CICRA
CHANNEL ISLANDS COMPETITION & REGULATORY AUTHORITIES

WELCOME TO THE 5G SUMMIT

Agenda

08.45	Coffee/light breakfast - Networking
09.15	Introduction – Tim Ringsdore CICRA
09.20	Chairman CICRA - Michael O'Higgins
09.30	Chief Minister - Gavin St Pier
09.45	States of Jersey Senator - Lyndon Farnham –
10.00	Key Note Speaker McKinsey - Nemanja Vucevic
10.30	States of Guernsey Policies – Colin Vaudin
11.00	States of Jersey Policies – Stephanie Peat
11.15	*Break*
11.30	Planning & Environment Jersey & Guernsey
11.45	The Digital Greenhouse – Lucy Kirby
12.00	Digital Jersey – Tony Moretta
12.15	James Falla - Panel Session: SP, CV, TM, LK, NV, CP
13.00	*Tim Closes Session - Lunch*

Agenda

14.00	Tim opens afternoon session
14.05	Airtel
14.15	JT
14.25	Sure
14.35	Clear Mobitel
14.45	Ofcom – Chris Woolford
15.00	Guernsey Schools
15.20	Jersey Schools
15.40	*Break*
15.55	James Falla – Panel: Sure, JT, Airtel, Ofcom, CICRA, CM
16.40	CICRA Next Steps Tim Ringsdore
16.50	Summary – Chairman Michael O'Higgins
17.00	Close
Networking drinks	

Nemanja Vucevic

ASSOCIATE PARTNER - MCKINSEY

Road to 5G and implications for Channel islands

WORKSHOP DOCUMENT | November 26th 2018

The road to 5G and implications for Channel Islands

1. **5G is imminent with increasing roll-out post 2020**
   Industry is coming out of 4G investment cycle without having been able to monetize investments – race to 5G has non the less begun

2. **5G can enable value generation for society, however, value capture by connectivity is diminishing**
   5G extends performance of Mobile networks to support new use cases – with step change in performance requirements

3. **Cost of upgrading networks to 5G becomes an obstacle that is putting industry at a challenge**
   Upgrades to 5G can increase network TCO 2x over the next 5-10 years

4. **Industry structure is at a challenge under given network evolutions**
   Network sharing is already announced in Sweden and South Korea, and is rumored in many other countries

5. **Industry at Channel islands will have to work closely if it is to support 5G evolution**
   Several enablers will need to be discussed within the industry to facilitate the evolution to 5G at Channel islands

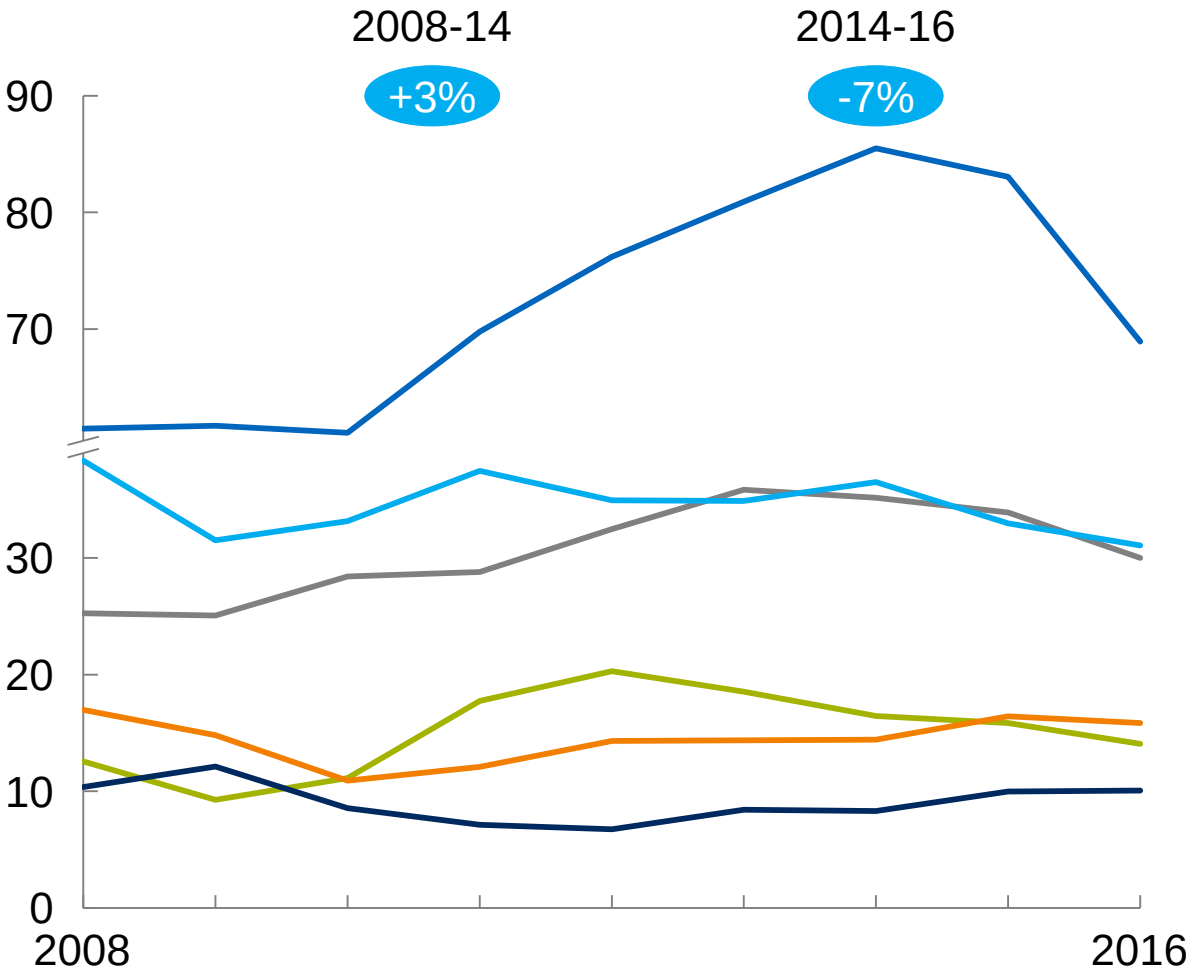
1 Industry is coming out of 4G investment cycle without having seen incremental monetization

USD trillions

North America | Latin America & the Caribbean | Europe | Asia Pacific | Middle East | Africa

