Wireless Communications for the UK Utility Industry

30th June 2021

WESTERN POWER DISTRIBUTION

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Agenda

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- 09:30 - 09:35 Introduction and Housekeeping – Ian Smith, Logistics Manager, WPD
- 09:35 - 09:50 Opening Comments and Scene Setting - Graham Halladay, Operations Director, WPD
- 09:50 - 10:10 Spectrum and LTE Updates from Around the Globe - Julian Stafford, Chief Technology Officer, Joint Radio Company (JRC)
- 10:10 - 10:30 LTE Studies Around the UK - Bob Tyler, Operations/Programme Manager, Joint Radio Company (JRC)
- 10:30 - 10:45 Comfort Break
- 10:45 - 11:10 WPD LTE Trial – Phil Rigden, Telecoms Manager, WPD
- 11:10 - 11:30 OFCOM Spectrum Update - Vaughan John, Principal Spectrum Policy Manager, OFCOM
- 11:30 - 11:50 UK LTE Design, Build and Operation thoughts - Peter Couch, Chief Executive Officer, Joint Radio Company (JRC)
- 11:50 - 12:20 Q & A Session
- 12:20 - 12:30 Wrap Up and Closing Comments

Spectrum & LTE updates from around the globe

Julian Stafford – Chief Technology Officer, Joint Radio Company Ltd (JRC)

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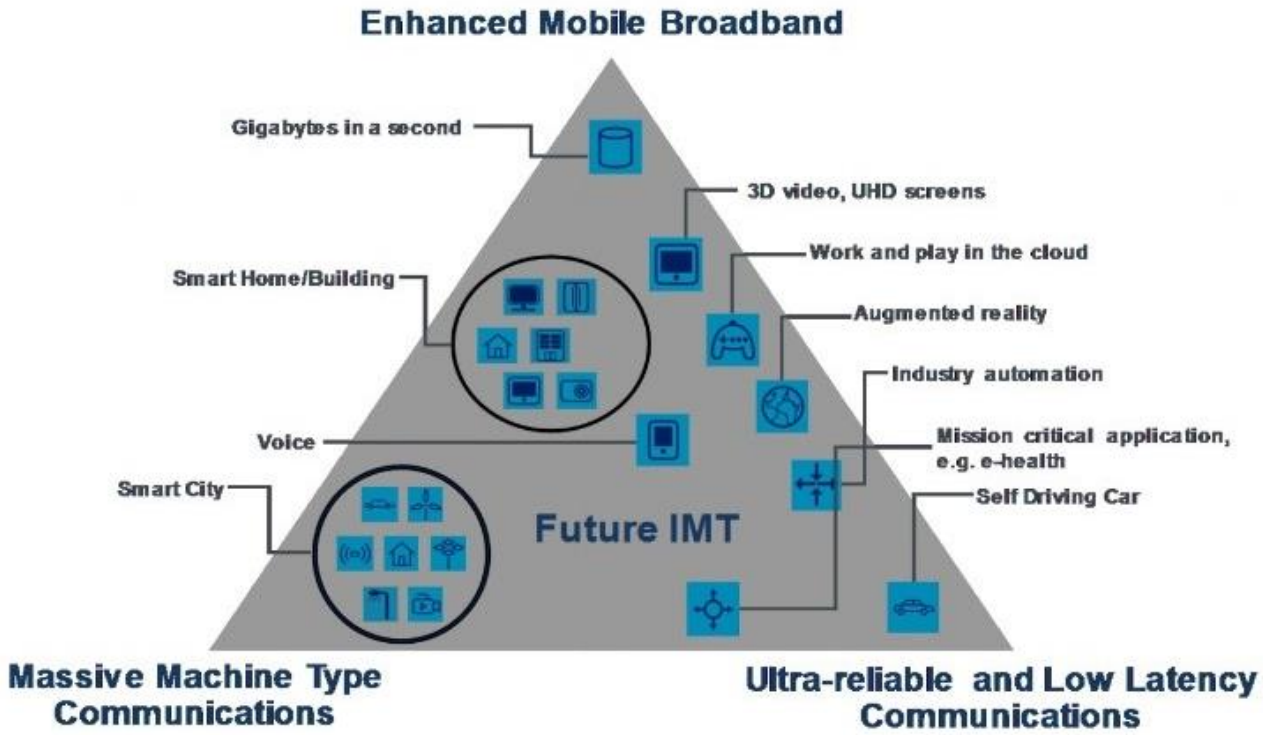
Enabling a ‘Smart Grid’ Solution – why LTE ?

- Terrestrial wireless connectivity has always been a key component in the connectivity toolkit of energy utilities.
- In future the prominence of wireless connectivity is set to increase significantly as the most cost effective method to connect hundreds of thousands (potentially millions) of active devices in the smart grid – an increase of several orders of magnitude
- Legacy narrow band wireless systems have served the sector well for decades, however they have serious limitations when considering the scale of connectivity required by the evolving smart grid –
  - Proprietary nature – virtually zero interoperability with other manufacturer’s systems
  - Not scalable in terms of device numbers
  - Not scaleable in terms of throughput (majority will support less than 9.6 kb/s shared between devices vs anticipated requirements of hundreds of kilobits per second per device)
  - Expensive ‘Truck roll’ rip and replace often required as applications change over time
  - Vendor lock-in and obsolescence
  - No common approach to cyber security
- An LTE based system provides solutions to all of the above….

Utility Applications / IMT 2020

Media hype and excitement

Utility interests



UTILITY APPLICATIONS

Drones
Augmented reality headsets
CCTV

SCADA
Automation
Metering
Teleprotection

Collaboration globally is essential to ensure that devices and a healthy eco-system exist to serve the utility 'vertical' – including standardised spectrum allocations

The challenges faced by the UK energy sector in terms of decarbonisation and utility smart grids are mirrored around the world

LTE Trials

- Poland – PGE (combined Nokia & Ericsson system)
- Germany – 450 MHz trial lead by Eon and Innogy
- Spain – Iberdrola LTE conducted trials utilising muli-vendor hardware
- Portugal – EDP 450 MHz trial with Huawei
- Ireland – ESB trials at 410-430 MHz with Nokia & Huawei
- USA – Multiple trials co-ordinated via Electric Power Research Institute and UTC
- Russia – Trial in 450 MHz during 2018 World Cup with Tele 2 and Ericsson
- All the above have produced very positive results indicating the suitability of a private , multi vendor LTE solutions for the utility sector

The last two years has seen an unprecedented amount of positive activity – Carbon Neutral Aspirations are the main driver (COP 26)

February 2020 –' Role of Radio Spectrum Policy to help combat Climate Change' Rationale

Radio spectrum is the basis for electronic communications and broadband, but also key to important areas like climate change. Climate change is one of the predominant topics in European Union policies. In her political guidelines, the new Commission President Ursula von der Leyen has prioritised a 'green deal' stating: "I want Europe to strive for more by becoming the first climate-neutral continent". The climate-neutral target for Europe is 2050. The RSPG shares the opinion that the fight against climate change and its negative consequences is of utmost importance. Therefore, the RSPG establishes a work item to focus on spectrum policy aspects which are closely related to the efforts of ensuring climate-neutrality.

Scope of RSPG activity

Under the Climate Change work item, the RSPG will issue a debate within the Group, as well as with the relevant stakeholders, on how spectrum policy can help to combat climate change. To this end, questions that should be addressed are:

- *Identify climate change-related aspects within spectrum management;*
- *How can spectrum management help to combat climate change?*
- *What concrete actions should be recommended at EU-Level?*

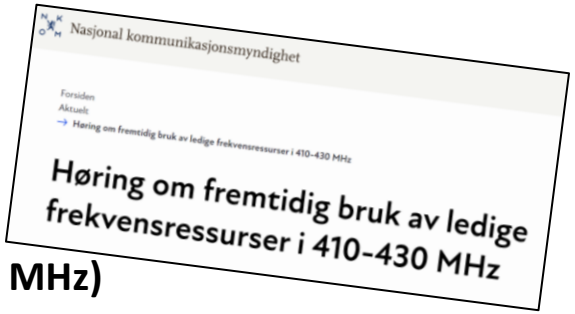

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR COMMUNICATIONS NETWORKS, CONTENT AND TECHNOLOGY
Electronic Communications Networks and Services
Radio Spectrum Policy Group
RSPG Secretariat

Brussels, 05 February 2020
DG CONNECT/B4/RSPG Secretariat
RSPG20-005

RADIO SPECTRUM POLICY GROUP

Work Programme for 2020 and beyond

Recent Consultations – all focusing on 400 MHz, LTE and Critical National Infrastructure (primarily Utility Smart Grids)

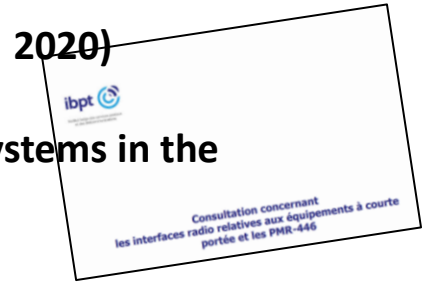


Slovakian Regulator January 2021 – future use of 400 MHz

Norwegian Regulator – re-purposing of 410-430 MHz (2 x 1.8 MHz)

Spain – further input to frequency allocation table (May 2021)

Greek Regulator – consultation on 410-430 MHz future use (Autumn 2020)



Saudi Arabia – Consultation regarding migration from TETRA to LTE systems in the 400 MHz band to support energy infrastructure

Columbia – consultation on re-use of 400 MHz band

Initial discussions by Czech Regulator on future of 400 MHz band

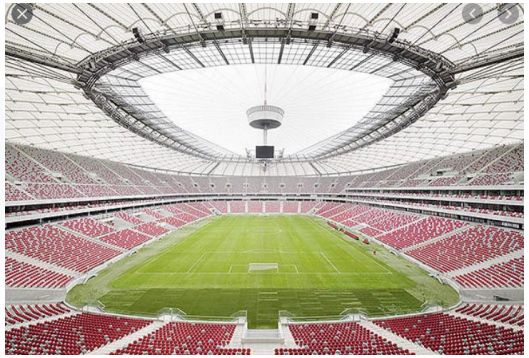
Portugal – discussions ongoing regarding price of 400 MHz spectrum for the energy smart grids

Regulator in Netherlands consultation on 450 MHz (April 2021)

UK – Ofcom continues review of spectrum requirements for Utility Sector

Successful Utility Spectrum Allocations for LTE based Solutions

September 2019, Poland – 450-470 MHz awarded (PGE) for private Utility Networks. Funding for network approved in March 2021



November 2019 - Ireland – 400 MHz Awarded (ESB) for LTE utility network – (Now engaged in procurement activity)

Commission for Communications Regulation

Energy for generations

Successful Utility Spectrum Allocations for LTE based Solutions

July 2020 – Spain – 2.3 GHz earmarked for private utility LTE networks

GOBIERNO DE ESPAÑA | MINISTERIO DE ECONOMÍA Y EMPRESA

BOLETÍN OFICIAL DEL ESTADO
Núm. 198 Martes 21 de julio de 2020

III. OTRAS DISPOSICIONES

MINISTERIO DE ASUNTOS ECONÓMICOS Y TRANSFORMACIÓN DIGITAL

Para optimizar su uso, la explotación de los canales 1 al 8 se efectuará de forma compartida por los diferentes usuarios. Los títulos habilitantes especificarán el número de canales que podrá utilizar cada usuario, sin especificar valores de frecuencia. La selección del canal o canales a utilizar en cada evento por cada usuario autorizado requerirá la coordinación previa a cargo de los propios usuarios.

El rango de frecuencias 2370-2380 MHz se reserva para redes de uso privativo del servicio móvil terrestre de banda ancha, preferentemente para la gestión de redes de servicios públicos de distribución de electricidad, gas o agua.

El rango de frecuencias 2380-2390 MHz se reserva para comunicaciones de uso privativo del servicio móvil aeronáutico en sentido descendente procedentes de sistemas de aeronaves no tripuladas (UAS). La explotación de este espectro se

March 2021 – Germany 450-470 MHz spectrum for private utility LTE Network

President Homann: **"Frequency for the digitization of the energy transition""**

Edition2020
Release date29.07.2020

450connect

The draft provides that the frequencies will be used primarily for the supply of critical infrastructure savers for nationwide use. The allotment taker is to provide radio network infrastructure for operators of critical infrastructure. The inquiring operators of critical infrastructures are to be offered demand-oriented radio applications or opportunities for cooperation in network construction. It is also possible to leave frequencies to operators and thus enable their own use or further use of existing radio network infrastructures.

Operators of critical infrastructures have expressed a need for radio-based implementation possibilities for the control of their plants and networks. No exclusive frequency ranges have been available for this purpose. In September 2019, the Advisory Board of the Federal Network Agency voted in favour of continuing to provide the energy industry with the proven secure communication solution based on 450 MHz radio technology.

Other Related Activity at Global Level

Ongoing dialogue and advocacy with all EU and global regulators (especially Anatel (Brazil) & FCC DOE & DOD))

Continuing global engagement with ITU WP1A and WP5
Ongoing knowledge sharing and thought leadership through the deployment phase of new networks

Further development of utility-specific functionality through ongoing engagement in 3GPP – better aligned with utility use cases in mind for future LTE releases including enhanced management visibility, cyber security, profile management, E-Sim / iSim integration, high power UE & dedicated Mobile Network Codes

Forthcoming Auction by CITC, Autumn 2021

As stated in our Spectrum Outlook, CITC will award spectrum on a service and technology neutral basis:

- In the 1980 – 2010 / 2170 – 2200 MHz range, we expect interest from users and operators wishing to deploy different wireless technologies, including, IMT, Air-to-Ground (A2G) or Mobile Satellite Services with a complementary ground component (CGG).
- In the 410 – 430 and 450 – 470 MHz bands, we expect interest from users and operators to deploy specialized narrowband and broadband services to enterprises, civil users and verticals, including mission-critical services, to allow digital transformation for utility and industrial sectors in the Kingdom and enable adopting advanced industrial internet of things applications.

Global Stakeholder Bodies with Key Input to Further Development of Private LTE Networks for Utilities -

Utilities Technology Council representing USA and Canada

UTCAL who lead representation in Brazil and ITU WP5A

AUTC common standards with Europe in many areas.

