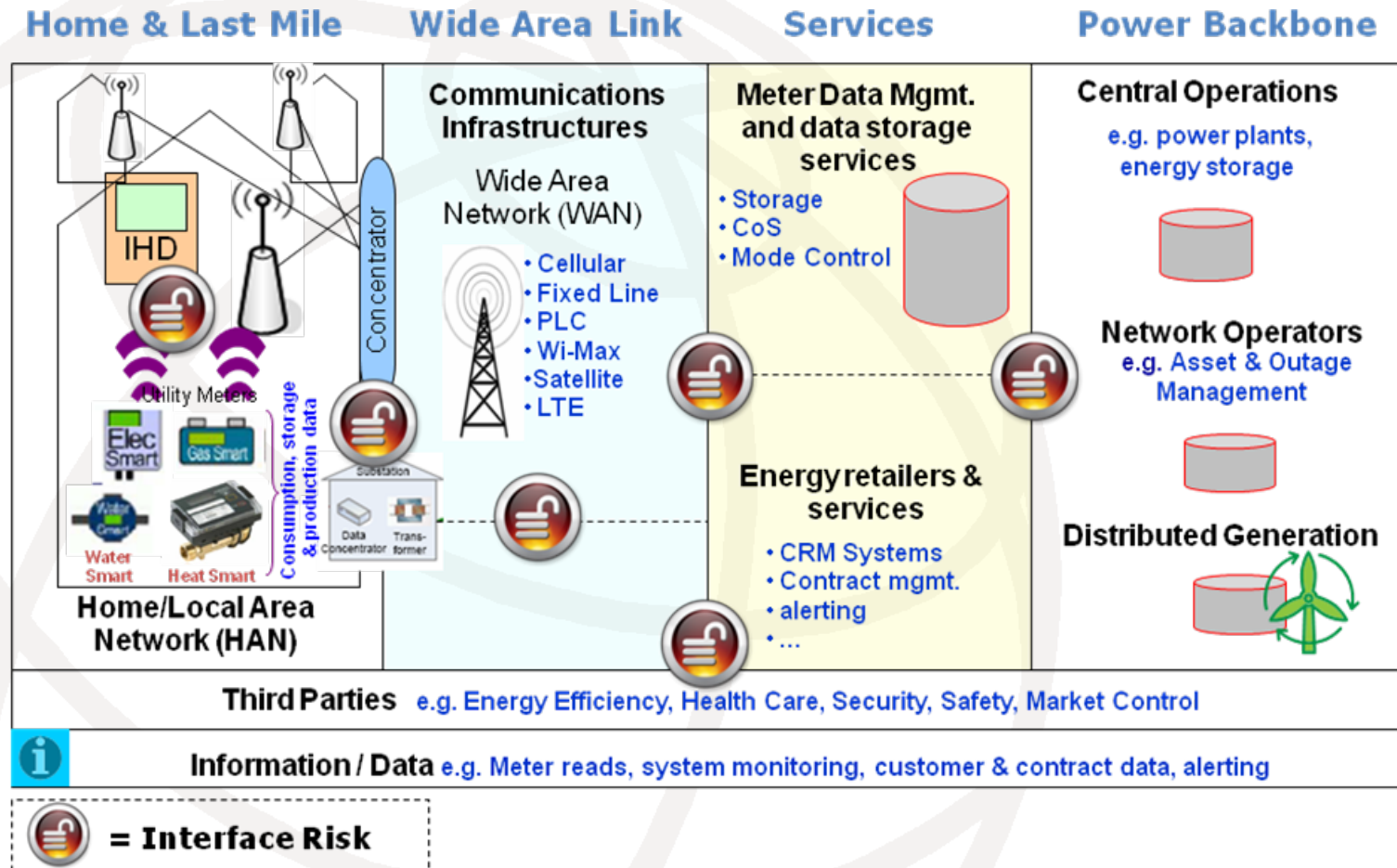
http://www.centrica.com/files/pdf/29032010_smart_metering_spec_summary.pdf

*<http://www.britishgas.co.uk/smarter-living/control-energy/smart-meters.html>

Privacy: the Dutch Experience

- 2009: Dutch law mandating smart meters voted down due to privacy concerns
 - Same as another Dutch law, for Road Pricing (also M2M)
 - Problem: Frequent monitoring of energy consumption gives insights on people's privacy
- Energy distributors in Netherlands became sensitive to Security & Privacy issues and addressed the issue
- According to EC Directives:
 - *Unless user chooses to enrol, there shall be no interference to privacy right, except as allowed by law in the interest of democratic society*
 - When do privacy violations counterbalance benefits to society?
- Level of trust must be raised by appropriate public communication
 - 80% smart meter coverage intended and needed to break even

Is Security the real challenge?



Situation in Europe today

- *Efforts towards implementation of Smart Grid have reached a sophisticated but not coordinated level*
- *Example initiatives:*
 - *Dutch Smart Metering Standard (DSMR)*
 - *German Open Metering System Specification (OMS)*
 - *German FNN MUC Specification*
- *Recommendations for data security exist (including smart grid data security) but...*
 - *No EU-wide guidelines for end-to-end security in Smart Grid*
- *Critical infrastructures such as power grids are targets for cyber attacks and therefore need strong protection*
- *Happenings in other fields (banking, healthcare) show that high attention to consumer data safety is critical*

Strategic Vulnerabilities

Ross Anderson *"Who controls the off switch?"**

- Elements of gas or electricity supply network could be switched off remotely
 - Denial of Service attacks
- Tariffs could be changed remotely (or charging turned off)
 - Due to flaws in poor authentication, lack of encryption and inadequate authorization
- Exposes utility companies to possible fraud, extortion attempts, lawsuits or widespread system interruption

DECC Consultation on Smart Meter Security

31 May 2012

- Government “will place a specific obligation on suppliers in relation to the security of their end-to-end smart metering systems”
 - Compliance with International Standards for Information Security (e.g. ISO27001)
 - Risk assessments are required
- Responses due by 27 July 2012

Conclusion

- Challenges will be met by
 - Careful system design taking end-to-end and whole-life issues into account
 - Field trials, risk assessments and war-gaming
 - Commitment to achieving annual roll-out targets