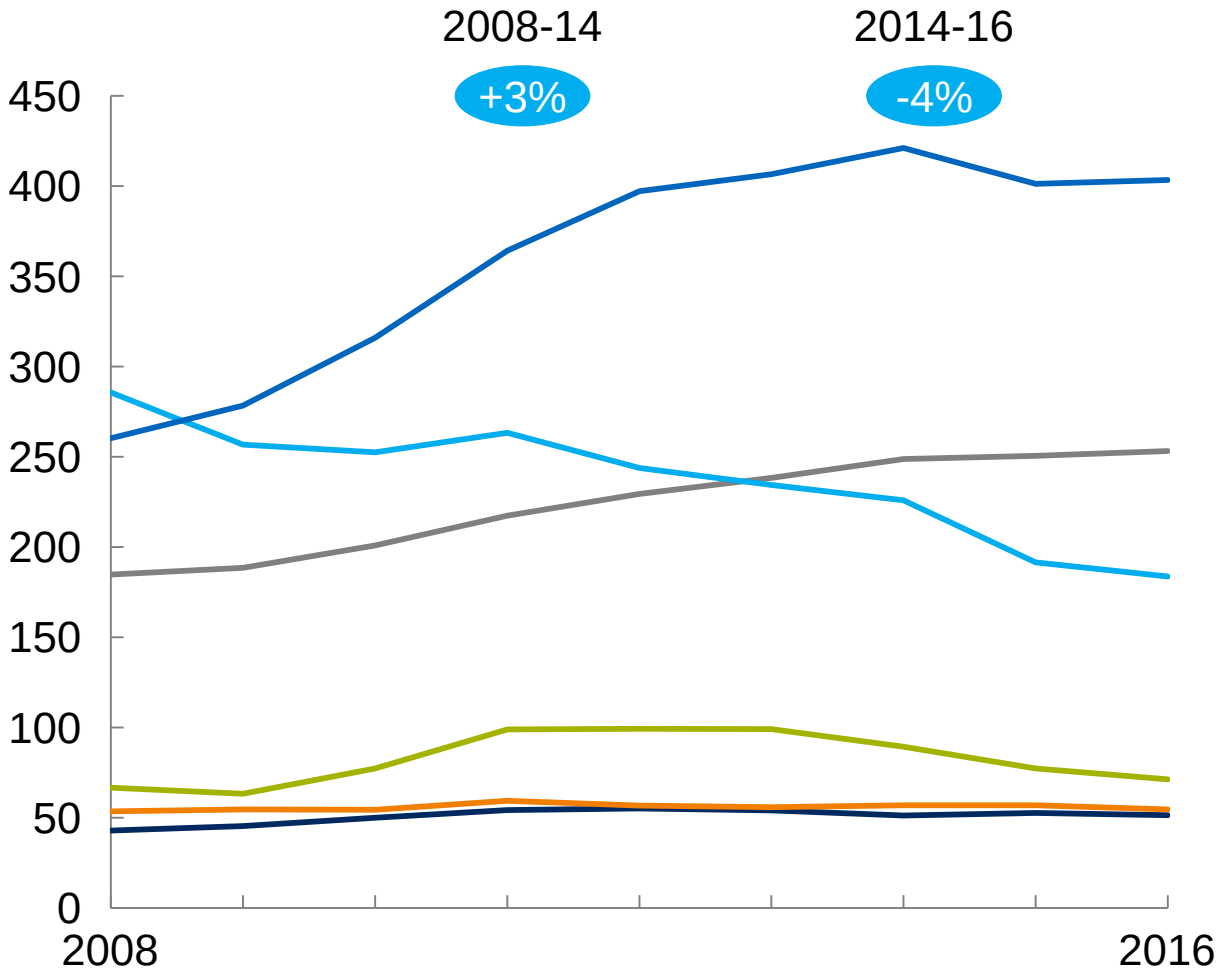
Mobile capex

CAGR, global mobile capex



Mobile revenue

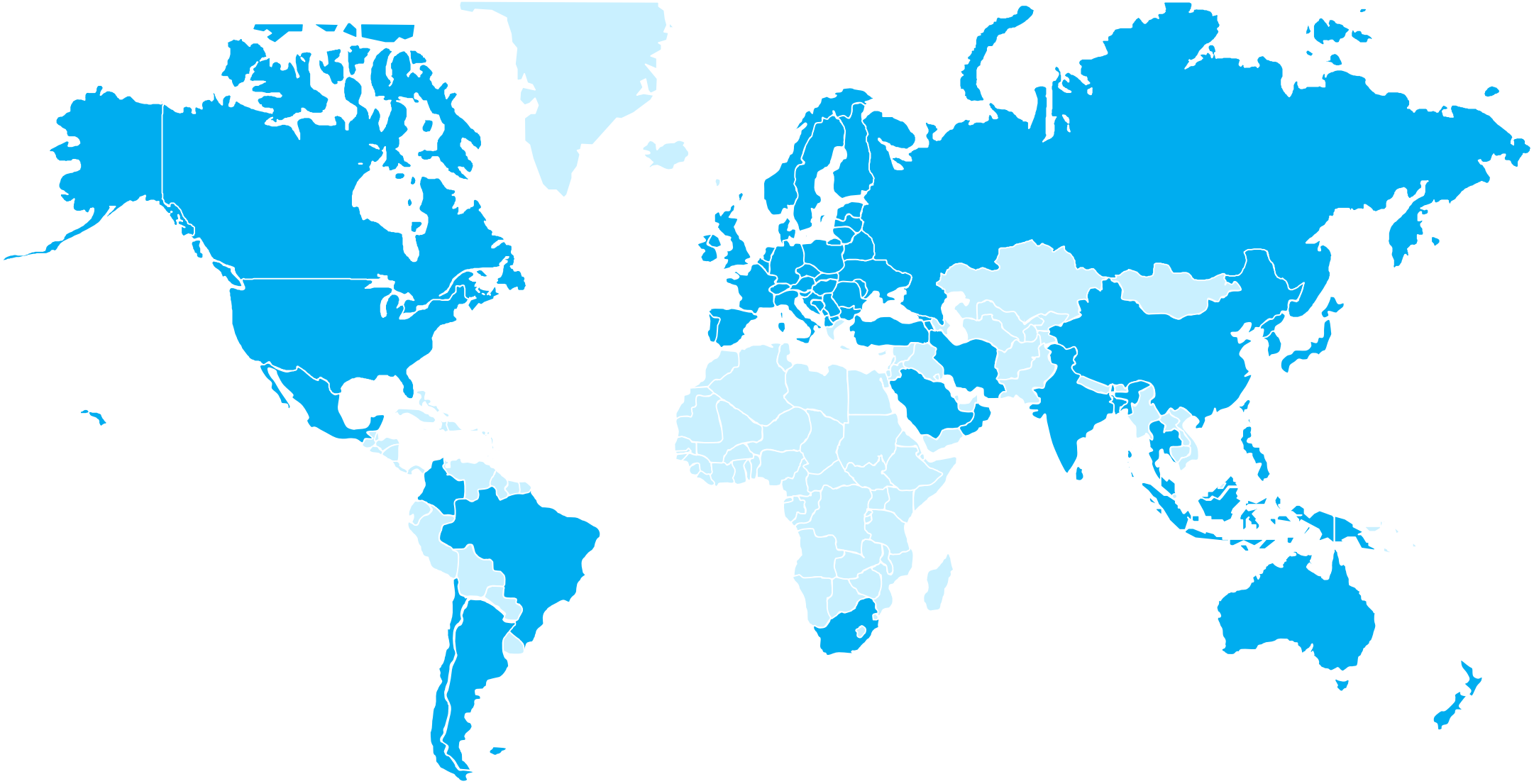
CAGR, global mobile revenue



SOURCE: Ovum

1 We see an acceleration in operator 5G announcements and build-out plans

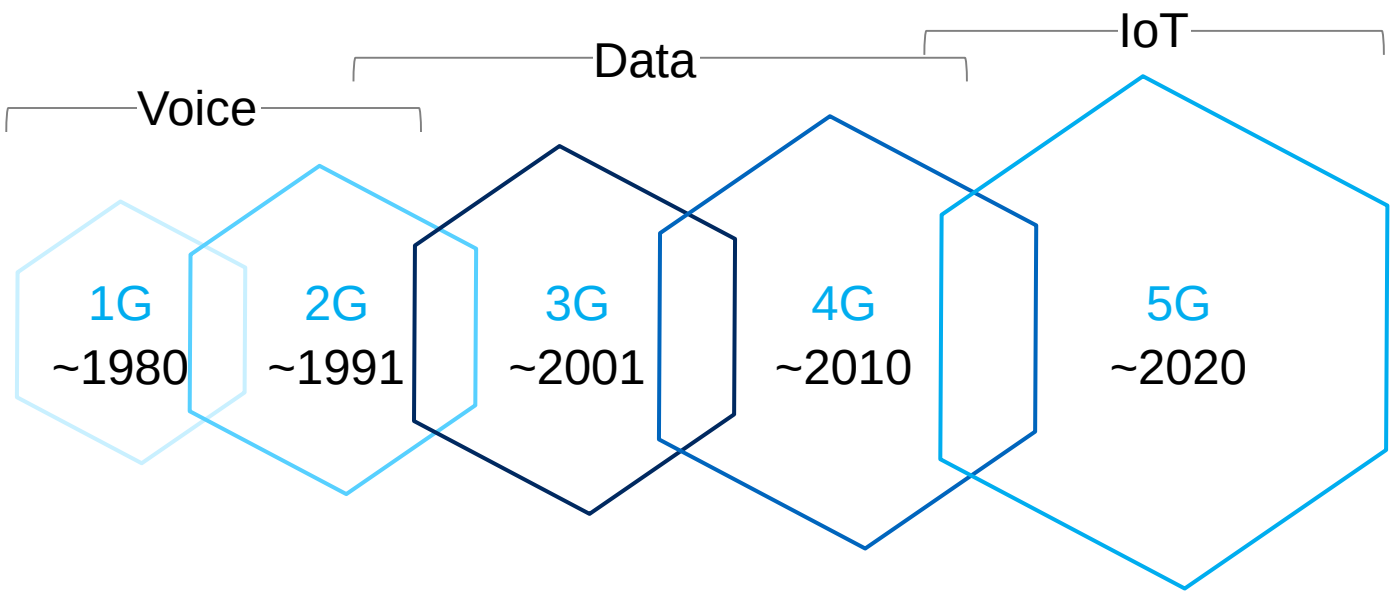
As of August 2018, 154 operators in 66 countries have demonstrated, tested or are trialing 5G technologies



SOURCE: GSA, Evolution of LTE to 5G, August 2018.

2 But what is 5G? – next cycle in mobile communication?

Key application



- Growth period for telecom with coverage race
- Strong contribution to GDP
- Regulatory focus on infrastructure competition

- Emergence Of mobile data, smartphones and Apps
- Spectrum auctions creating burden on industry
- Innovation moves to software