EUTC – most closely aligned with UK Utility requirements, cybersecurity, regulatory and corporate structure

The Critical Communications Association (TCCA) in particular the: Critical Communications Broadband Group (CCBG) and SCADA Group

450 MHz Alliance – Standards and Regulatory Group (e.g. Band 87 & 88 development of chipsets and devices)

Third Generation Public / Private Partnership Group (3GPP) via ETSI – especially RAN and SA1 (Iberdrola, Eon, EDF etc)

ETSI, CEPT, ECO… wide range of EU standardisation & regulation e.g. FM54

Thank You For Listening

Julian Stafford

JRC

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LTE studies around the UK

Bob Tyler – Operations/Programme Manager, Joint Radio Company Ltd (JRC)

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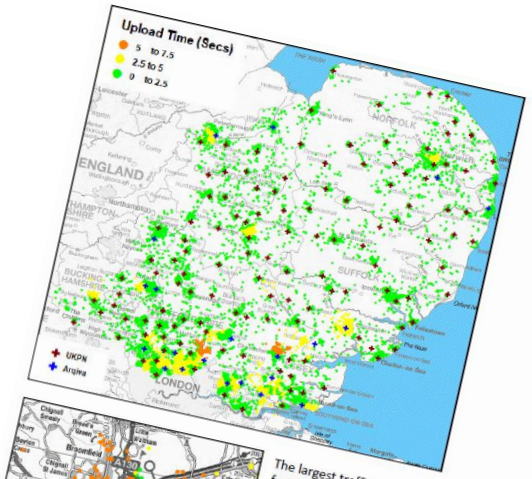
Introduction

LTE Studies



The largest traffic loading (orange) is from the sector on (from Chelmsford, as shown. This results from over 129 connected outstations. This is closely matched by the secto on 0° from Gilwell Park, with 125 connected outstations. In more detailed planning, the sector positions would be moved, or an additional sector/sites added to share the traffic load, as required.

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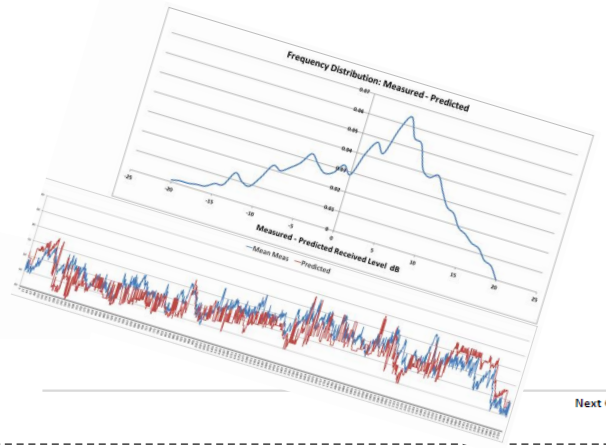
UKPN_LTE Study_JRC Report_FINAL



Next Gen Wireless Telecoms_JRC Final Report

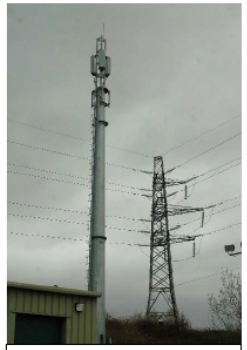
WPD Next Gen Wireless Telecoms Analysis : FINAL REPORT

Executive Summary

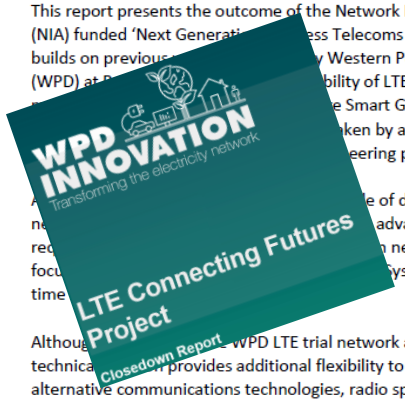
This report presents the outcome of the Network Innovation Allowance (NIA) funded 'Next Generati ess Telecoms Analysis'. The Analysis builds on previous y Western Power Distribution (WPD) at bility of LTE (Long Term Evolution) e Smart Grid electricity network ken by a joint team comprising eering personnel.

e of defining a future advanced connectivity network. The study ystem Operator in the

Althou WPD LTE trial network at Portishead, the technica provides additional flexibility to accommodate alternative communications technologies, radio spectrum bands and physical parameters for both radio base stations and the terminal equipment at electricity substations. Because the maximum data rate achievable for each outstation connection depends on the precise nature of the radio path between the outstation and its associated base station, the model calculates the data rate for each path rather than relying on an average data rate based on path length.



Radio base station trial at WPD Portishead Primary Substation.



A Time of Transformative Change

A snapshot of recent history

A snapshot of UK Electricity's recent history!

2013	Didcot Power Station ceases generation on 22 March 2013.
	Fawley Power Station closes on 31 March 2013.
2015	Ironbridge Power Station is switched off on 20 November 2015.
2016	Ferrybridge Power Station closes on 31 March 2016.
	Rugeley Power Station closes.

Source :

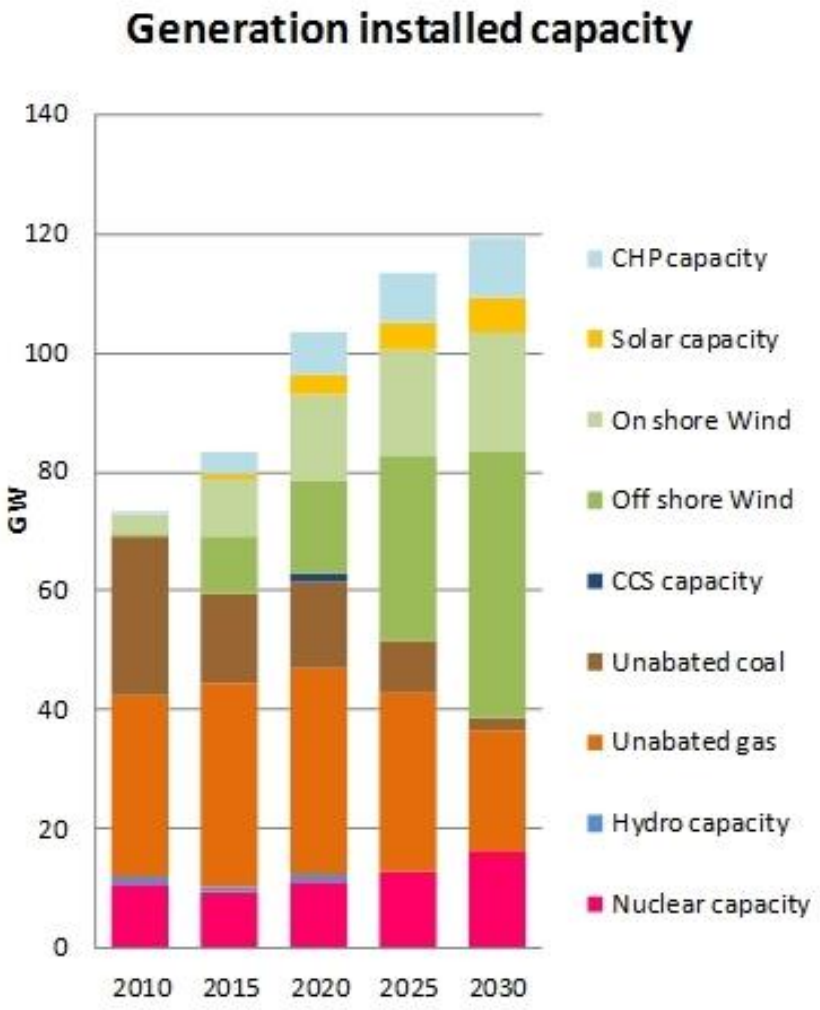
https://en.wikipedia.org/wiki/Timeline_of_the_UK_electricity_supply_industry

Drivers

Increased Connections

Forecast growth in asset numbers

DSO (FUTURE) Comms required to contribute to achieving Net Zero targets - Future smartgrid not scalable with current technology mix		ESTIMATED QTY	
		NOW	FUTURE*
DER Assets (Customer Premises)		10,335	9,243,844
Dist Network M&C	<33 kV	81,438	724,014
LV Network M&C	415/230	3,730	800,906

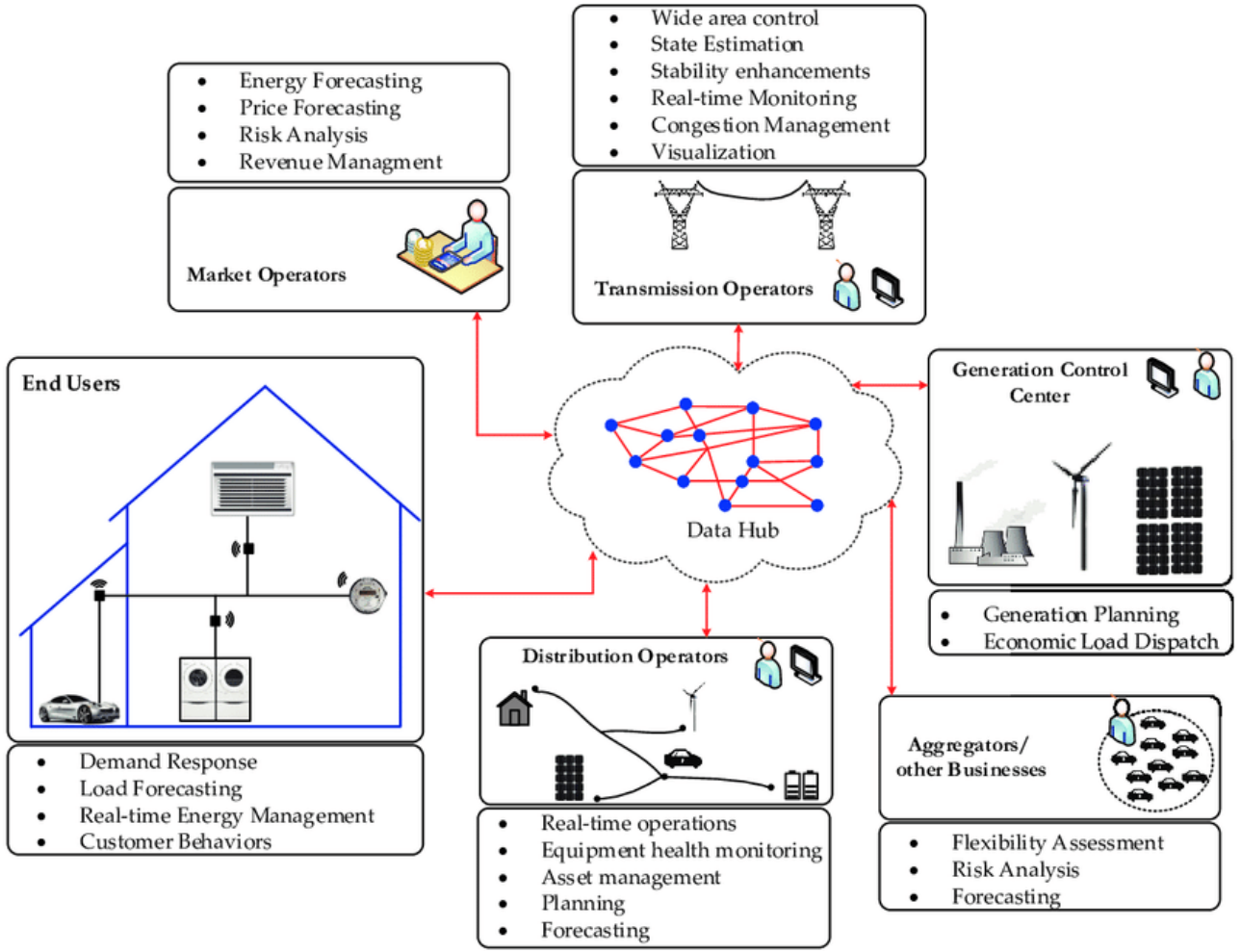


Source :

Electricity Networks Association / JRC

Increased Data Volumes

Impact of Digitalisation



Source :

BEIS Update on Energy Market Data Policy **JRC Seminar 2020**

Increased Data Volumes

Impact of Digitalisation

Energy Data Task Force (EDTF) report published June 2019

Government Endorsement of EDTF

Ofgem and BEIS formally endorsed the EDTF and deliver recommendations through the Modernising Energy Data (MED) programme

UK's first Energy Data & Digitalisation Strategy

https://www.gov.uk/government/groups/modernising-energy-data

Source :
Smart Systems Forum – March 2021

Start of the story - Portishead

2018

WPD eLTE trial based on Portishead substation.

2019 LTE Study - WPD

Next Generation Wireless Telecoms Analysis

WPD-JRC 2019

Objectives

- Demonstrate viability of pLTE over-lay on to existing sites & infrastructure;
- Develop flexible methodology for high-level designs;
- Evidence to support spectrum case.