- Next phase Of evolution extending performance of mobile networks

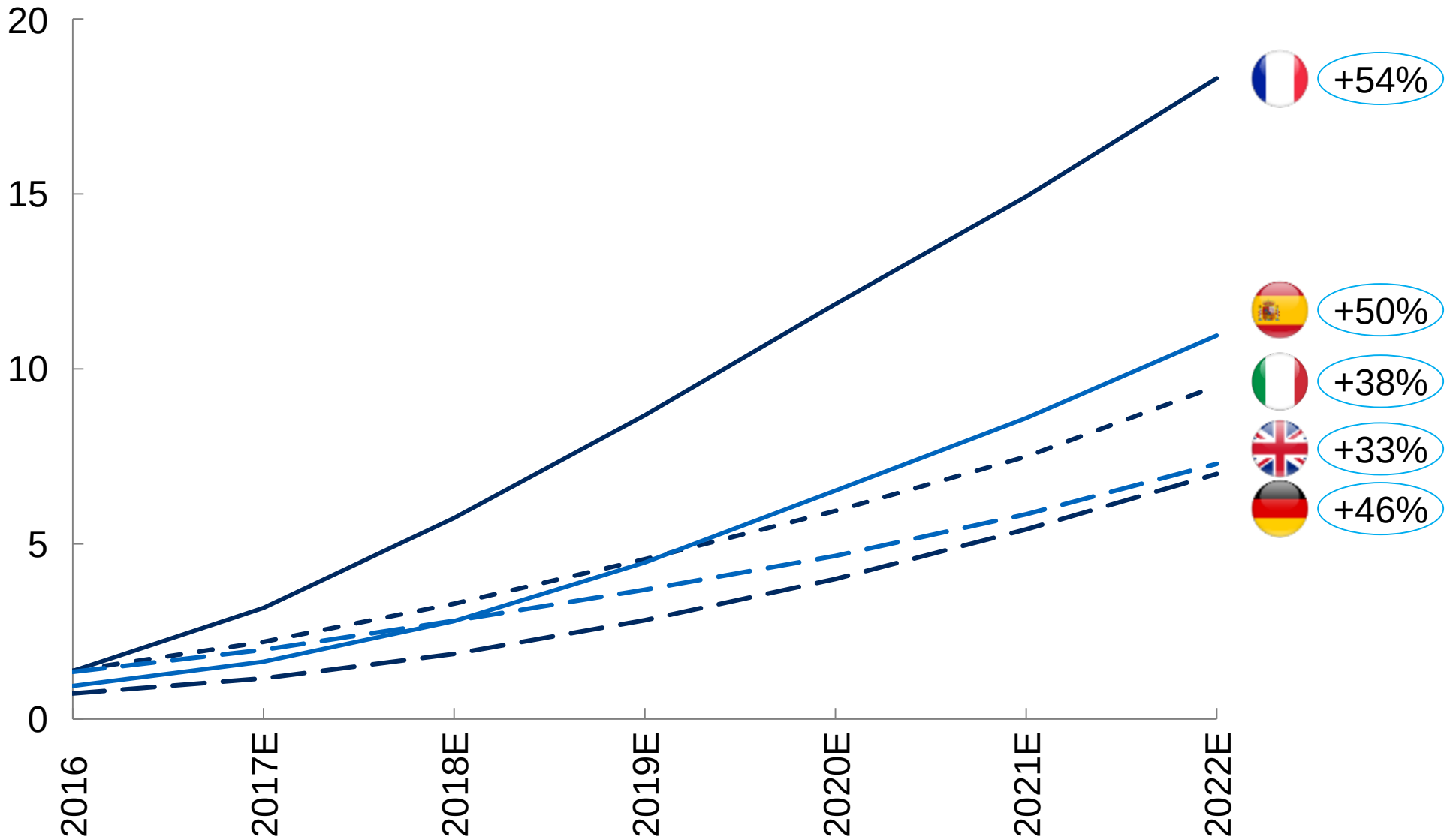
Example Of 5G KPIs

- 10-100x typical user **data speed rate** (up to 1 Gbps)
- **10-100x connected devices**
- **Low latency** (<1 ms)
- **1,000x data volume** per unit area

SOURCE: Wireless Broadband Alliance; McKinsey Analysis

2 5G will help operators accommodate traffic demand growth…

Data consumption forecasts in European countries, GB/sub/month



CAGR,%

+54%

+50%

+38%

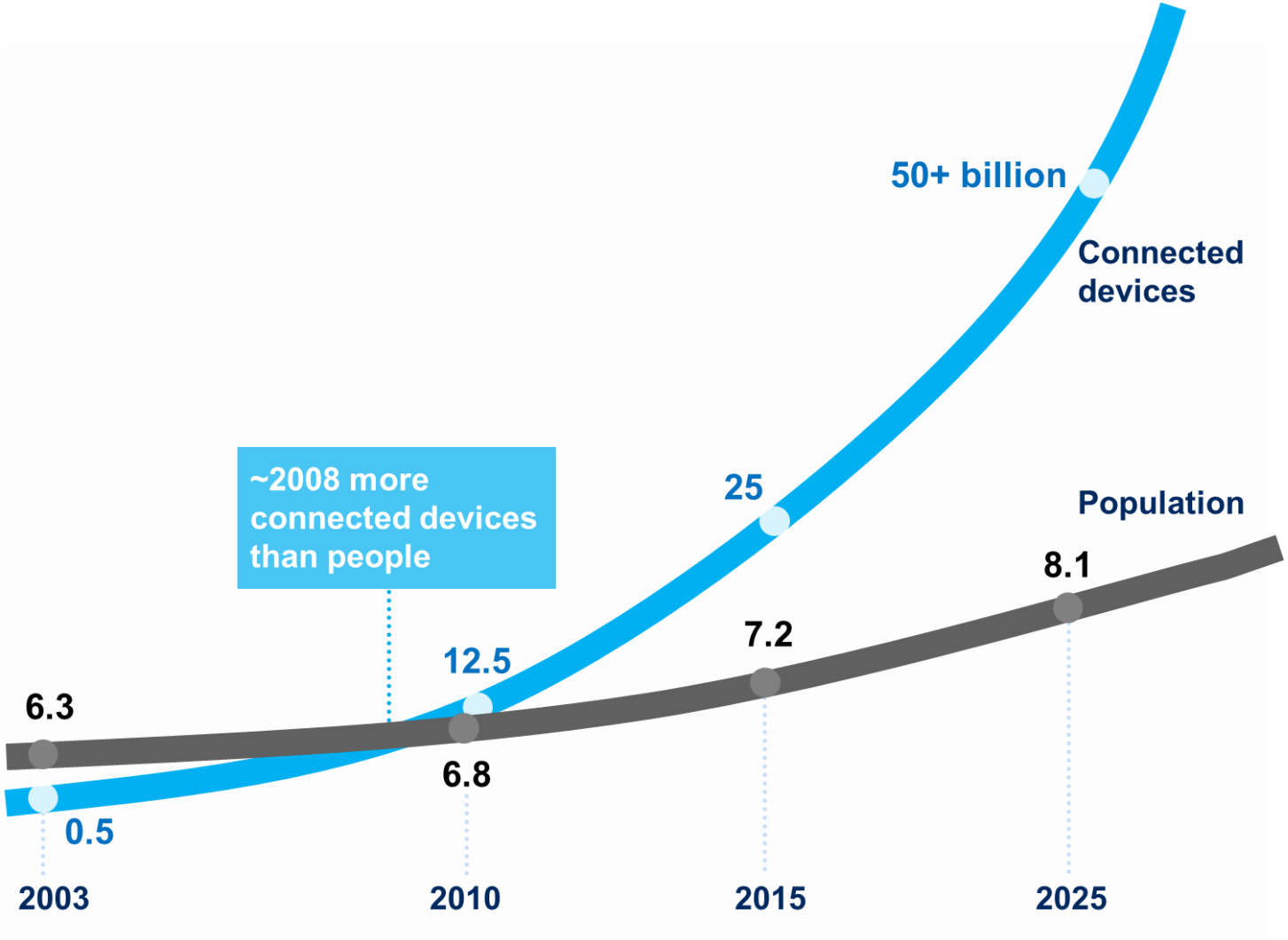
+33%

+46%

SOURCE: Analysis Mason

2 … next wave of connectivity is for IoT …

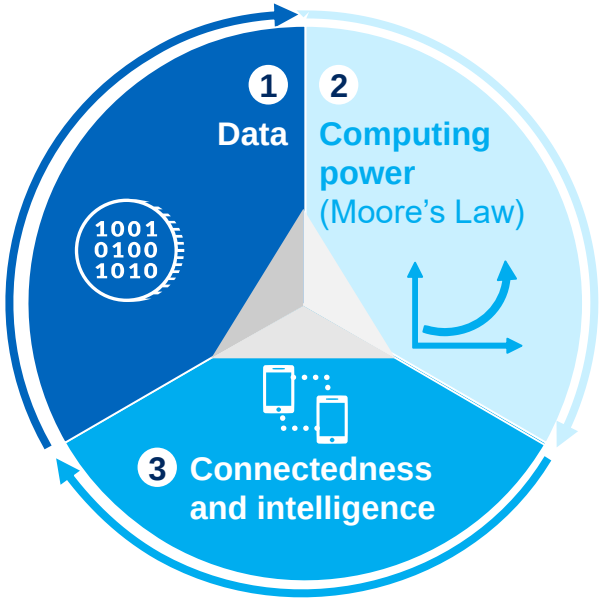
Connected devices surpass individuals



Due to three critical enablers

sensors shipped in manufacturing increased from 4.2B in 2012 to 23.6B in 2014

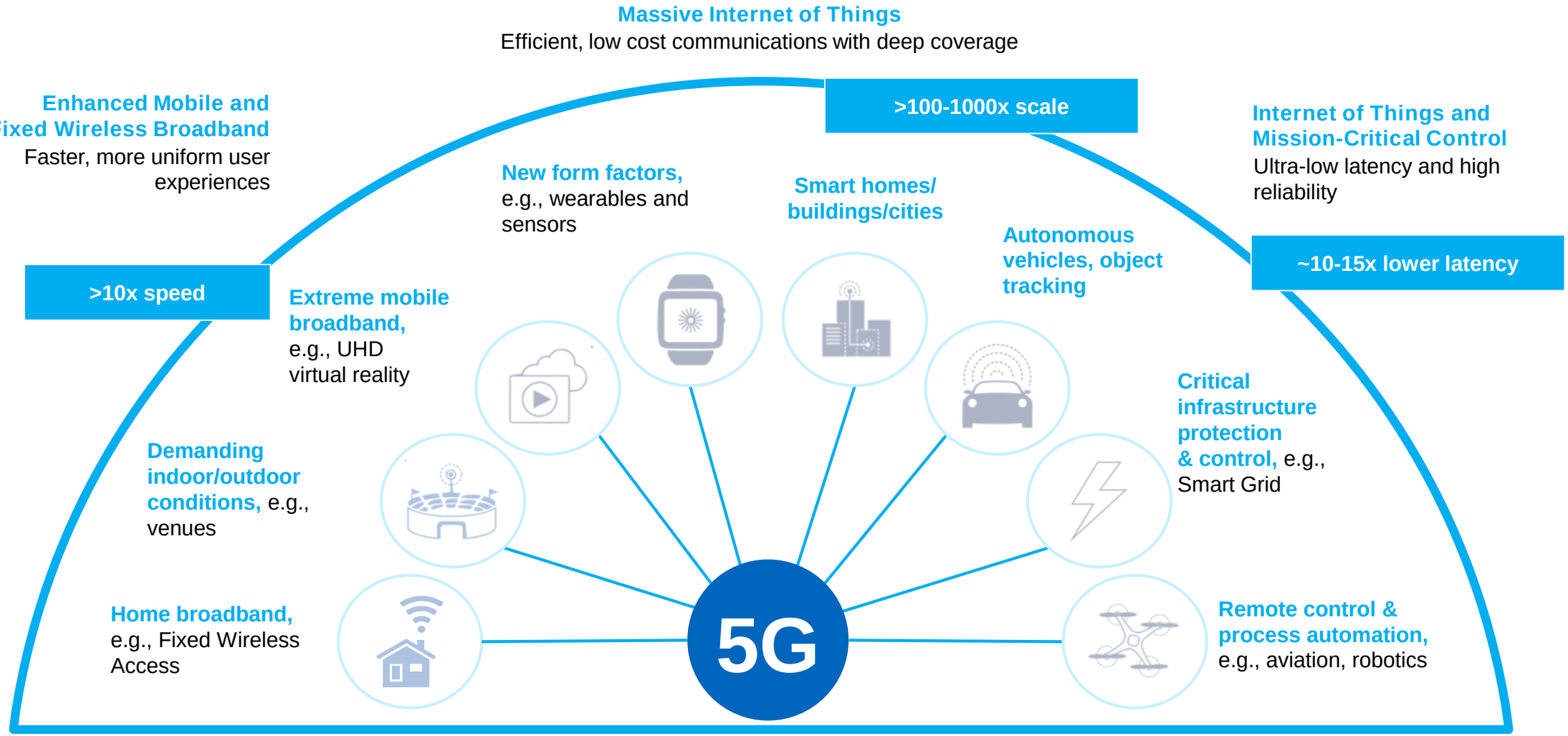
1,000 fold increase in computing power/mm^2 in last 10 years