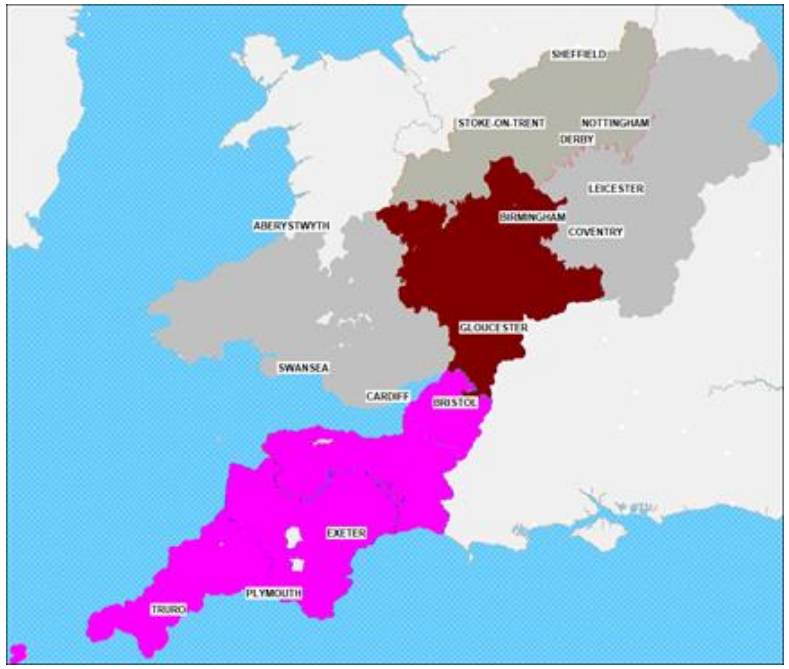
Source :
WPD Innovation Web-site / PEA Document

Next Generation Wireless Telecoms Analysis

WPD-JRC 2019

Approach

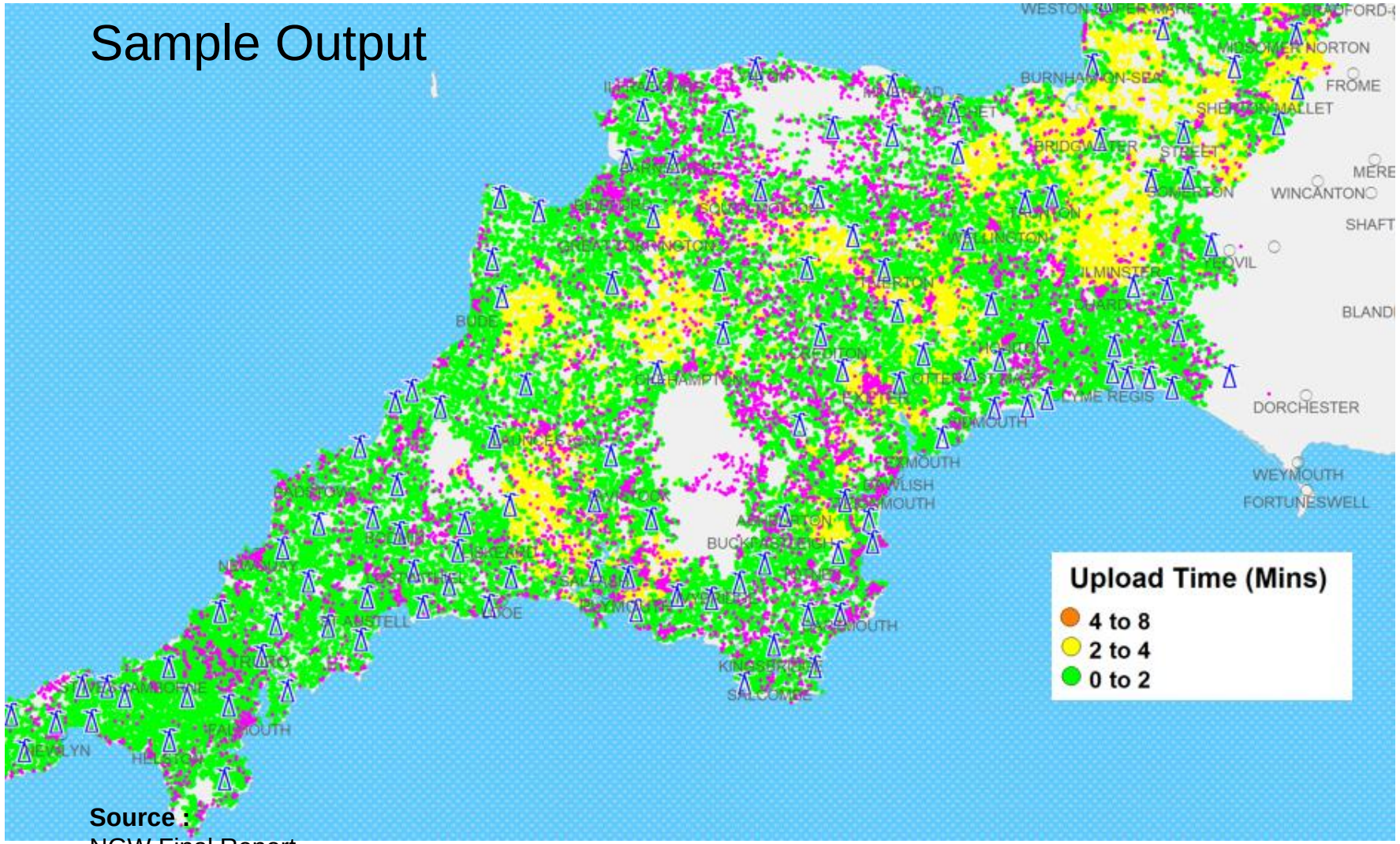
- Seek to connect all WPD Distribution Sub-Stations ;
- Agree data volume & upload time assumptions ;
- Partially optimise network design to demonstrate base station density & fit on to radio sites ;
- Take backhaul upgrade into account Fibre & Radio



Source :
WPD/JRC

Next Generation Wireless Telecoms Analysis

WPD-JRC 2019



Source :
NGW Final Report

Next Generation Wireless Telecoms Analysis

WPD-JRC 2019

Conclusions

- A pLTE network meeting utility requirements will overlay well on to legacy & existing infrastructure ;
- Important aspects of the design differ substantially from a commercial mobile network, about certainty! ;
- 'Diminishing Returns' will cap Base Stations, but after detailed optimisation, for which options incl. :

  trading resilience v coverage, non-standard outstation antenna format/height, 'rotating' sectors, increasing BS / sector numbers in congested areas etc.
- At DNO boundary, there may be gains from using sites in another or in other ways sharing resource ;

Source :
NGW Final Report

Recommendations for Further Work

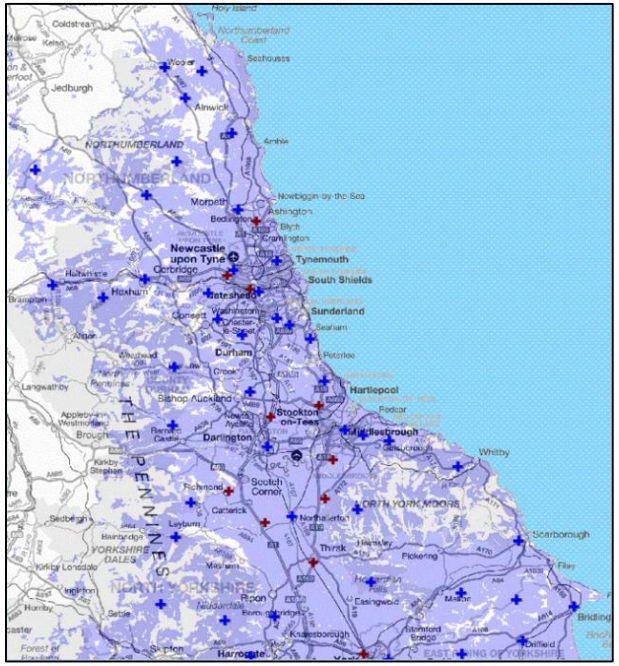
- Validate prediction models and data assumptions, particularly for challenging geographic areas;
- Impact of uplink interference & overlapping coverage ;
- Design optimisation and RF resilience ;
- Test operational characteristics in a ‘real-life’ environment ;
- Consider single and multiple antenna configurations ;
- Assess mobile data & wide-area voice capability;
- Trial multi-vendor interworking ;
- Impact of cybersecurity measures on data volumes.

Source :
NGW Final Report

2020 LTE Study - NPg

Northern Powergrid Study - 2020

Yorks & North East



Approach

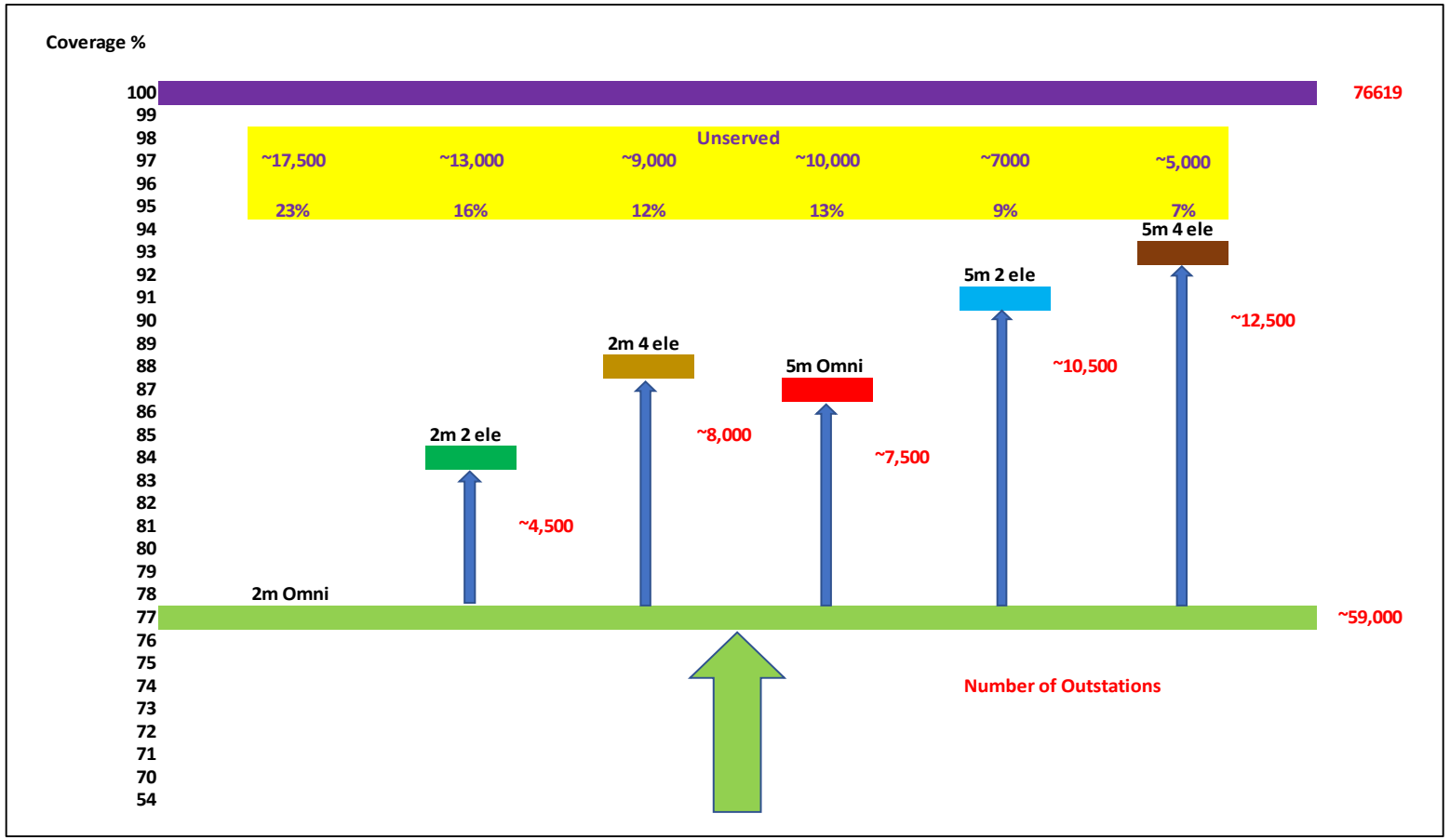
- Start with (~80) hilltop sites & Omni outstations antenna at 2m above ground level.
- Add Primary Sub-Stations for ~90% outstation coverage.
- Semi-optimised network [104 NPg Telecoms sites
- Explore sensitivity of 104 sites to power budget and outstation antenna height – see next slide.

Source : JRC Report – July 2020

Northern Powergrid Study - 2020

Yorks & North East

Outcomes



Source : JRC Report – July 2020

Northern Powergrid Study - 2020

Yorks & North East

Conclusions

- Sites can be largely sourced from NPg's existing asset base
- CPE costs dominant over RAN hardware costs
- Network software licensing cost model influenced by features and connected devices
- Wi-Fi based local coverage for local voice / data comms available subject to robust security provisions

Source : JRC Report – July 2020

Summary

Summary

Study Outcome Summary

- A number of desktop LTE RAN studies completed
- Utility specific requirements [Connections / Data Volumes]
- Utility specific RF design assumptions [Uplink critical]
- Increasingly backed up by Lab & Field measurements
- Now looking at Dense Urban
- Underpins spectrum requirement to provide shared IP/MPLS platform for critical Smart Grid applications

Thank You For Listening

Bob Tyler

JRC

WPD LTE Trial

Phil Rigden – Telecoms Manager, WPD

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The WPD LTE Trial

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Overview:

- LTE trial is in band 87 (410-430 MHz)
- Current bandwidth for the trial is 2 x 3MHz (FDD)
- Operation mode frequency division duplex (FDD)
- Installed with three enodeB base stations
  Comprising 1 x three sector site and 2 x single sector sites
- Service area of 25km centered on Taunton

The WPD LTE Trial

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Geographical Map – enodeB Installations

The WPD LTE Trial

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Geographical Map – enodeB and CPE Installations

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Field Trials:

- 10 substation locations chosen ranging from grid supply point down to distribution substations.
- Each site has been selected based on geographical location within the respective cell.
- Within each substation we have installed a CPE connected to an RTU, CCTV and a fixed VOIP handset.

- In addition we have trialled LV monitoring and mobile voice and data.
- We have also installed a solar powered RTU and CPE.

The WPD LTE Trial

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Findings:

- We have proven that LTE can provide connectivity for:
  - SCADA
  - Automation
  - LV Monitoring
  - Mobile Voice, Video and Data
  - Fixed Voice
  - Fixed Video (with limitations)

- Due to the observed latency of LTE system we have ascertained that it is not suitable for Tele-protection or Inter Tripping

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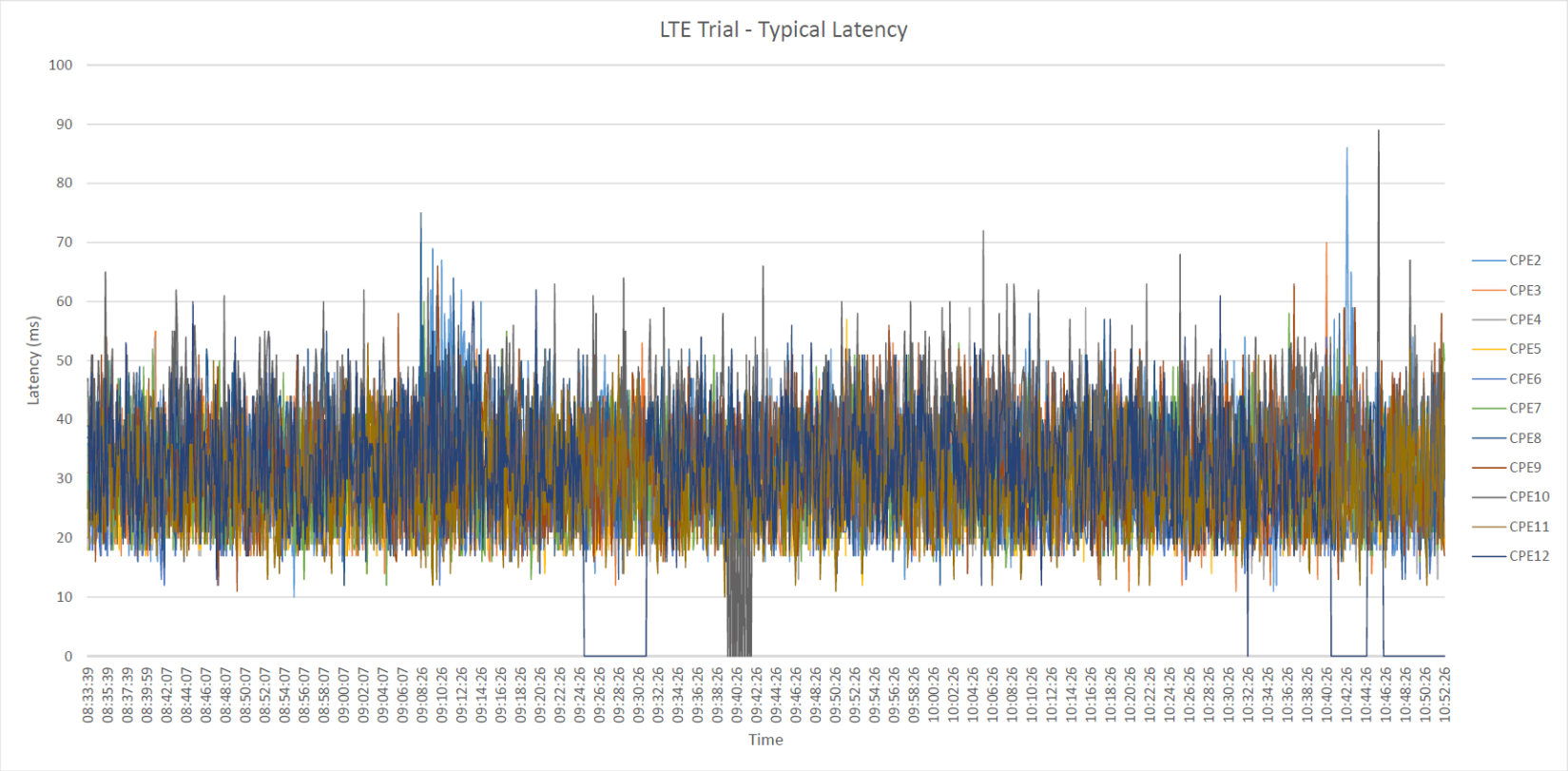
Latency:



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Security and Segregation:

- Security testing of the LTE network has been carried out, further analysis of the findings are being undertaken.
- Any tenders for a private LTE network must include security testing prior to the award of any contract.

- Segregation of the utility traffic has been configured and tested on the LTE network.
- Further security testing needs to be conducted to ensure secure segregation.

The WPD LTE Trial

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Coverage and Spectrum:

- The coverage of the network met the predicted data from the previous JRC led innovation project.
- It has been identified that an increase in gain in the uplink direction will be necessary to facilitate a balanced network.
- Resilience of the LTE network has shown that we have reached over 90% connectivity when losing a sector or base station, compared to the predictions of 60% as found in the desktop study.
- The study has confirmed that the preferred spectrum is in the 400MHz band, based on the coverage calculations of various 3GPP bands.
- Any increase in the frequency will have a major impact on the cost of deploying a private LTE network

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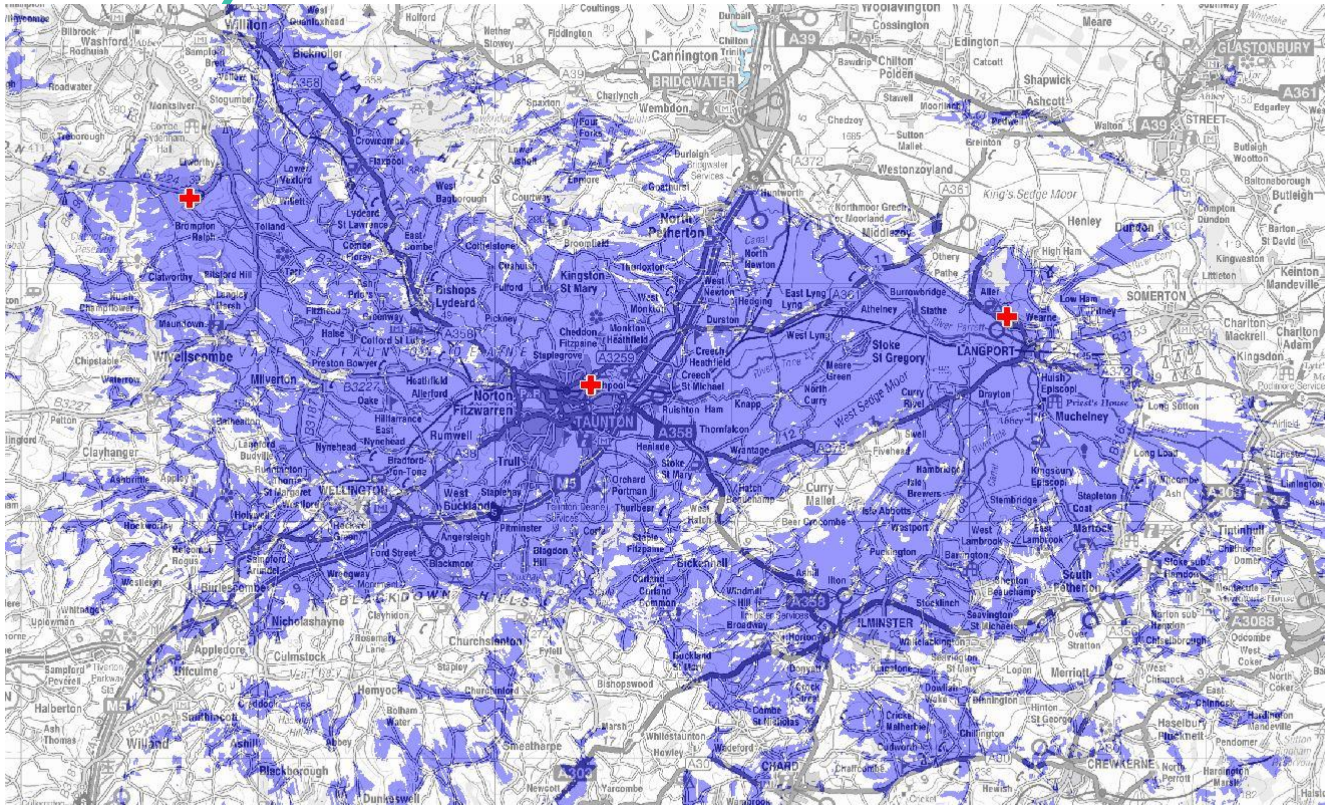
Coverage Map (415 MHz):



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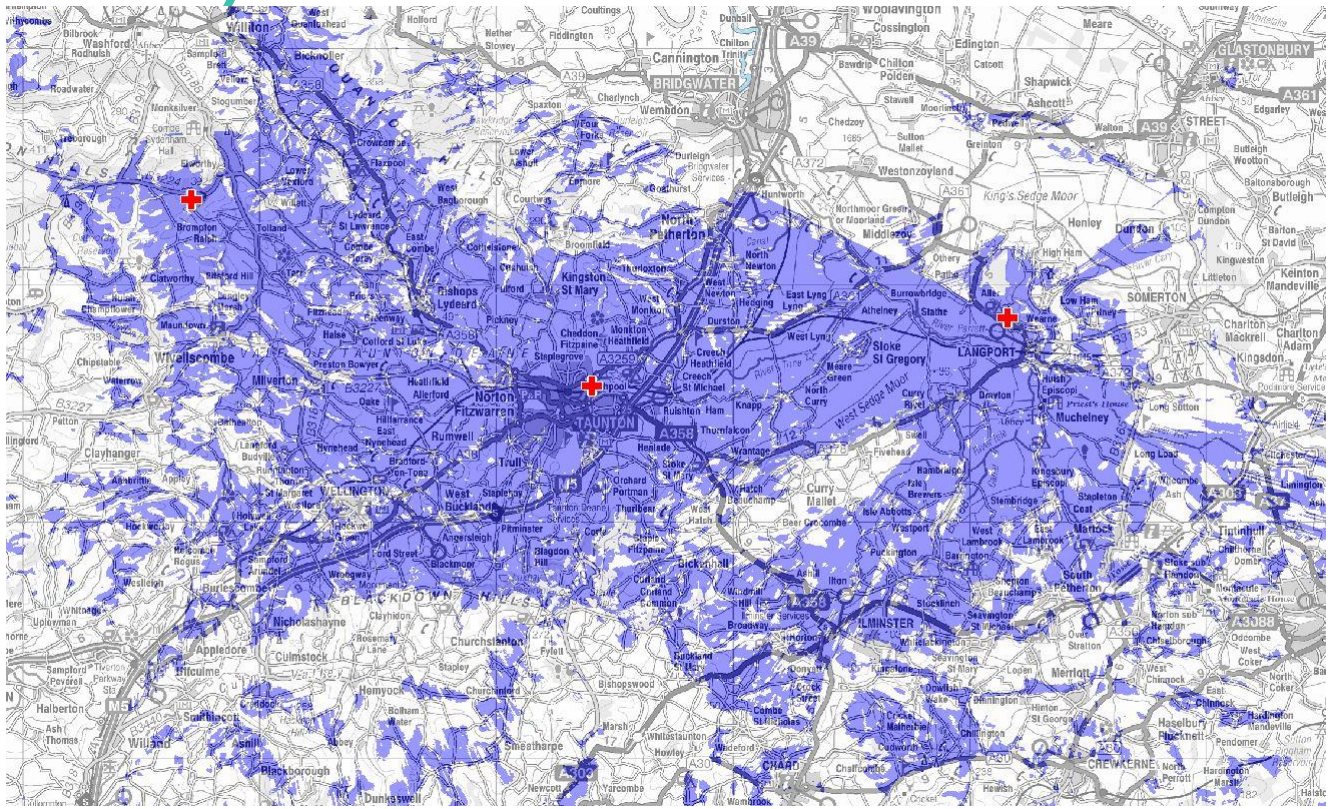
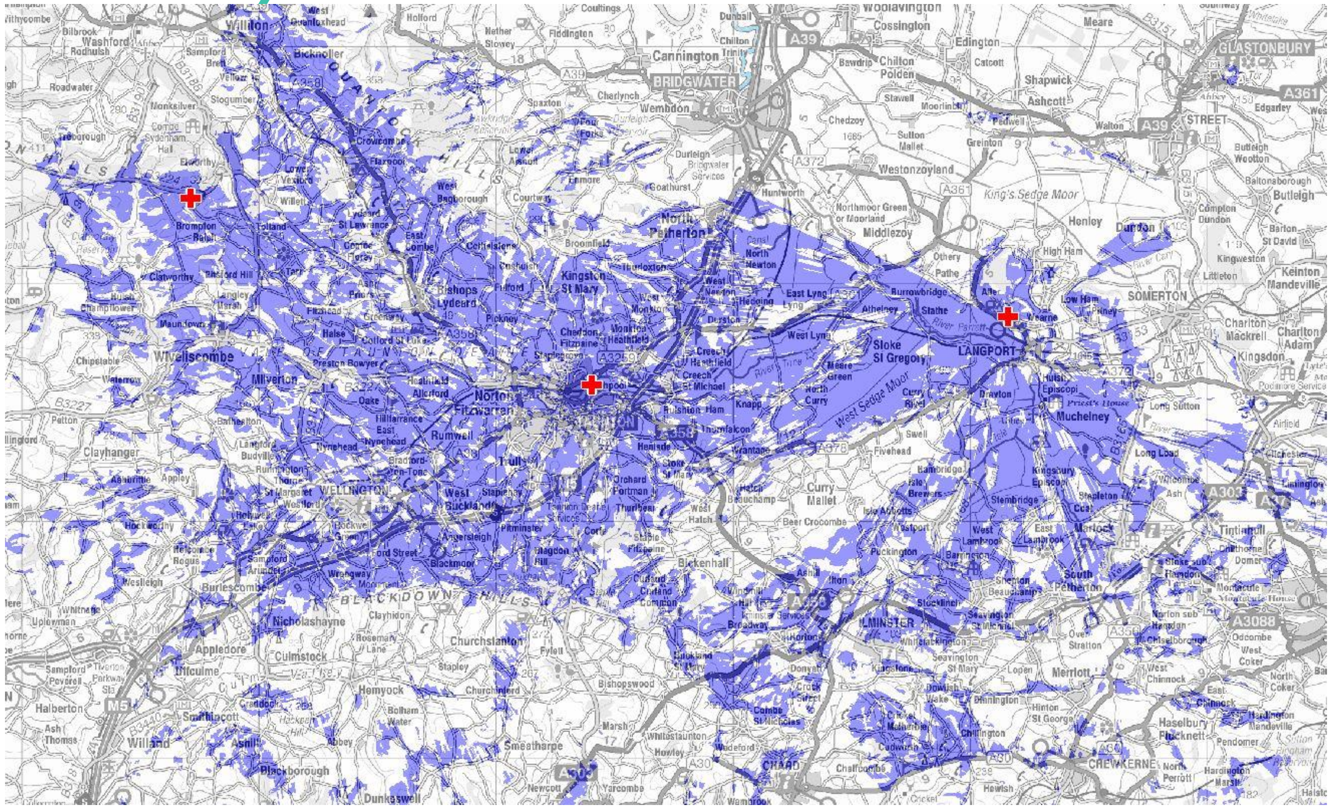
Coverage Map (740 MHz):



The WPD LTE Trial

Coverage Map (2350 MHz):