Machine intelligence predicted to match that of humans by 2029

SOURCE: Statistisches Bundesamt; Deutsche Bundesbank; Prognos; Thomas Nipperdey; McKinsey

2 … and new use cases –grouped into three types of use cases enabled by step-change in speed, latency and number of connections handled



SOURCE: Qualcomm, NGMN, Expert interviews

ILLUSTRATIVE

2 5G is to a large extent B2B play, with several services that will mature in the next 3 to 5 years

Legend (market maturity horizon): ● Short term, ~2020 ● 2020-2025 ● 2025+

Key use cases	Example applications	Market maturity horizon	Likely monetization models: B2C	B2B2C	B2B	Illustrative "2B" clients
Fixed wireless access	Fixed wireless access as a substitute for fixed broadband connectivity	Short term, ~2020	✓			*SMEs*
5G hot spots EMBB boost	Smart helmets	Short term, ~2020	(✓)	✓	✓	Aqua Splash; Guernsey Football Club; EA
	Cloud gaming	Short term, ~2020	✓	✓		
	Streaming and live broadcasting HD video1	Short term, ~2020	(✓)	✓	✓	
	Cloud office /storage	Short term, ~2020			✓	
Virtual & Augmented Reality	Cloud AR/VR	2020-2025			✓	Pokémon
	Interactive AR/VR gaming	Short term, ~2020	✓	✓		
In vehicle infotainment	HD streaming	Short term, ~2020			✓	Island Taxis; Domino Cabs
	Video conferencing	2020-2025			✓	
	Gaming	2020-2025			✓	
Autonomous vehicles	Aided driving	2020-2025	(✓)	✓		Channel Islands Logistics; Condor Ferries
	Platooning	2020-2025		✓	✓	
	Autonomous driving	2025+	(✓)	✓		
Drone Applications	Field mission, e.g., agriculture, industry outdoor	2020-2025			✓	amazon.it; Ministry of Defence
	Safety & emergency interventions	2025+			✓	
	Logistics (delivery)	2020-2025			✓	
Tactile internet	Remote precise interventions (health or similar)	2025+			✓	
	Security / natural disaster interventions	2025+			✓	
Industry 4.0 applications	Cloud based wireless robot control in manufacturing	Short term, ~2020			✓	Schroders; Channel Islands Surfboards

1 E.g., panoramic cameras, 8k

SOURCE: McKinsey

2 5G will enable significant value creation, but connectivity is diminishing in terms overall value capture

IoT market outlook 2020 by vertical; EUR billions

Market size, 2020

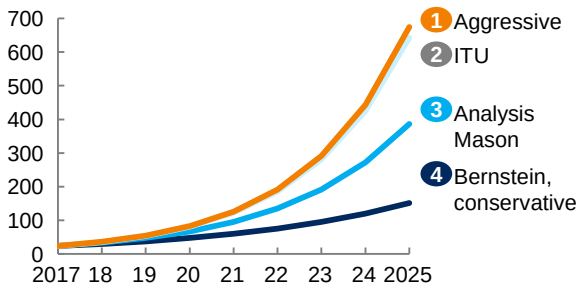
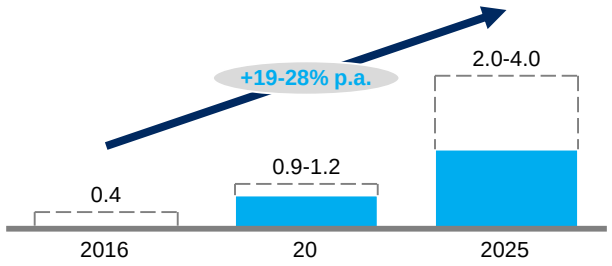
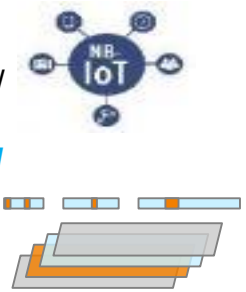
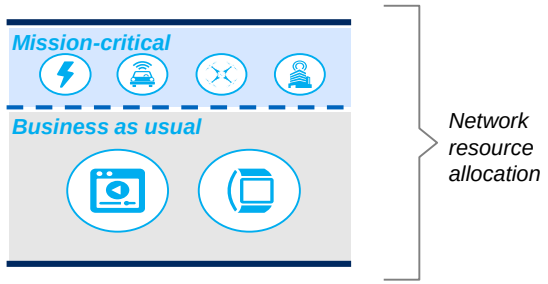
- USD 0-0.5 billion
- USD 0.5-1 billion
- USD 1-2 billion
- > USD 2 billion

		Con-nected car	Industry 4.0	Smart utilities	Retail	Public safety	Smart city	IT	Smart home	E-health	Total
Software	Services/ applications	90.0	70.0	14.1	12.9	13.0	7.2	6.1	1.7	2.9	218.0
	Enablement platform	6.5	2.4	4.2	0.5	0.4	1.7	0.3	0.6	0.5	17.1
	Cloud infrastructure	1.4	0.3	0.5	0.1	0.0	0.1	0.0	0.1	0.1	2.6
	Connectivity	2.6	0.0	0.0	0.4	0.6	0.5	0.0	0.0	0.1	4.2
	Connectivity hardware	1.6	2.0	1.1	0.2	0.1	0.3	0.5	1.8	0.5	8.2
	Total	102.1	74.7	19.8	14.2	14.1	9.8	6.9	4.2	4.0	249.9

- **Almost 75%** of total 2020 revenue will be in just three verticals: **connected car, smart utilities and industry 4.0**
- **Over 90%** of the total value lies in **services and the enablement** platform
- **Connectivity** revenues will be **small, making up < 2%** of total IoT market

SOURCE: Machina; MGI

3 Key challenge of future 5G RAN will be to cope with the scale-up required from data growth while minimizing constraints new use cases introduce

	Key challenges	Description	Network infrastructure requirements
Enhanced Mobile Broadband	**Annual data consumption,** PB 	▪ User- and machine-generated data is **expected to increase ~25-50% p.a.** by 2025, overall growing **5-25x** vs. today's volumes	▪ **Upgrading** of sites (e.g. add'l bands, MIMO…) to cater for traffic needs ▪ **Rollout** of new sites (Macro, Small Cell) where upgrades are not sufficient 
Massive Internet of Things	**# of IoT devices in Europe**, Billions 	▪ IoT devices are expected to increase **5-10x** vs. today ▪ With heterogeneous requirements countrywide	▪ Rolling out **narrow-band technologies** (e.g. NB-IoT) to cater for low-power/ wide-area needs ▪ Assigning **network layers/ bands** and **slices** to IoT 
Mission-Critical Control		▪ Mission-critical applications to require **dedicated resources**, **small latency**, and **high resiliency / reliability**	▪ Deployment of **country-wide low-band 5G** layer for universal coverage ▪ Increasing **fiber** adoption to **~100%** ▪ Dedicating **e2e slices** for critical applications 

Massive network scale-up

Network resource constraints

SOURCE: Analysis Mason; Bernstein Research; other industry and vendor / telco reports; McKinsey

3 Enabling 5G use cases will trigger investments across all network domains

☐ Illustrated next

Key use cases are pushing network evolution

New spectrum

a **New <800 MHz bands,** e.g. new coverage bands for IoT

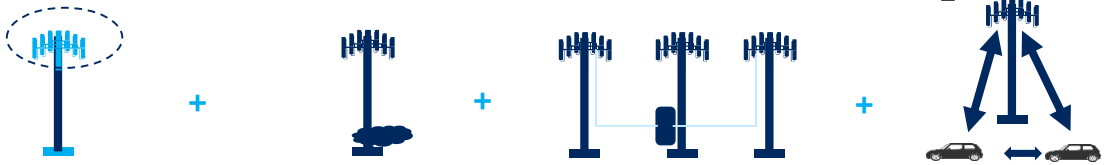
b **New >3GHz** bands, e.g. for small cell deployment in urban

c **Spectrum refarming** from 2g, 3g and 4g

d **Unlicensed** or secondary license access

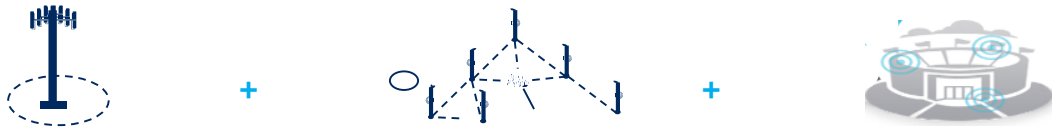
2 RAN infrastructure

a **Legacy evolution & new network architectures**



- Active antennas
- Massive-MIMO
- Beam forming
- SDR, vRAN
- Cloud RAN
- Edge computing
- "Side links"

b **Network densification**



- New macro sites
- Small cell densification
- Advanced indoor & DAS

c **5G Network sharing**

3 Transmission

a **80-100% backhaul fiberization**

b **New techno-logies:**
- **FTT-S**ite
- **FTT-A**ntenna (Cloud-Ran)
- **mmWave** backhaul