The WPD LTE Trial

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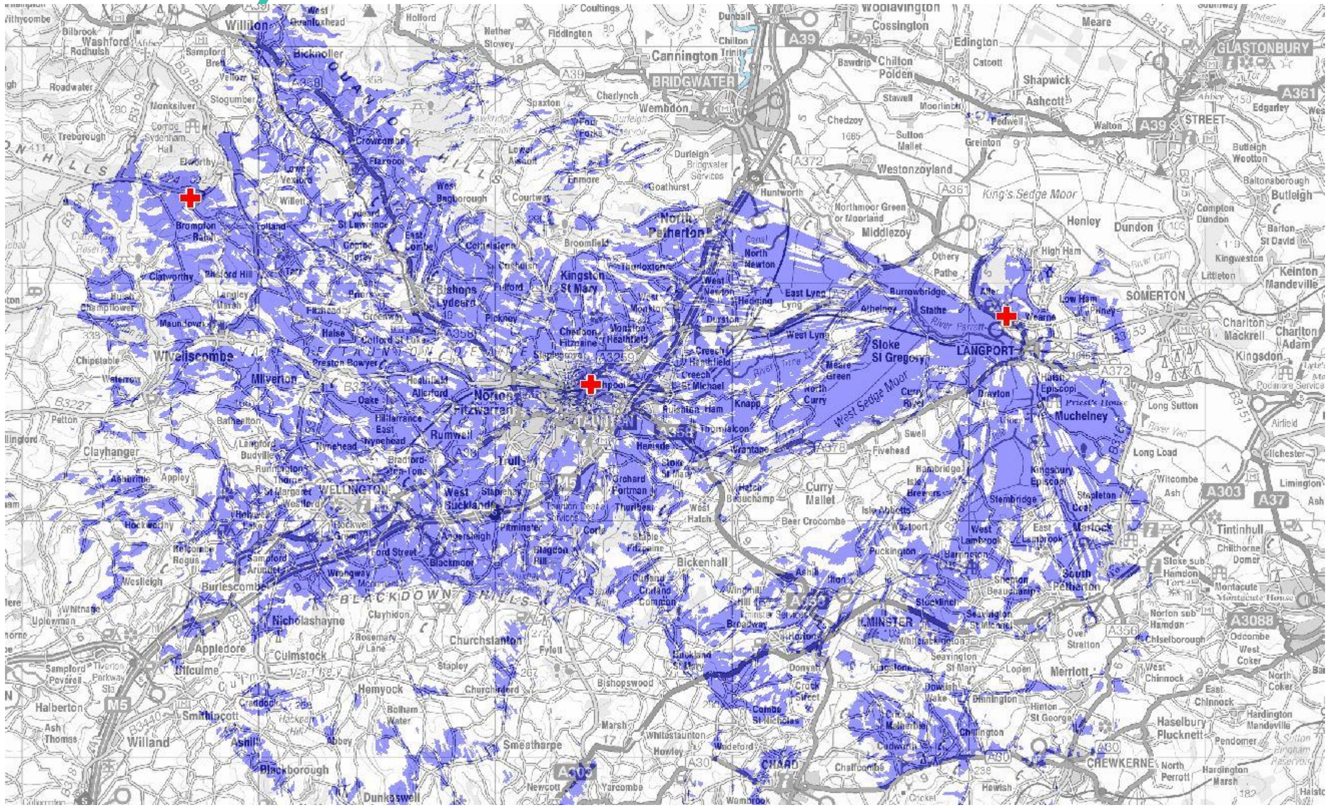
Coverage Map (3850 MHz):



The WPD LTE Trial

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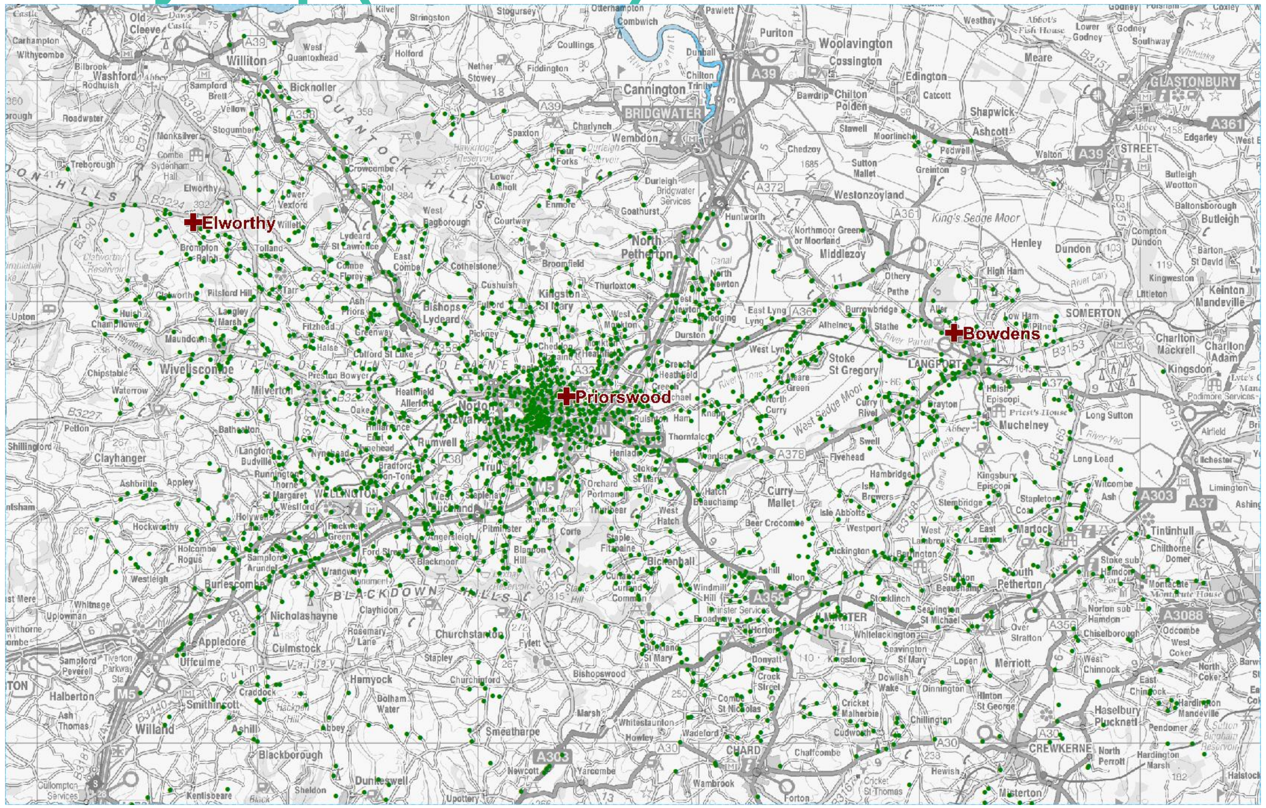
Substation Connectivity Map (415 MHz):

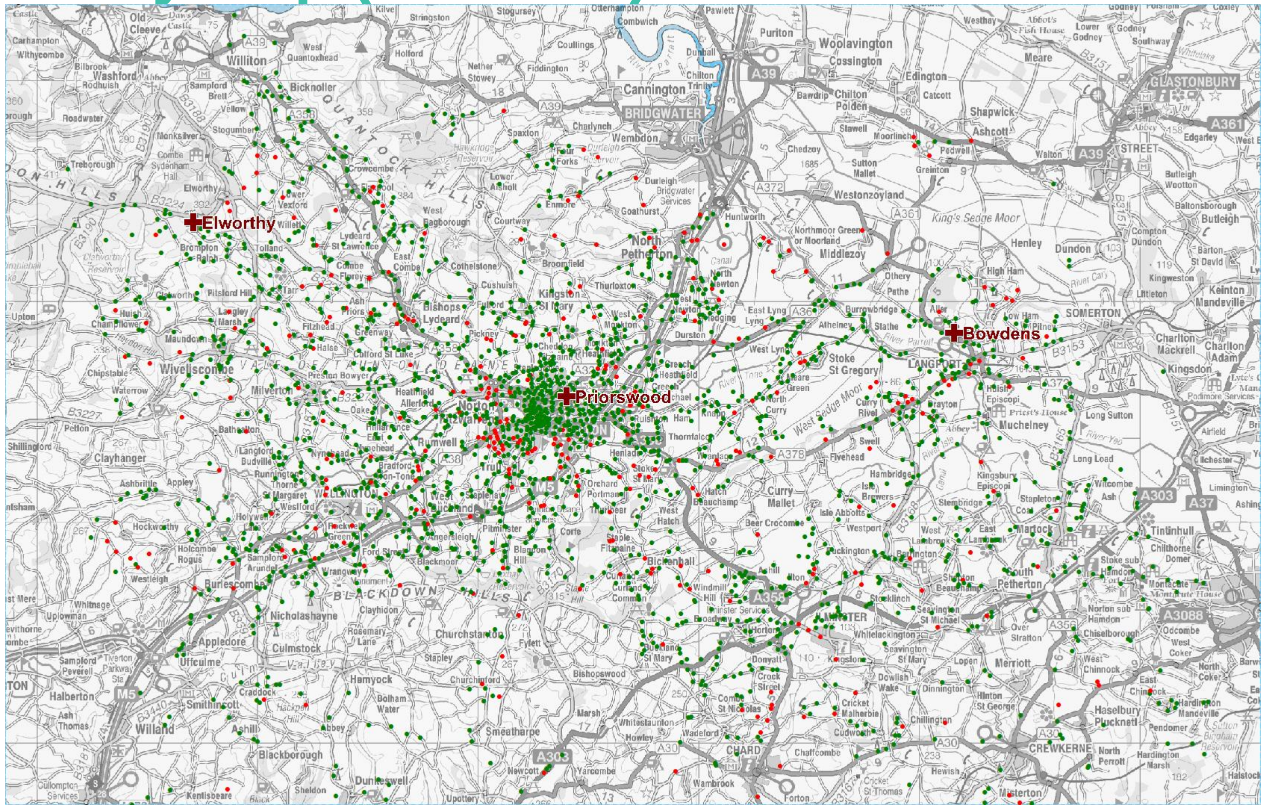
- 2390 Substations Connected



The WPD LTE Trial

Substation Connectivity Map (740 MHz):

- 2182 of 2390 Substations Connected (91.3%)



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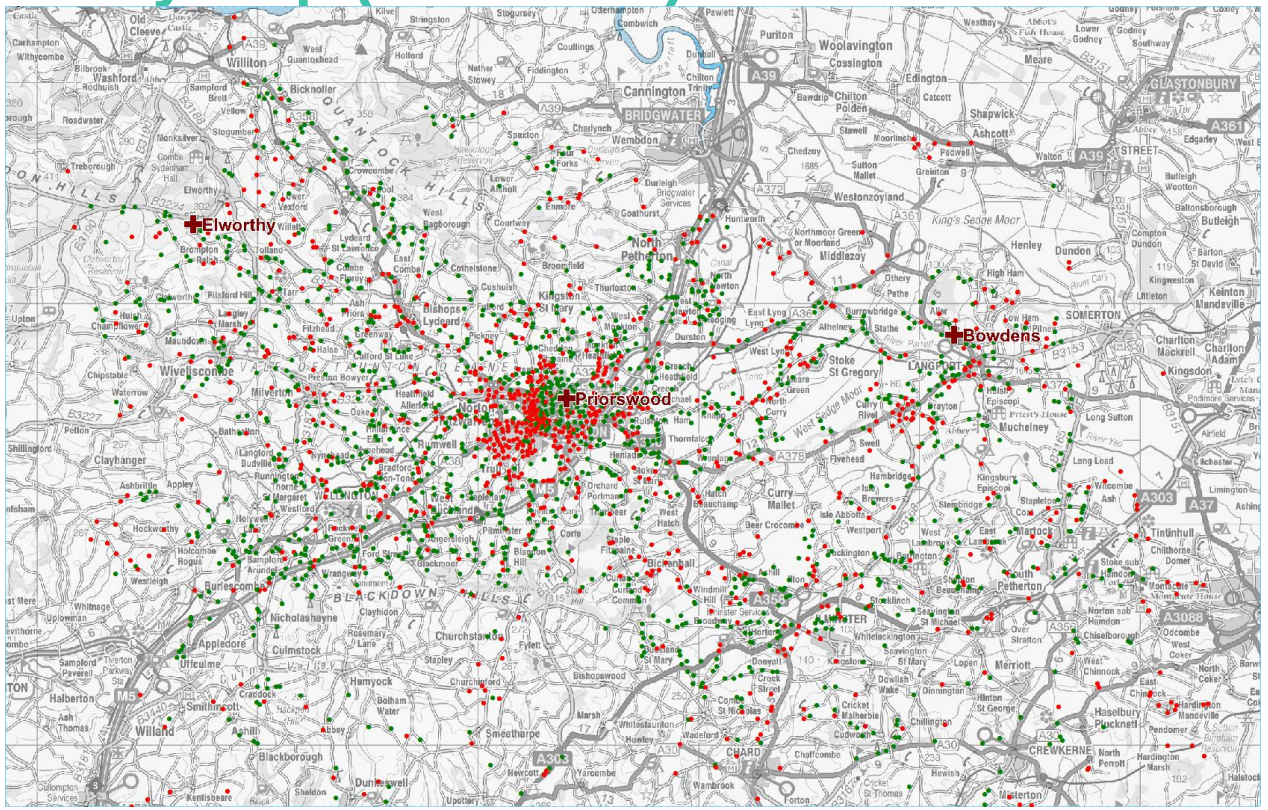
Substation Connectivity Map (2350 MHz):

- 1404 of 2390 Substations Connected (58.7%)



The WPD LTE Trial

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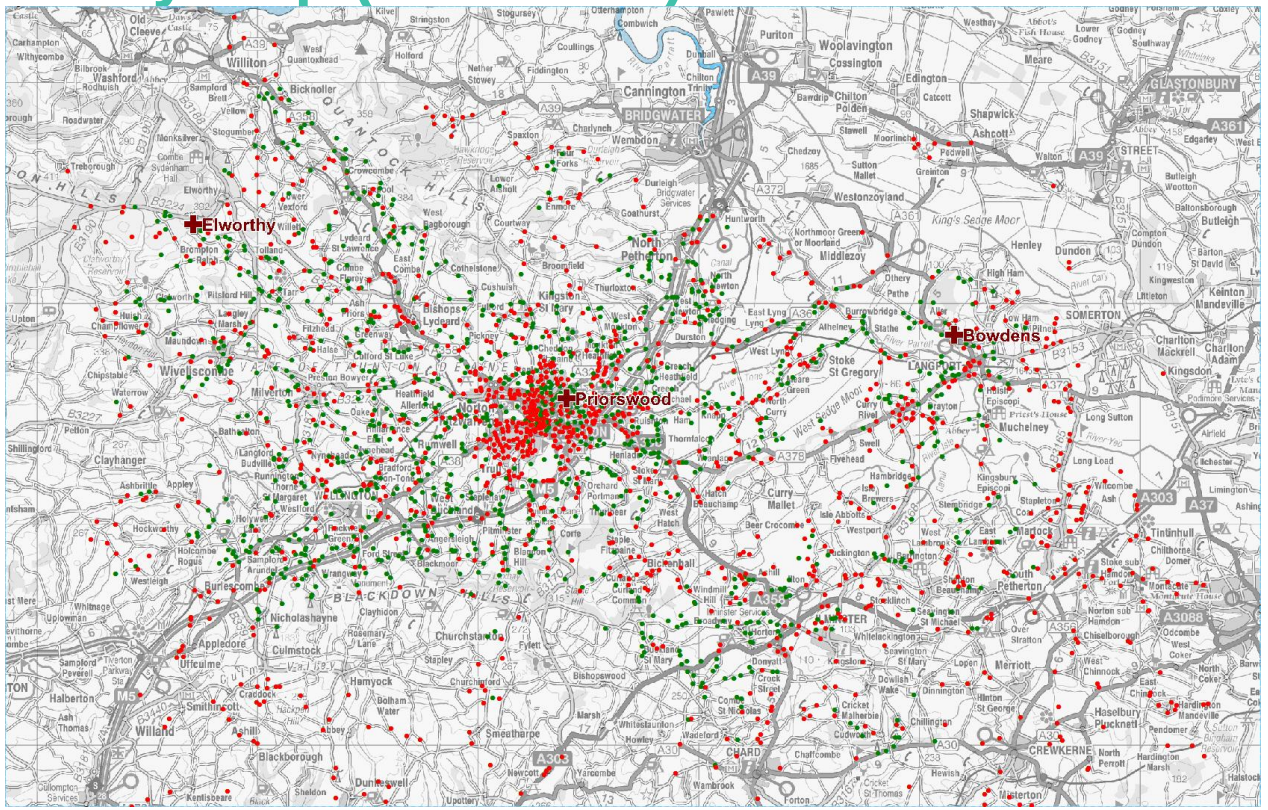
Substation Connectivity Map (3850 MHz):

- 1090 of 2390 Substations Connected (45.6%)



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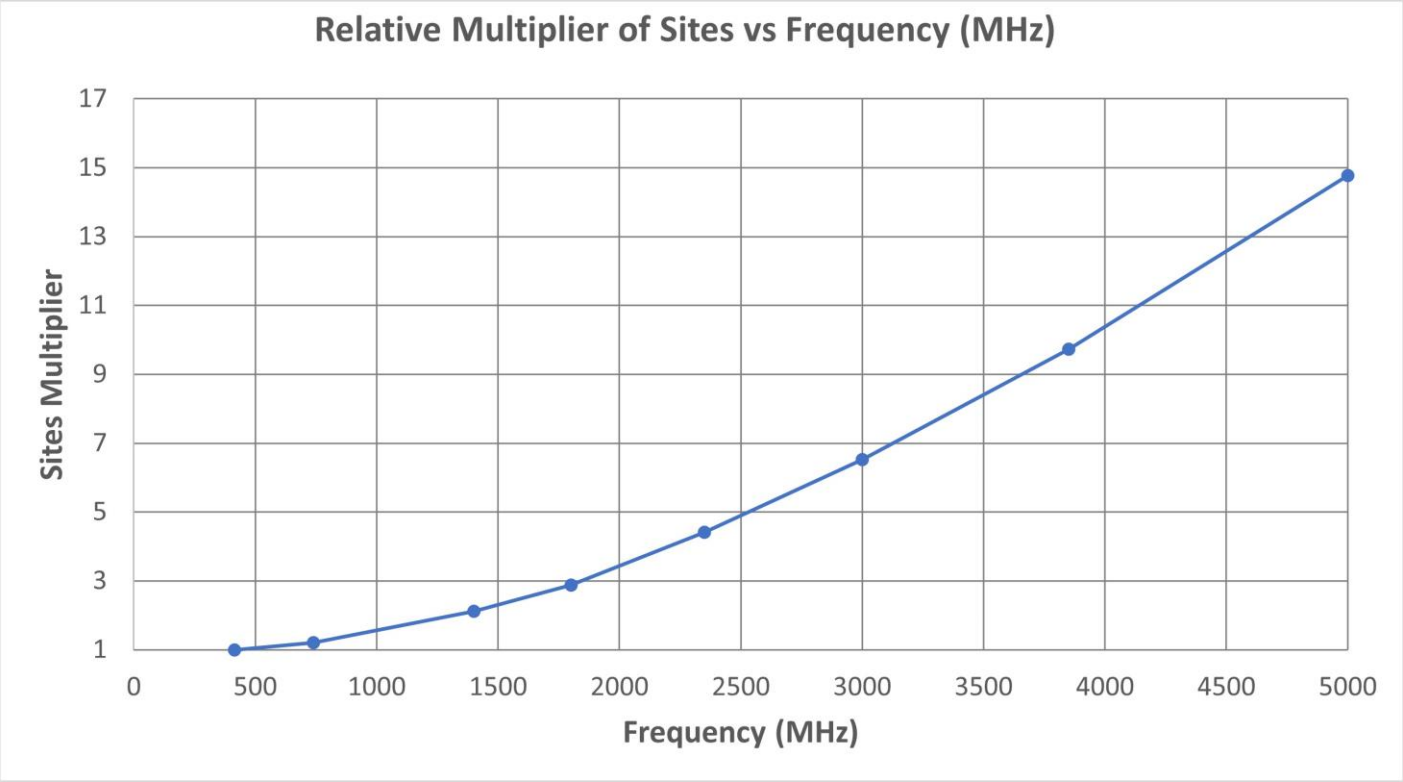
Expected enodeB requirements:



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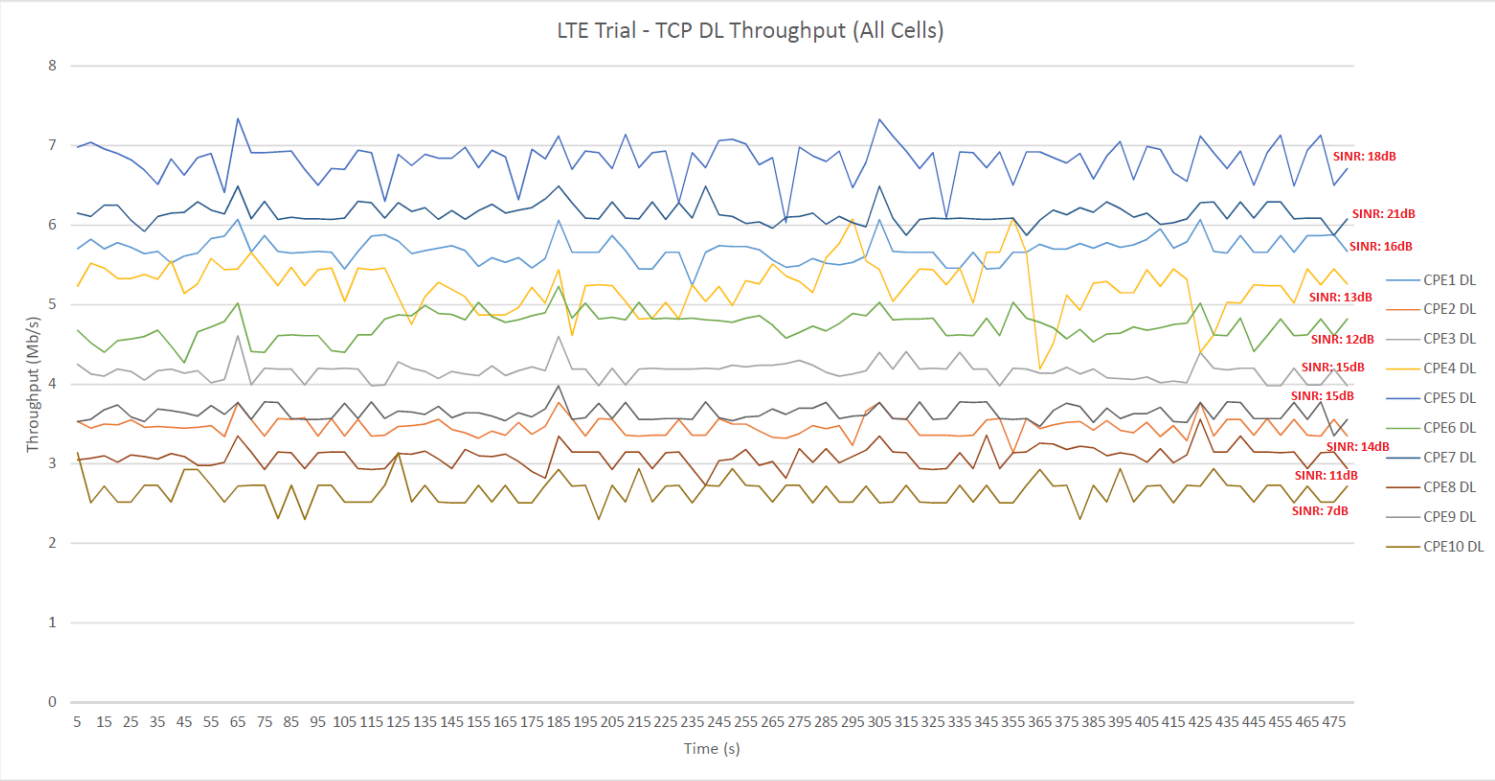
Throughput: Downlink (enodeB to CPE)



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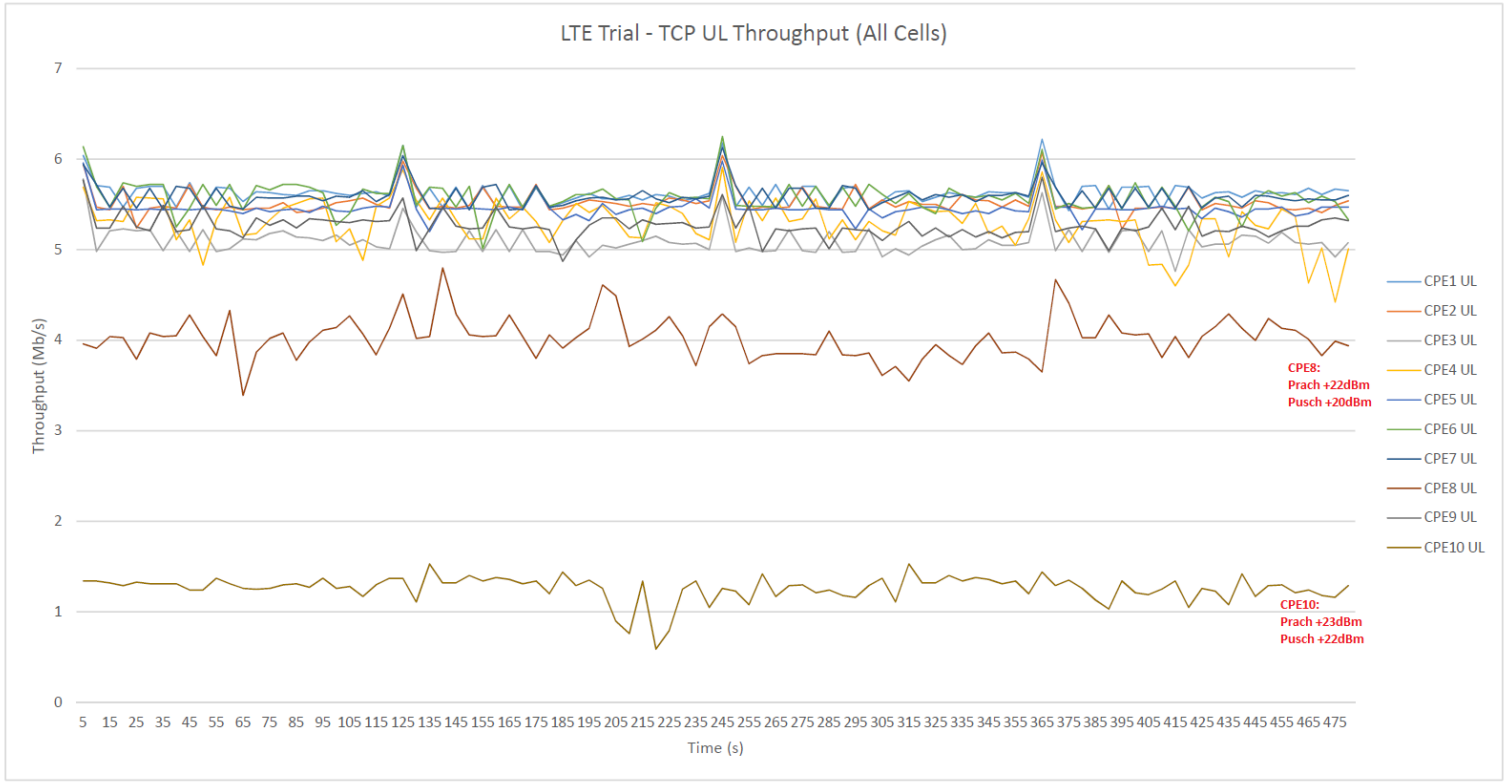
Throughput: Uplink (CPE to enodeB)



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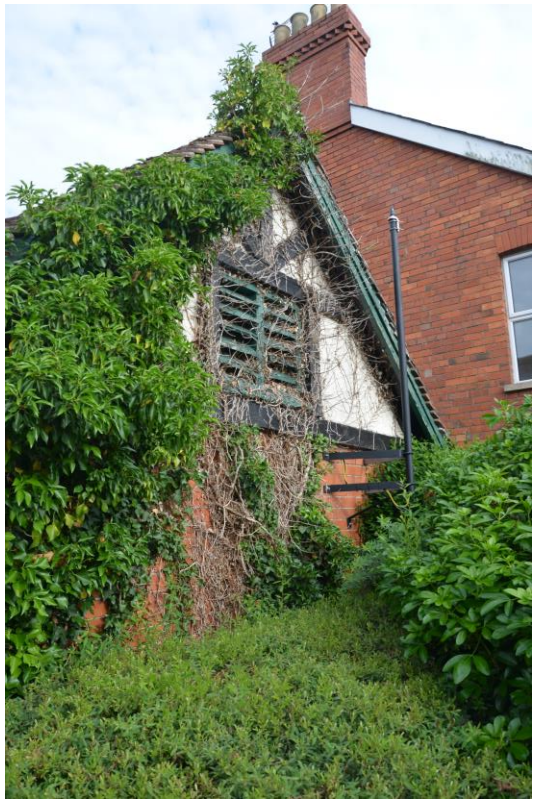
Future works:

- Multi vendor inter-operability
  - Core
  - Open RAN
  - Alternative user equipment – CPE, handsets, tablets etc.
- APN segregation security
- Traffic shaping and priority
- Narrow band IOT / CAT-M
- Antenna analysis
- NOC integration
- Test equipment



The WPD LTE Trial

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Summary:

- Without any doubt we now know that a private UK LTE network is a viable solution for providing secure, reliable and resilient communications for the UK energy and utility industries.
- We need to act quickly to hit the deadlines imposed by the PSTN switch off and the 2G/3G sunset programme, in addition to meeting the UK Governments low carbon agenda.
- We need cross Government department working to ensure funding mechanisms are in place to deliver this private UK LTE network.
- What we now need is;
  - Confirmation if spectrum is to be allocated to the utility industry
  - Confirmation on which 3GPP band is going to be allocated to a private UK LTE network.