4 Core & features

a **"SAAx", NFV, ultra SON, analytics**

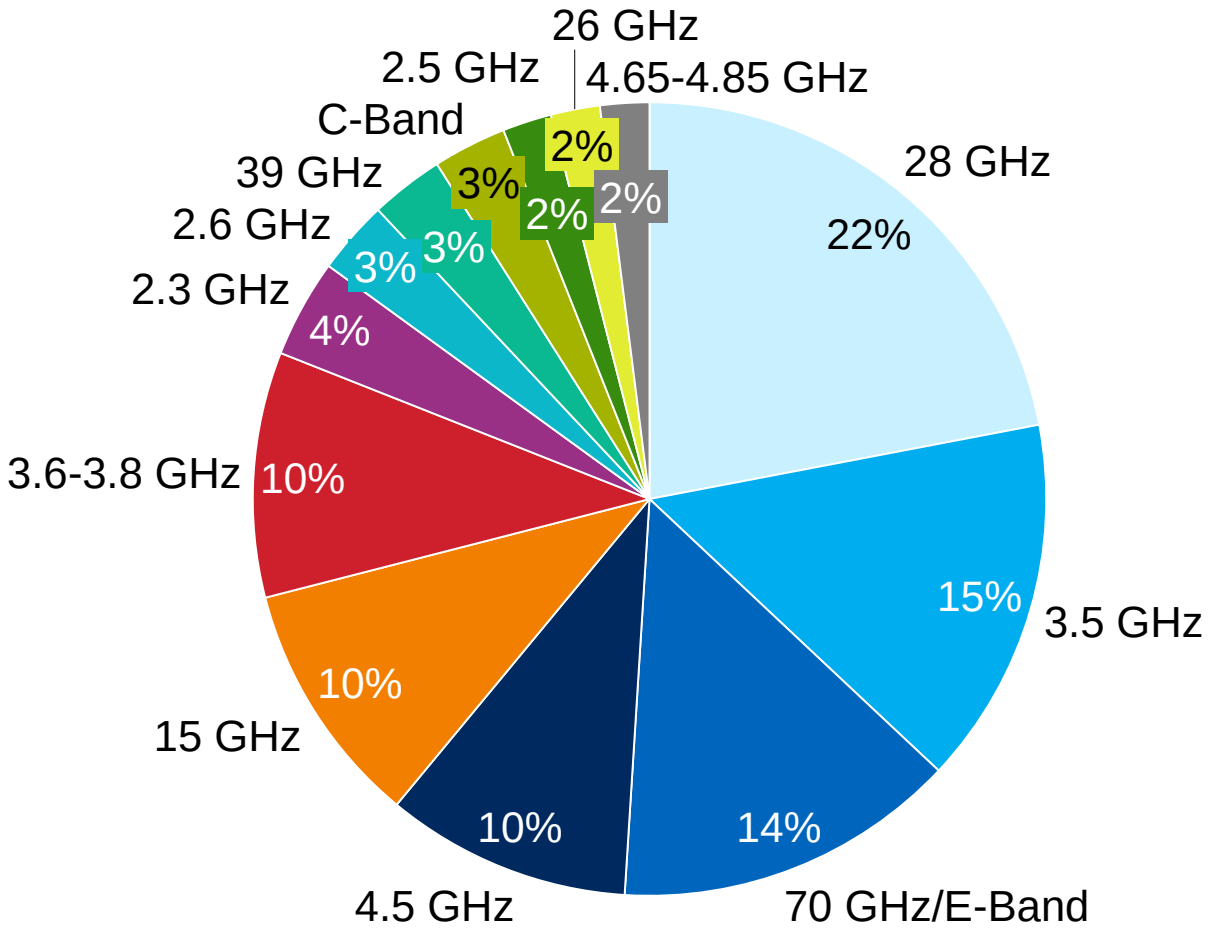
b Separation of **C-plane vs. U-plane**

c **Network slicing**

SOURCE: McKinsey

3 Upcoming spectrum auctions put urgency on 5G plans

Global trials; percent



- *Global 5G trials predominantly focus on 28GHz and 3.4-3.8 GHz bands, from GSA report*
- *US leading initiatives in mix of licensed and unlicensed layers empowered by the technology companies (e.g., CBRS[1] and PAL[2])*

1 Citizen's Broadband Radio Service
2 Priority Access Licenses

SOURCE: GSA report; policy tracker; expert interviews

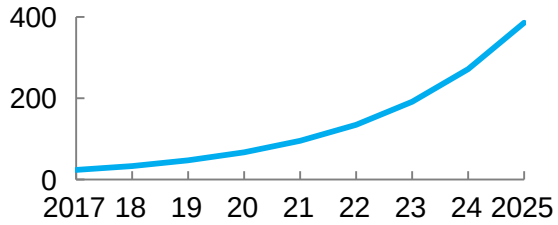
3 Simulation for a European country show that RAN TCO will double before 2025 TCO for access network2 (opex + capex)

35% PA TRAFFIC GROWTH ASSUMED

5G use case requirements will drive demand for network resources …

Enhanced mobile broadband

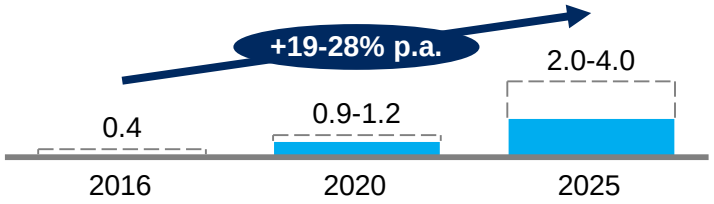
Annual country-wide data usage, PB



- Data **to increase ~35% p.a.** by 2025, overall growing **~11x** vs. today

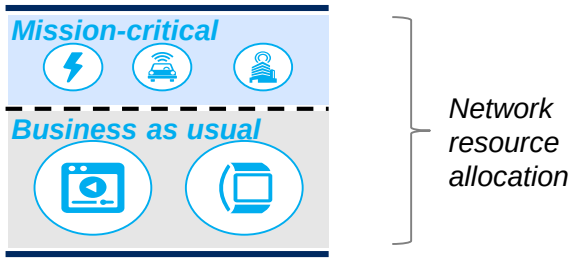
Massive internet of things

# of IoT devices in Europe Billions



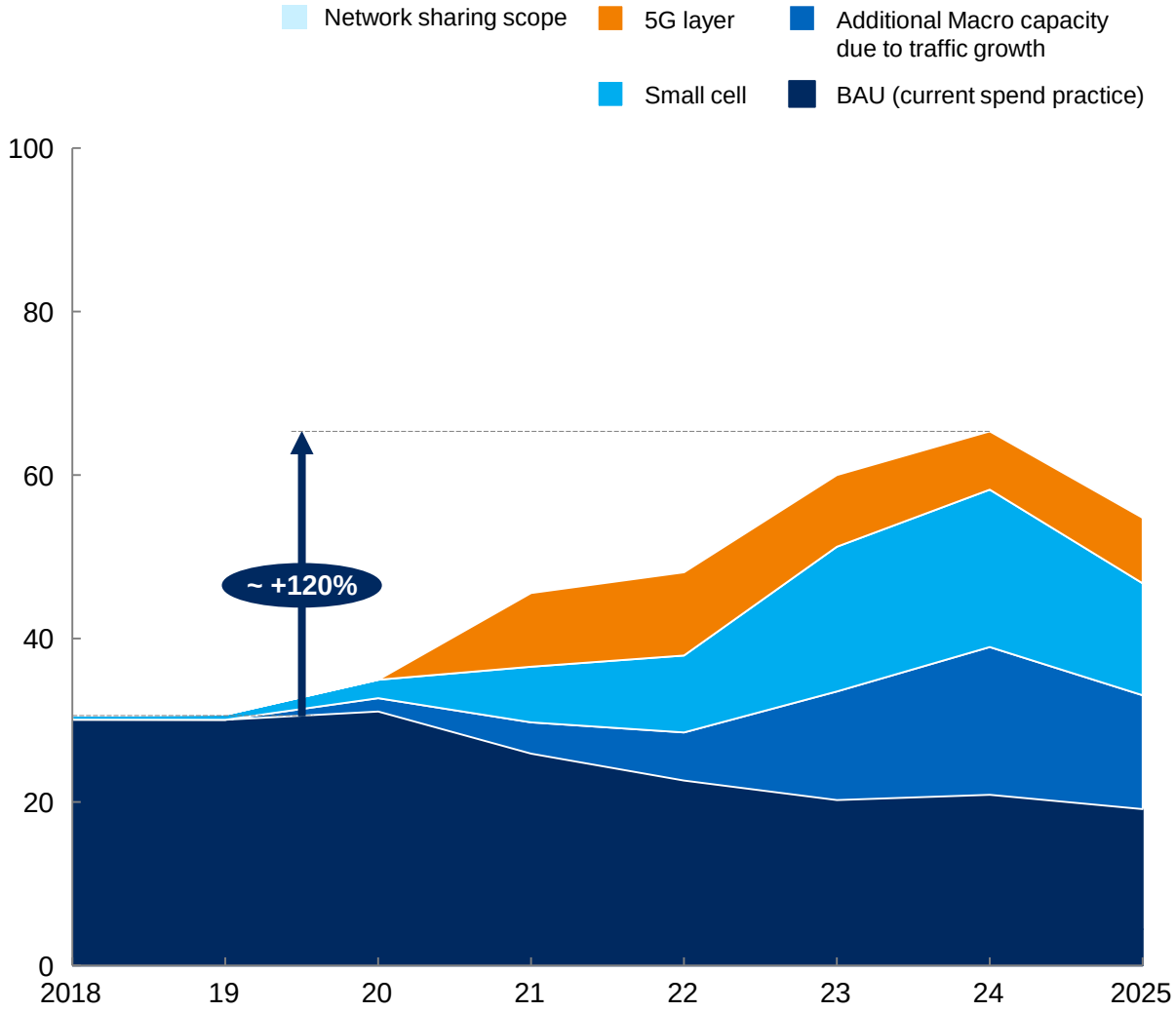
- IoT devices to increase **5-10x** vs. today; with heterogeneous requirements; countrywide

Mission-critical control



- Need for **dedicated resources, small latency,** and **high resiliency and reliability**

… resulting in >100% increase in TCO if all operators build as-is

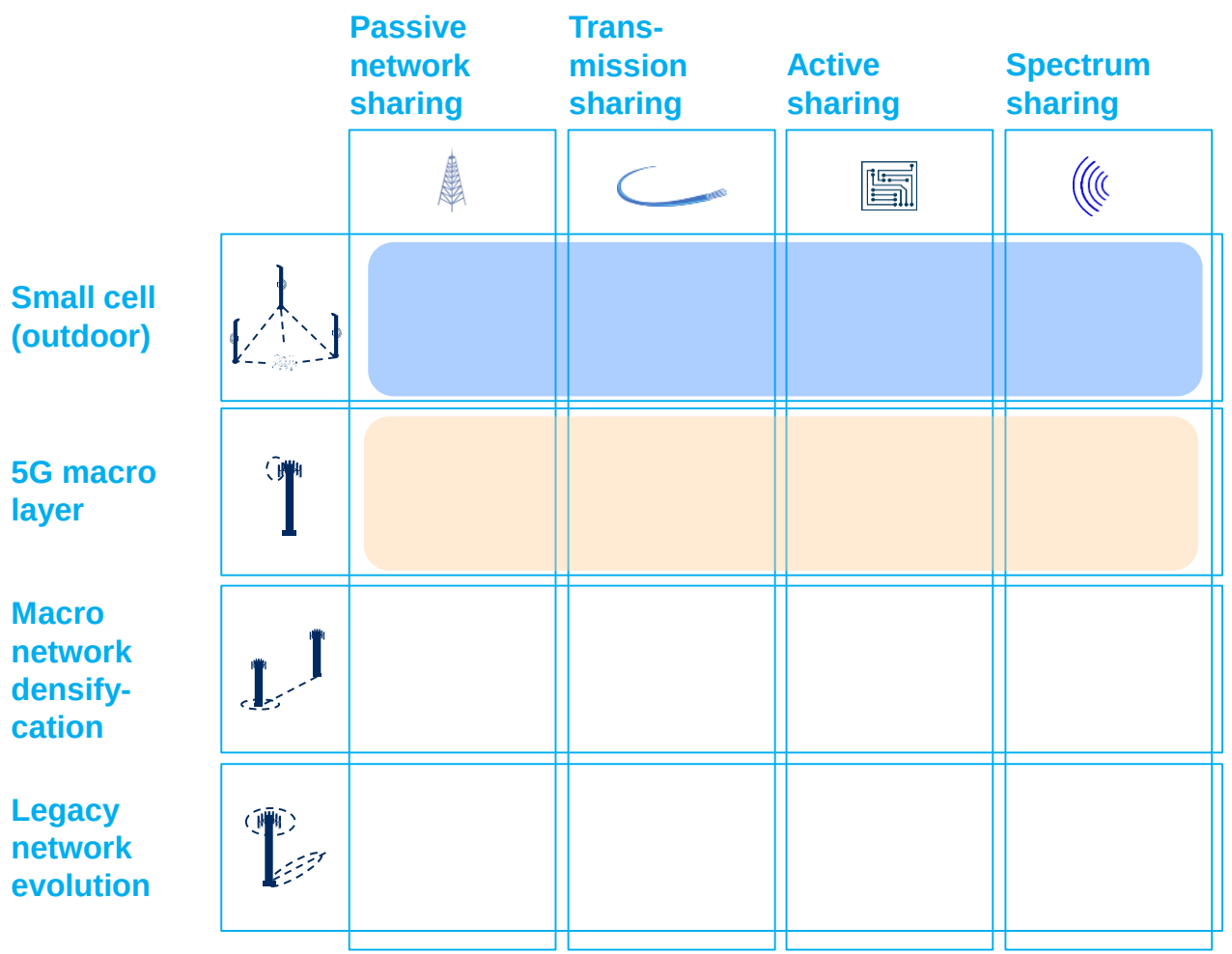


1 Simulation for all 3 operators in a European country based on actual network capacity simulation
2 RAN + transmission

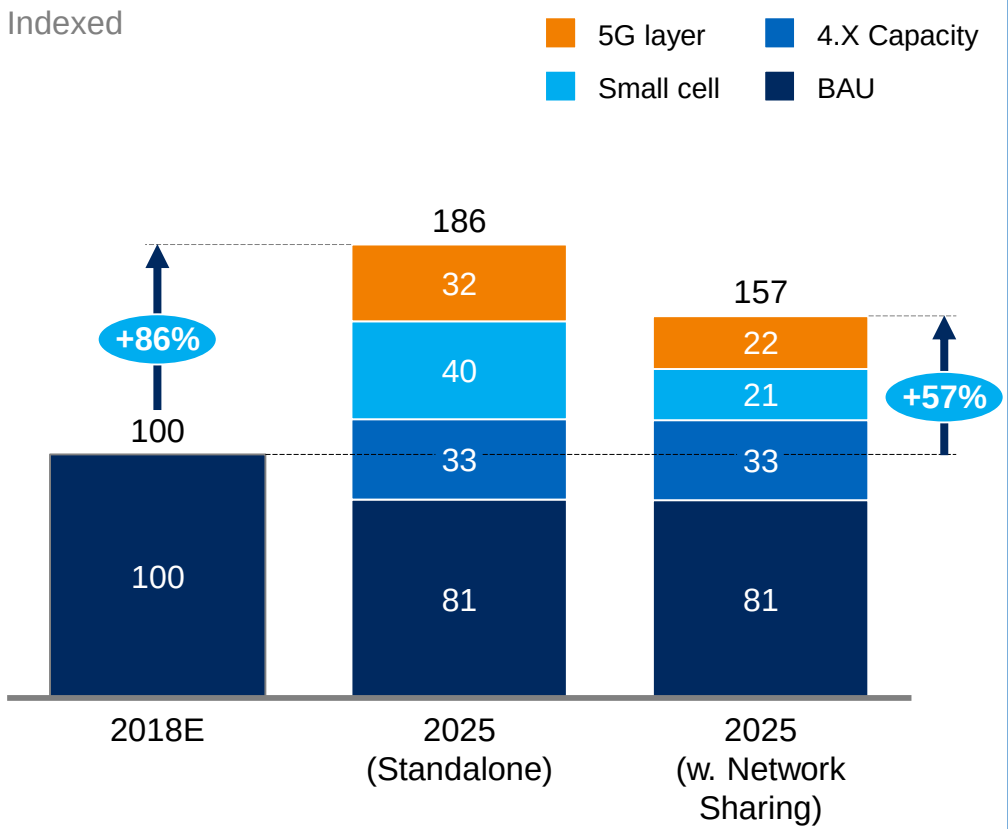
SOURCE: McKinsey

4 Network sharing/wholesale can reduce 5G spend in access networks by ~40%

Proposed network sharing domains



Annual RAN TCO[1] evolution



- **Network sharing** is a lever that can **reduce 35-40% of the incremental RAN TCO**
- Operators will need to consider **other levers to further reduce cost**, including wider sharing and cost cutting (see appendix)

1 Opex+Capex

SOURCE: McKinsey

4 5G network sharing is already announced in Sweden and South Korea

Telenor and Tele2 plans agreed to build a common 5G network in Sweden

- Telenor and Tele2 announced plans to build a common 5G network in Sweden in Dec 2016
- Tele2 and Telenor already share 2G and 4G networks via their joint company Net4Mobility
- Plan to provide customers with a fully functional 5G network by 2020
- Telenor CEO stated that 5G network would be business case driven with a gradual roll-out

"The advantages of two parties joining forces to develop a 5G network are not solely financial. It also gives us tremendous benefits in terms of how quickly and flexibly we can work when the network is actually rolled out."