WPD LTE Trial

Thank you for listening

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OFCOM Spectrum Update

Vaughan John – Principal Spectrum Policy Manager, OFCOM

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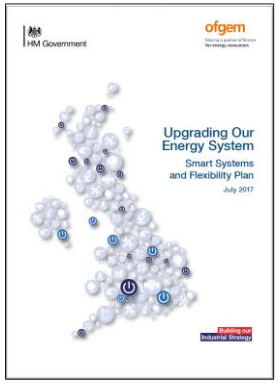
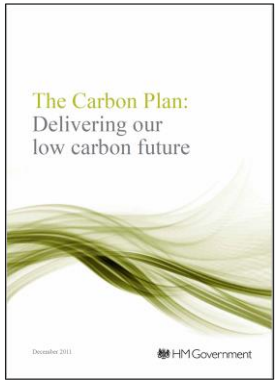
Introduction and background

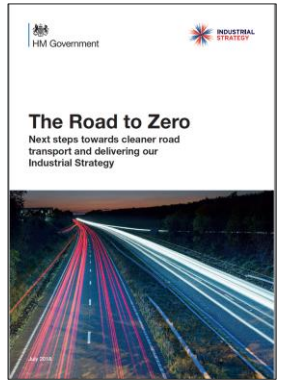
What is the Utilities Spectrum Strategy Project?

We are looking at the potential spectrum requirements to support the Utility sector's operational telecommunications strategy in support of Government's low carbon and environmental objectives over the next 30 years

- 2018/2019 – we met with electricity, gas and water companies, industry bodies, government (BEIS), Ofgem and other organisations such as ERP and ENA
- All agreed that the changes in how electricity, gas and water is supplied and consumed will require a significant increase in operational communications
- Biggest growth in operational comms is in the electricity sector – for both supply and demand







This is a multi-phase project occurring over several years

Project is set up over 3 phases with decision points after Phase 1 and Phase 2

Phase 1: modelling	Starting in 2019, we modelled the data requirements of the utilities sector over the next 20 – 30 years and how that would translate to spectrum demand
Phase 2: policy	Options to meet the requirements identified in Phase 1, taking into account resilience, coverage, security, costs, data and digitalisation and System Restoration
Phase 3: consultation	We would consult on any spectrum management proposals in line with our consultation principles

Policy options

Criteria that the Utility Sector state their communications need to meet

From EUTC:

- High (comms) network availability and reliability
- Resilient with mains power autonomy for up to 72 hours for critical elements
- Security against physical disruption and electronic intrusion as set by national cybersecurity requirements
- Connectivity to all network assets, including those in remote or sparsely populated areas
- Appropriate bandwidth, varying from as little as 600 bps to 2-10 Mbps (feeding into fibre-based or microwave core networks)
- Low latency
- Long-lasting operation and support, as utility assets are generally expected to last 15-50 years

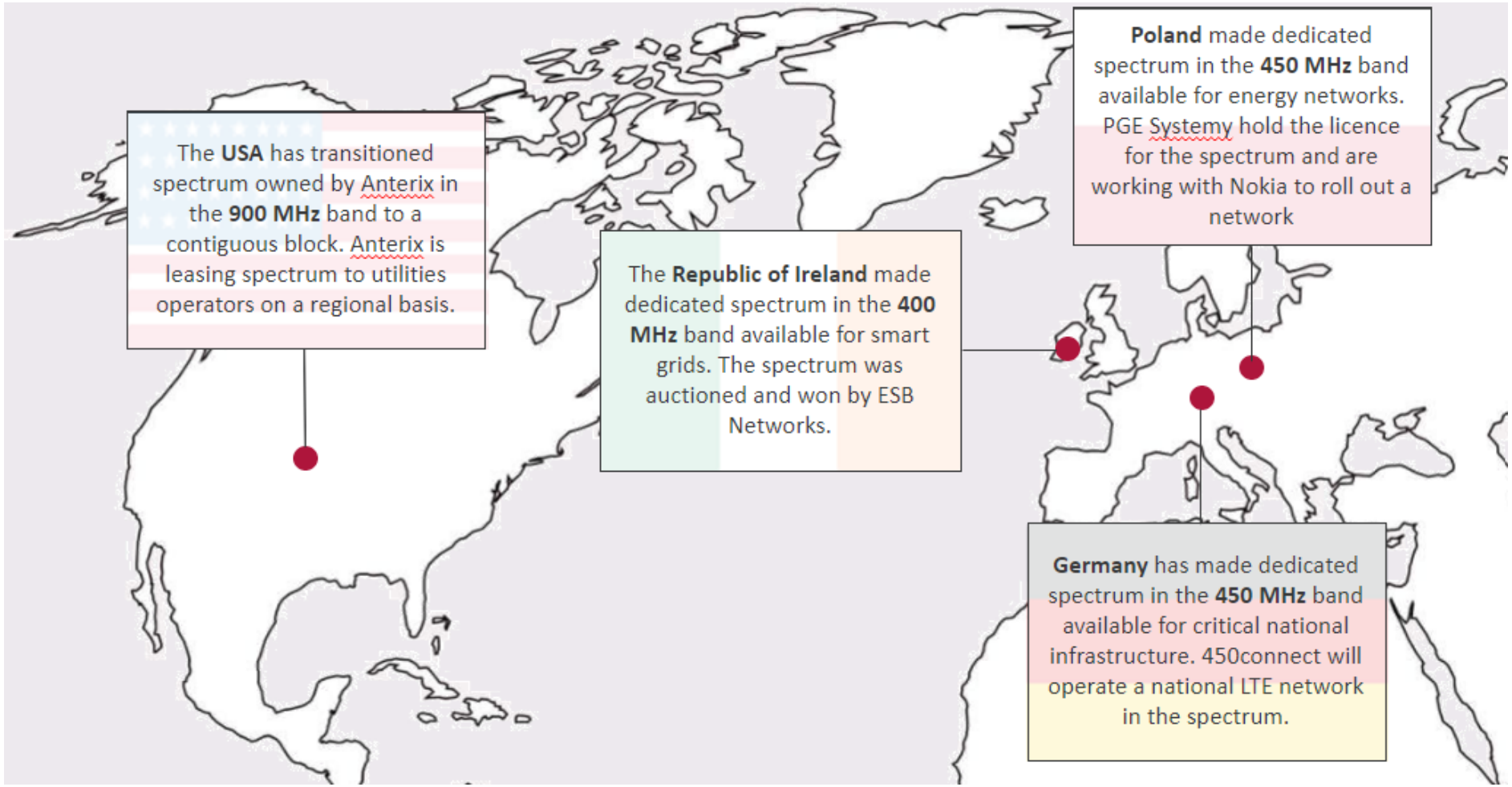
Also

- LTE is the technology of choice

Industry has highlighted a number of risks with relying on commercial networks

- **MNO Coverage:**
  - 4G coverage from at least one operator is 91% of the UK (Connected Nations Report, 2020)
  - Shared Rural Network: “initial commitment for each MNO to reach 88% coverage by 2024” (lowest is 79%, highest is 85%)
  - ESN extended area service: “coverage in the most rural and remote parts of Great Britain”
- **MNO Resilience:**
  - Recognised as a key issue by Government and Ofcom. Work underway to enhance resilience of public telecommunication networks
- **Cybersecurity:**
  - Telecommunication (Security) Bill
- **Satellite – costs & latency:**
  - New satellite services with reduced costs and latency (OneWeb, SpaceX etc)

Several countries have made spectrum available to utilities



In Europe, these allocations to utilities are in spectrum that was unused or became available due to existing licences ending

Potential LTE bands in the UK are heavily utilised

Band	Uplink (MHz)	Downlink (MHz)	Comment
28	703 - 748	758 - 803	2 x 3 MHz available in 700 MHz band, but high risk of harmful interference from 700 MHz mobile use (SDL) >9km separation needed
31	452.5 - 457.5	462.5 – 467.5	BR use: ~15k licensees & 28k licences (incl Light Licences) PMSE: ~14k freq assignments Emergency Services: 110 Licensees & 135 assignments
72	451 - 456	461 - 466	
73	450 - 455	460 - 465	
87	410 - 415	420 - 425	RAF Fylingdales needs >230 km separation from LTE (ECC Report 240) Arqiva Smart Meters (Scotland and Northern England)
88	412 - 417	422 - 427	
40	2300 – 2400 (TDD)		2300-2350 MHz used by MOD and HO 2350-2390 MHz awarded
5G (C-Band)	TDD 3300 - 4200 (TDD)		Limited transmit power available

Non-LTE spectrum options also have enduring use and incumbents e.g. 380/390 MHz

Each option raises a different challenge to resolve

Commercial	Can issues regarding commercial delivery of communications (e.g. MNO or satellite) be sufficiently mitigated?
Dedicated spectrum	There is no easily available spectrum so what action would need to be taken?
Shared spectrum	Potential for Utilities to share spectrum with other – which we encourage as part of our spectrum management strategy?

Working with BEIS and Ofgem

Collaboration with Government and Ofgem

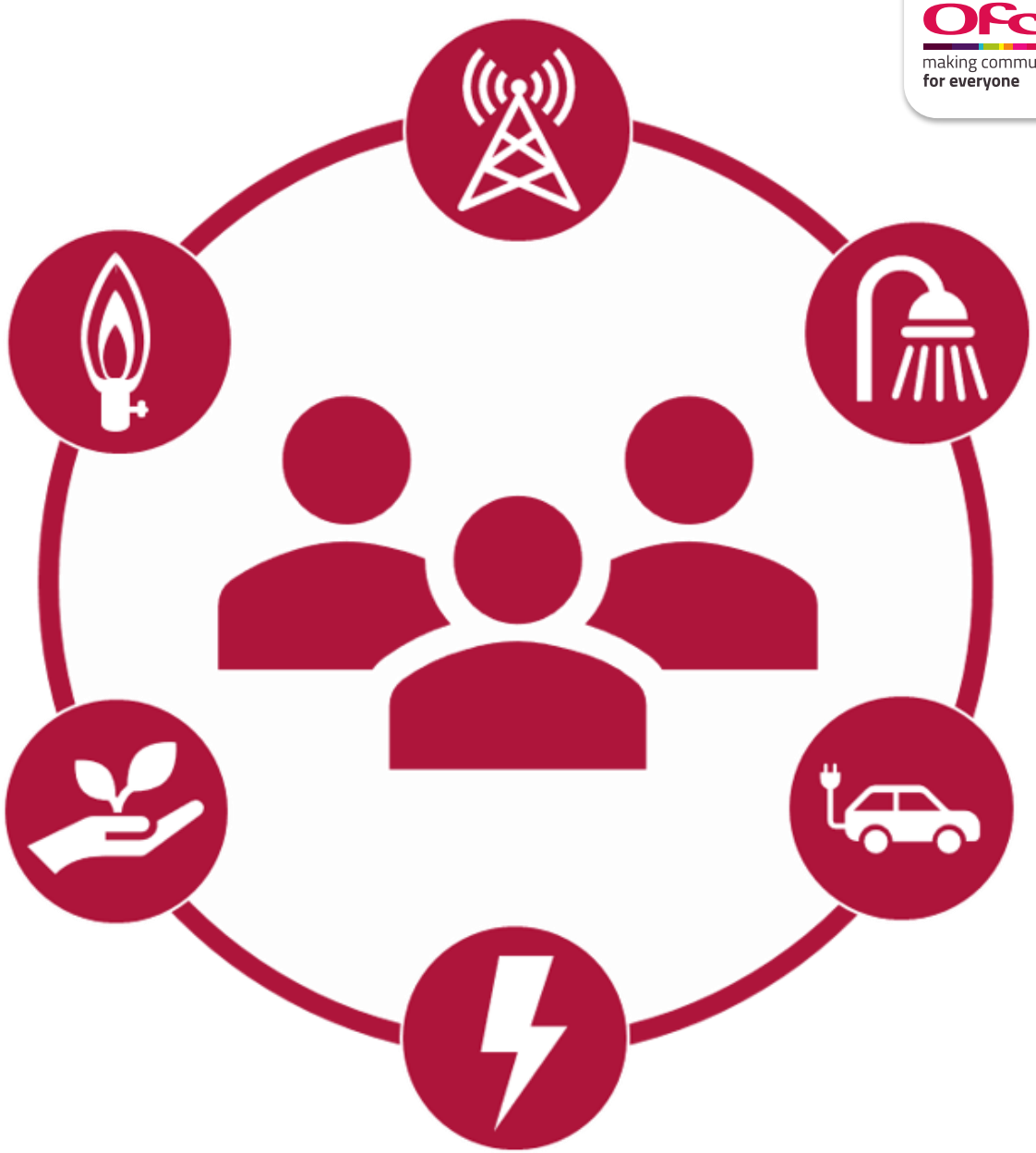
NIC: “Regulators’ duties need to be coherent, covering price, quality, resilience and environment. Collaborate with other regulators…to avoid contradictory regulation and promote efficient outcomes for consumers on cross-sectoral issues.”