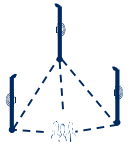
– Samuel Skott, CEO Tele2, Sweden

South Korean operators plan to launch a common 5G network to reduce costs

- Korean operators KT, LG U+, SKT and SK Broadband agreed to develop a common 5G network in April 2018
  - The common network is expected to save USD 938 million over 10 years in 5G investments
  - Korea Information Society Development Institute will develop pricing models for the carriers
- South Korean government coordinated the effort as part of its ICT strategy to reduce redundant investments in network
  - 5G network is expected to have 4 to 18 times more base stations than 4G
  - 17 government agencies would also provide access to street light and transportation structure for telecom equipment installation
- All 3 operators have secured 5G spectrum in 3.5GHz and 28GHz band

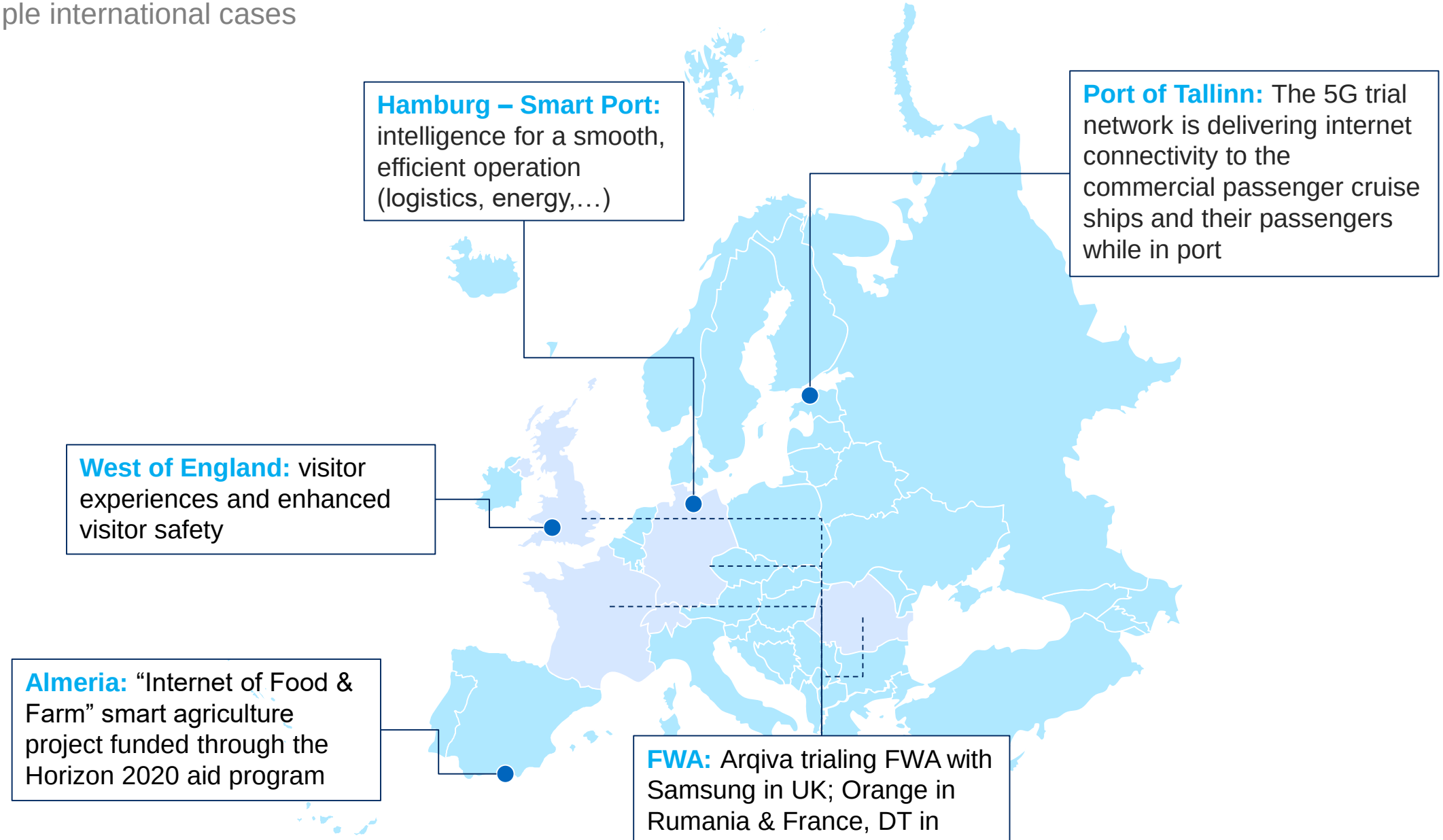
SOURCE: Telegeography; press

5 Channel islands will have to work on several enablers on the way to 5G

	Examples	Stakeholders
Spectrum 	▪ New frequency bands, 700, 3.5G, mmWave ▪ Spectrum access policies, e.g., sharing, secondary spectrum access, use-it or lease-it ▪ Rollout obligations	Ofcom, CICRA
Network densification 	▪ Access to urban furniture ▪ Access to government property and land	CICRA
Backhauling / Fiber 	▪ Fiber connectivity and new fiber rollout ▪ Fiber access policies	JT, sure., Newtel, CICRA
Capacity evolution 	▪ Building permits process speedup ▪ Equipment upgrades & swaps	CICRA, NOKIA, ERICSSON, HUAWEI, ZTE
Other enablers and limitations 	▪ Network sharing and wholesale policies ▪ EMF management ▪ Funding, government and industry-led venture funds	CICRA

5 Industry will have to build use cases tailored for Channel islands

Example international cases



Hamburg – Smart Port: intelligence for a smooth, efficient operation (logistics, energy,…)

Port of Tallinn: The 5G trial network is delivering internet connectivity to the commercial passenger cruise ships and their passengers while in port

West of England: visitor experiences and enhanced visitor safety

Almeria: “Internet of Food & Farm” smart agriculture project funded through the Horizon 2020 aid program

FWA: Arqiva trialing FWA with Samsung in UK; Orange in Rumania & France, DT in Germany, Swisscom

SOURCE: Company web sites, press

5G Conference

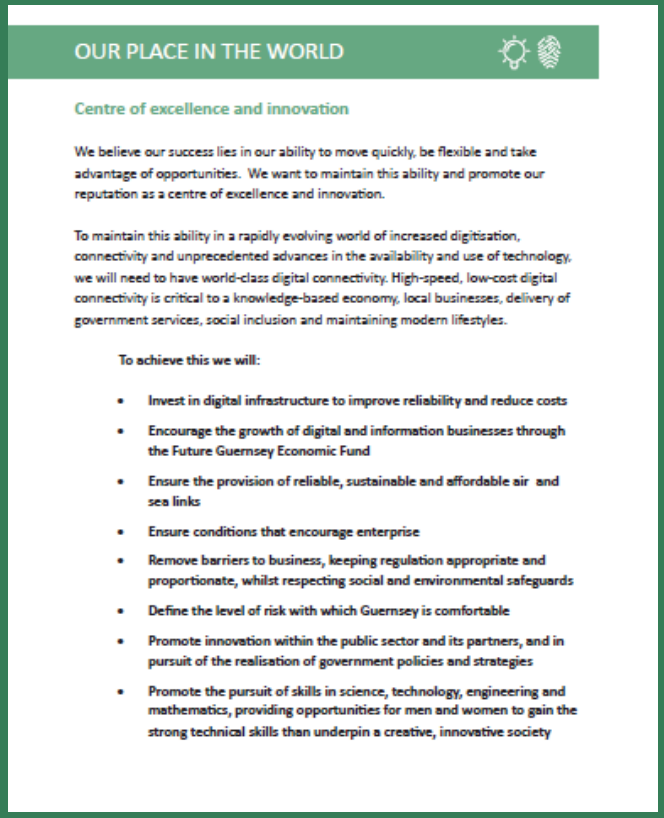
Colin Vaudin
States of Guernsey - Chief Information Officer CIO

States of Guernsey

26th November 2018

Key Policy Documents

Policy and Resources Plan



Policy and Resources Plan
Approved by the States on 16 November 2017

States of Guernsey

Medium Term Financial Plan

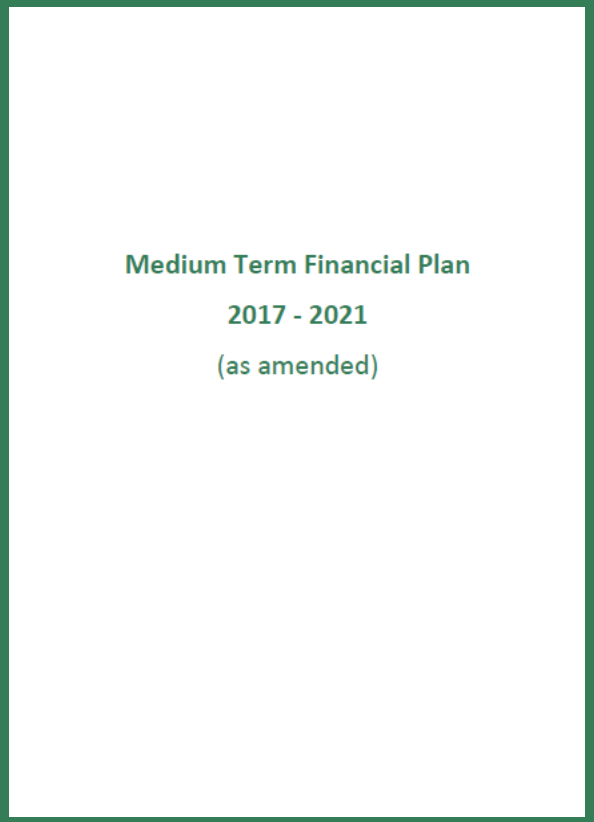


Table 27: Portfolio Projects in the Grow Category

GROW CATEGORY		
Small	1	Cyber Information
Medium	2	Castle Cornet Refurbishment
Large	3	Digital Infrastructure
	4	Strategic Air and Sea Links Infrastructure (Pipeline)
	5	St Peter Port Harbour Action Area Development (Pipeline)

MTFP

Approved by the States on 16 November 2017 as part of the Budget Debate

States of Guernsey

Future of Telecoms

Published 19 June 2018

- Published by Committee for Economic Development
- Consultants – RedSky
  - Ian Campbell – Ex CEO Airtel Vodafone
  - David Fowler – Ex CTO SURE
- Consulted with:
  - SURE, JT, Airtel Vodafone
  - CICRA
  - OFCOM
  - SoG CIO, CfED, CfHSC, CfESC, CfHA, Planning and Development Authority
  - IoD and CoC
- Supporting Documentation
  - Analysis Mason Review 2016
  - CfED Digital Sector Strategic Framework

States of Guernsey

Future of Telecoms

Published 19 June 2018

The key recommendations in this Telecommunications Sector Policy Statement are:

1. The current competitive telecommunications market will deliver fibre to all business districts with 2-3 years and no Government intervention is required.
2. The current competitive telecommunications market is likely to deliver up to 100Mbps high quality superfast broadband to around 85% of the population with 2-3 years. Government support will be required to roll-out superfast broadband to the remaining 15%.
3. CICRA will develop the regulations to enable Government direct support where the commercial business case is uneconomic, and the telecommunications companies have made all reasonable steps to meet the 85%.
4. Government will support a 5G testbed and will, subject to business cases from telecommunications companies, work with CICRA to release spectrum on a temporary basis for 5G testing.
5. Next generation mobile will challenge the traditional investment models and Government will work with CICRA and the Telecommunications companies to develop the most effective network sharing architecture.
6. Government will develop a range of support for the early development of the most effective 5G networks sharing model through a range of measures from planning policy, availability of spectrum through to commercial use of States assets and capital investment.