- We are working closely with colleagues in BEIS and Ofgem to bring together sectoral, regulatory and policy expertise
- Objective is to support a future communications strategy that
  - Can achieve Government’s environmental policy objectives
  - Facilitates digitalisation of the energy network
  - Promotes efficient outcomes for consumers
- In addition we are engaging with:
  - UK Regulators Network
  - NGESO (Bridging the Gap to Net Zero)
  - ENA (Strategic Telecommunications Group) & industry

Thank you

Ofcom, June 2021

Vaughan John



UK LTE – Design, Build & Operation

Dr Peter Couch – Chief Executive Officer, Joint Radio Company Ltd (JRC)

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UK Private LTE for Energy Utilities

Design, Build and Operation

a Perspective

Joint Radio Company: Making the spectrum and technology work for your business
www.JRC.co.uk

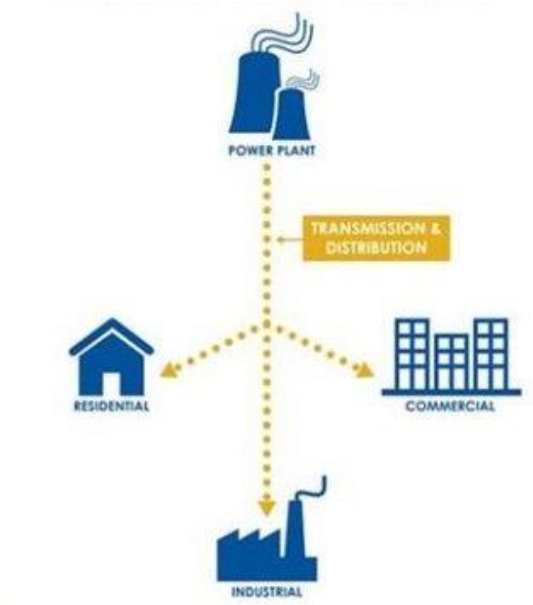
Agenda

- Changing Context
- Network Options to explore
- DisRestart use case

Changing Context

Whole System Perspective

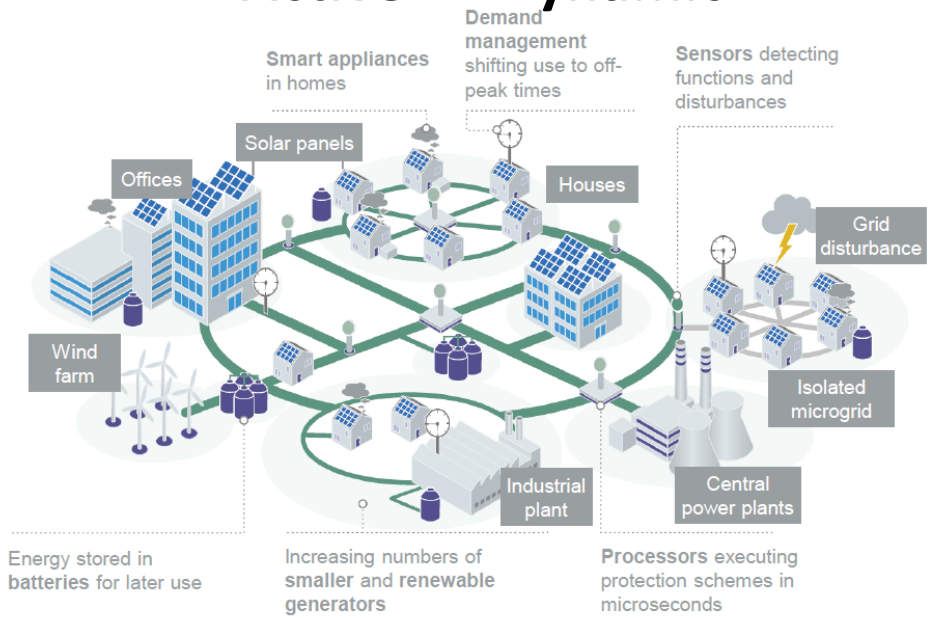
“Passive” – Top Down



Transmission → Distribution

- Large Generation – limited in number

“Active” – Dynamic

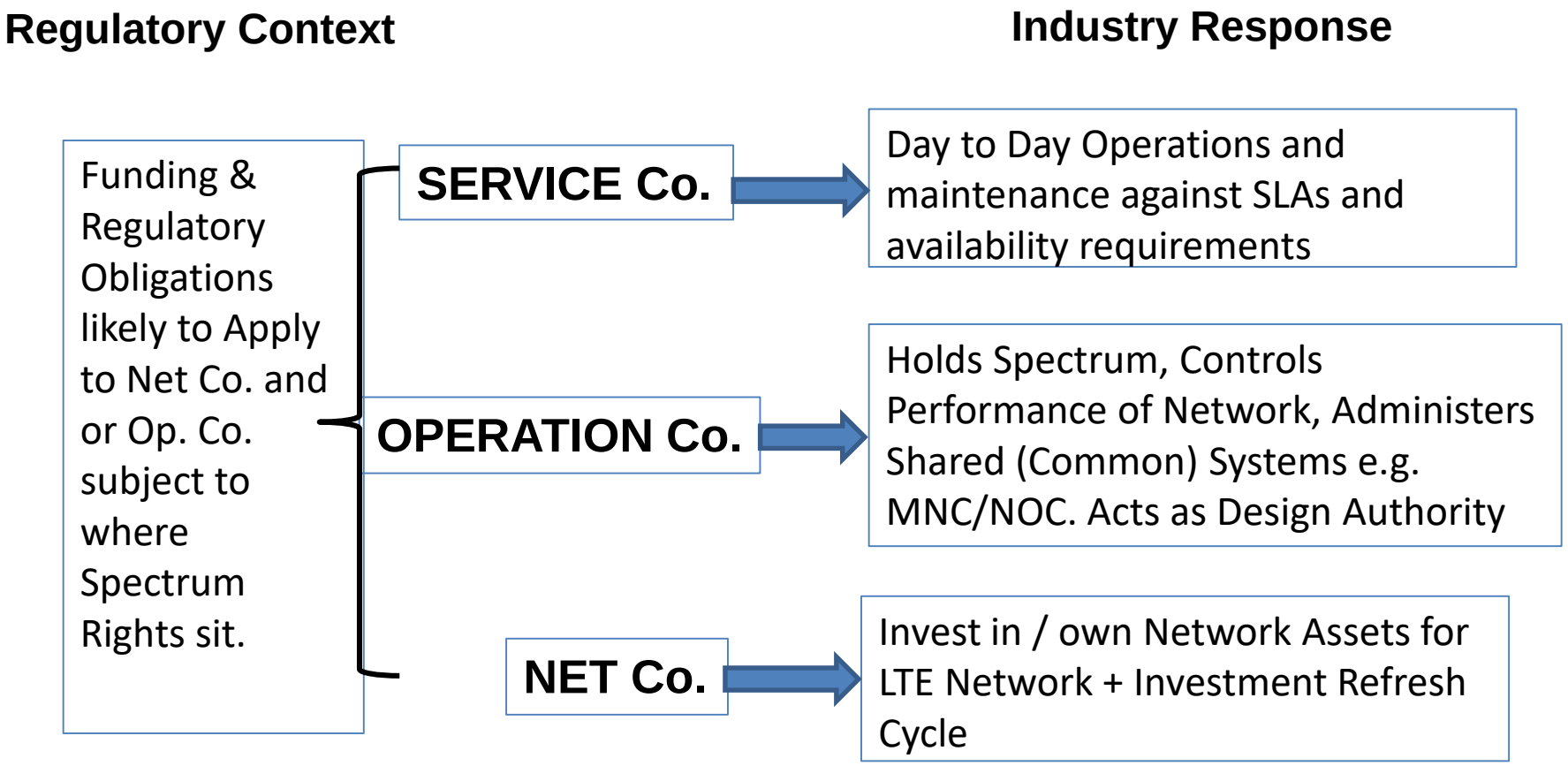


Transmission
DERs
Prosumer
} Smart Grid

- Limited Large generation – Extensive Local Generation + Storage
- Focus on balancing demand and availability through the the transition to embedded generation and alternative gases

Enabling a ‘Smart Grid’ Solution

Building Block Approach



“Active Local Networks” – Today’s Approach

Stand Alone DSO / GDN Approach – Local System Operator Model

DSO		GDN	
Service Co	Day-to-Day Operations / SLAs	Service Co	Day-to-Day Operations / SLAs
Op. Co	Design Authority	Op. Co	Design Authority
Net. Co.	Invest in / Own Network Assets	Net. Co.	Invest in / Own Network Assets

“Active Local Networks” – Discrete DNO / GDN Solutions

Facilitates ‘Smart Grid System Operation at the Sector Level – Electricity / Gas

	DSOs		GDNs
Service Co	→	Day-to-Day Operations / SLAs	Service Co → Day-to-Day Operations / SLAs
Op. Co	→	Design Authority	Op. Co → Design Authority
Net. Co.	→	Invest in / Own Network Assets	Net. Co. → Invest in / Own Network Assets

Regulatory funding arrangements could enable discrete operational outcomes. However, capability and cost effectiveness is unlikely to be optimised

“Active Local Networks” – Single Solution for ALL ENOs

Whole System Approach – Common OT Platform for Gas & Electricity

Single Platform for DSO & GDNs

- **Service Co** → Day-to-Day Operations / SLAs
- Op. Co → Design Authority
- Net. Co. → Invest in / Own Network Assets

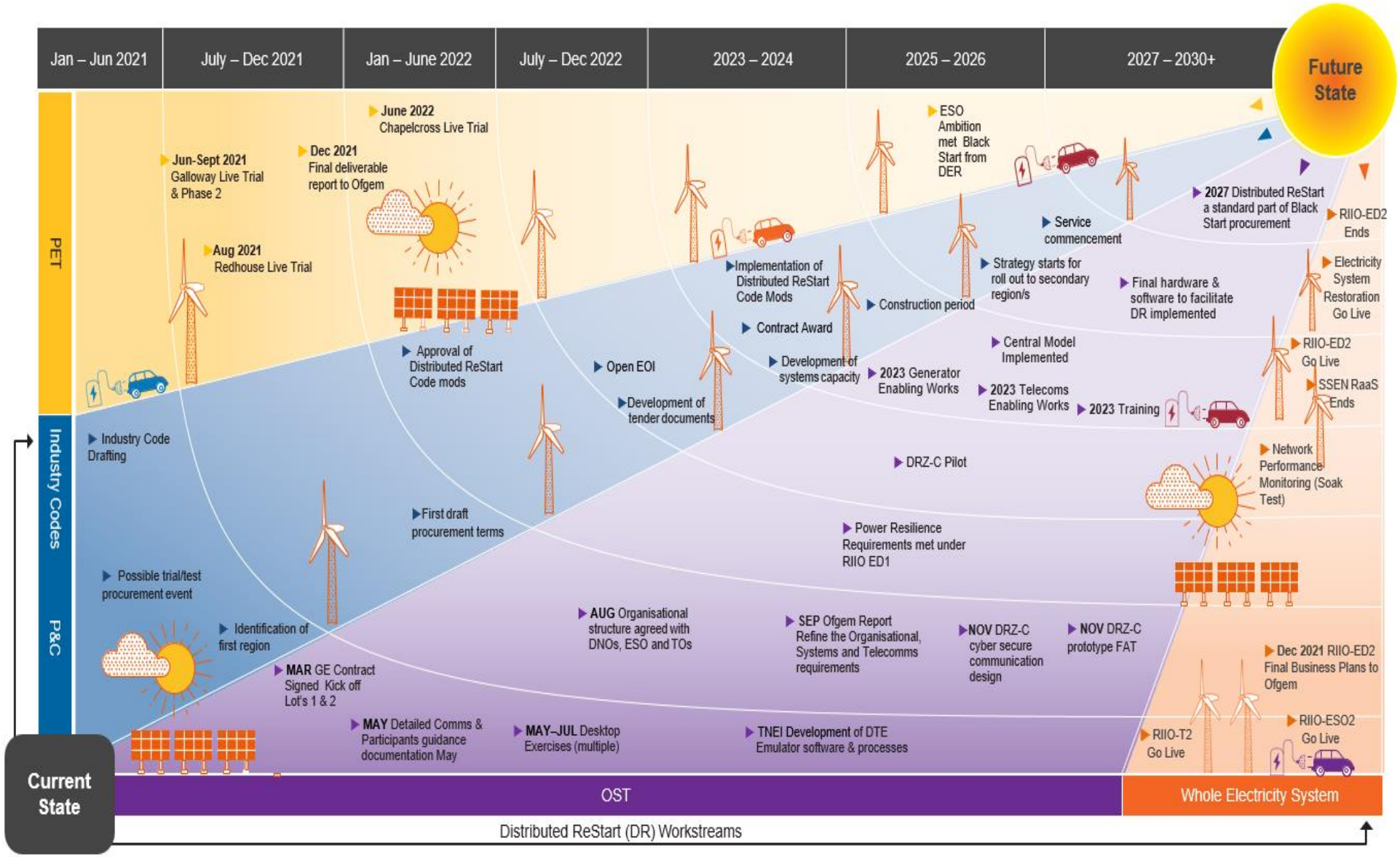
System Operator tasked with establishing system capability, owns investment and Operational requirement. Administers Spectrum Access and System Design

Regulatory and Funding Mechanisms to be Addressed

Benefits from Scale Economies and Network Efficiencies not available in the alternative Fragmented options

Distributed Restart Application

Enhanced OT Capability enables future system resilience



Wrap-up

- Changing Context
- Network Options Explored
- DisRestart use case

Thank You For Listening

Dr Peter Couch

JRC

Q&A Session

Julian Stafford – Chief Technology Officer, JRC

Steve Pike – Network Infrastructure Manager, WPD

Vaughan John – Principal Spectrum Policy Manager, OFCOM

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Thank you

If you have any further questions please email wpdlteseminar@westernpower.co.uk

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