States of Guernsey

Residential Superfast Broadband

Objective

- Superfast Broadband services available to all residential properties within 2 years

Definition

- Up to 100Mbps (needs to be converted into ASA)

Scope

- Commercial Case for Telco to deliver superfast broadband to c85% of residential properties within 2 years
- Support is for the residual c15% ONLY
- Network not retail level grant
- Work does not require a customer to take up the service

Work Required

- Define the c15% of properties and confirm with incumbent TELCOs there is no commercially economic case
- Define the level of grant to connect each property (network level only)
- Subsidy is paid when property is connected and connection speed is verified
- Technology agnostic (so VDSL or Fibre)
- Define conditions for grant (ie ensure all 15% are delivered)

Funding Model

- Likely approach - No tender, grant available to all Telcos who can deliver the service.

Fibre to Business

Objective

- Connect Businesses to full fibre backbone (not just fibre to business districts) within 2 years

Definition

- Direct connection to fibre backbone for access to services (ie 1Gbps)

Scope

- Business premises
- Network not retail level grant
- Telco will have to secure a retail customer

Work Required

- Define Business Districts
- Define scale of Business
- Define the level of grant to connect each business (network level only)
- Subsidy is paid when property is connected and connection speed is verified
- Define conditions for grant (ie ensure Telcos provide same offer to all (inscope) businesses)

Funding Model

- Likely approach - No tender, grant available to all Telcos who can deliver the service

States of Guernsey

Future of Telecoms – 5G

1 5G Network

A single, resilient 5G network that provides boundless connectivity can meet the needs of the Island. A far greater level of network sharing, a new single 5G network or a RAN sharing would meet this requirement. Government will support the regulator in developing the model for the delivery of the most cost effective 5G network that builds competition at all levels, not just the network level, to the advantage of the consumer. CICRA will advise on what legislative and regulatory action is required.

2 5G Backhaul

CICRA to consider the regulation of the interconnect cost of fibre backhaul to 5G sites as sites and backhaul transmission are shared. In this way no operator can enjoy a commercial advantage when it comes to rolling out 5G to areas where fibre is scarce.

3 5G Spectrum

Spectrum to enable 4G was free. The States of Guernsey and CICRA to consider the availability and cost of spectrum with the obligation to develop the most effective 5G network and to ensure sufficient spectrum is available.

4 Planning Policy

Planning policy will be used to encourage the rapid rollout and densification of the 5G network in support of the delivery of the most effective shared 5G network in accordance with the States environmental and planning

5 SoG Infrastructure and Funding

The States of Guernsey may wish to take a role in the commercial aspects of the future 5G network. The States of Guernsey, primarily through its trading entities, owns a range of transmitter sites, street furniture, buildings, underground ducts and off-island cables. In addition to direct funding, as identified in the Medium Term Financial Plan, these physical assets may be made available at

Published 19 June 2018

States of Guernsey

Next Generation Mobile – 5G

Objective

- Provide next generation mobile (5G) as soon as, if not earlier, than UK

Definition

- Incremental delivery as 5G technology evolves.
- Deliver a 5G FWA [release 15] network built for 5G [release 16] – 'Fibre in the Air, Everywhere'
- Rapid delivery of release 16 (with Slices) once technology is available

Outline Scope

- 5G Core, upgrade to existing cell-sites, delivery of c100-150 new cell sites.
- Ubiquitous, high capacity, high speed coverage to all population

Funding Options

- Discussions with Telcos and beauty parade (as required) in Q1/Q2 2019
    - work with Telcos on delivering best solution
    - specification of Red/Green Lines based on outcomes NOT detailed requirements
    - Range of funding models to be considered/ selected; if required
- Options for Single Netco/ Infraco [can include consortia], network sharing or RAN Sharing
    - NB does not preclude other networks being deployed
    - Open to all Telco Providers not just incumbents

Next Generation Mobile – 5G

Work Required

- Confirm plans to deliver SoG Government policy and/or where SoG can support to deliver outcomes
- Define licence conditions could include [but not limited too]:
  - Ensure all retail suppliers are supplied equally
  - Ensure no monopolistic position regarding 5G [Release 16]
  - Access to network Backhaul
  - Regulation of Network Pricing (cost +ve, NOT retail -ve)
  - Coverage, capacity and speed requirement
- Structure of Netco/Infraco
- Appropriate and proportionate access to new mast sites
- Delivery timelines

- Other considerations
  - 5G Netco/Infraco or a pan-CI Netco/Infraco?

Future of Telecoms - Timelines

19 June 2018 - Future of Telecoms Published
5 July 2018 – CICRA 5G Working Conference
TODAY - 26 November 2018 – CICRA 5G Conference
Q1/Q2 2019 – Detailed definition of the business cases, tenders (as required), 5G beauty parade and drafting of Policy Letter
Q2 2019 – CfED Policy Letter to the States of Deliberation
Q3 2019 – Contracting and 5G Licences' issued
Q3/4 2019 (onwards) - Delivery

States of Jersey

CICRA – 5G Summit

Stephanie Peat
Director of Digital and Telecoms Policy

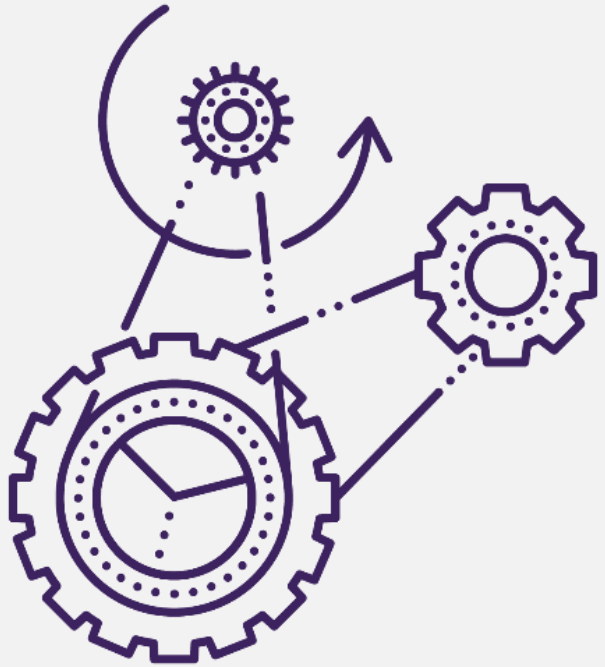
26 November 2018

The Council of Ministers has agreed strategic priorities

Official Sensitive: prepared in support of policy development. Not for circulation beyond the Telecoms Strategy Steering Group.

Jersey is committed to maintaining an ‘Advanced Digital Infrastructure’

- Support projects that improve digital infrastructure
- Promote innovation in the delivery of next-generation networks and services
- Encourage affordable services, with appropriate choice for homes and businesses
- Maintain resilience and capacity of Jersey’s digital infrastructure



Delivered as part of an overarching Telecoms Strategy for Jersey

- Consistent with wider policy aims
- Support the development of an advanced digital infrastructure
- Bolster businesses in all sectors that rely on connectivity & enable productivity led growth
- Deliver consumer and citizen benefits from connectivity
- Encourage affordable services with appropriate choice for homes and businesses
- Promote innovation in and remove any necessary barriers to delivery of next generation networks and services
- Maintain a level of resilience and capacity

5G is central to Jersey's Telecoms Strategy

Five interconnected policy principles underpin Jersey's Telecoms Strategy

- Promote the path to next generation connectivity building on the current advanced digital infrastructure already in place
- Promote retail competition (not network competition) as the most effective way of delivering the benefits of next generation connectivity to consumers and businesses
- Set out clearly any universal service obligations and deliver social policies from the telecoms sector only when it is efficient to do so and the cost/funding are transparent
- Ensure resilience of off-island connectivity
- Measure outcomes using appropriate key performance indicators (KPI's) developed in consultation with the industry

Which agrees the principles for our approach to delivering 5G connectivity

Our Telecoms Strategy principles are informed by a set of policy recommendations that guide our approach

- Be a fast adopter of next generation technologies
- Maximise the advantage of Jersey's Gigabit network
- Adopt policies to incentivise mobile network sharing and rollout of mobile next generation technologies across relevant Government departments and CICRA
- Continue spectrum management via Ofcom, with CICRA ensuring better coordination and communication with Ofcom
- Coordinate with the UK, Guernsey and other European jurisdictions on using new technologies to deliver specialised services (e.g. TETRA)

Next steps

There's a great deal of work ahead of us:

- We will take a 'one government' approach with a cross-government Telecoms Steering Group
- We will work with our stakeholders to understand which form of shared 5G network will deliver the greatest benefits
- A pan-Island network might have advantages – we need to continue work to understand these and any risks
- States of Jersey has a key role to play – we will be an active participant
- Regulation will continue to play a central role - retail competition benefits everyone, network operators, consumers, business and the wider economy
- We will encourage CICRA to work with Ofcom to ensure spectrum is released in a timely manner

States of Jersey

CUSTOMER FOCUS

CONSTANTLY IMPROVING

WE DELIVER

BETTER TOGETHER

ALWAYS RESPECTFUL

5G Summit Meeting – Guernsey

Planning Perspective

Development & Planning Authority

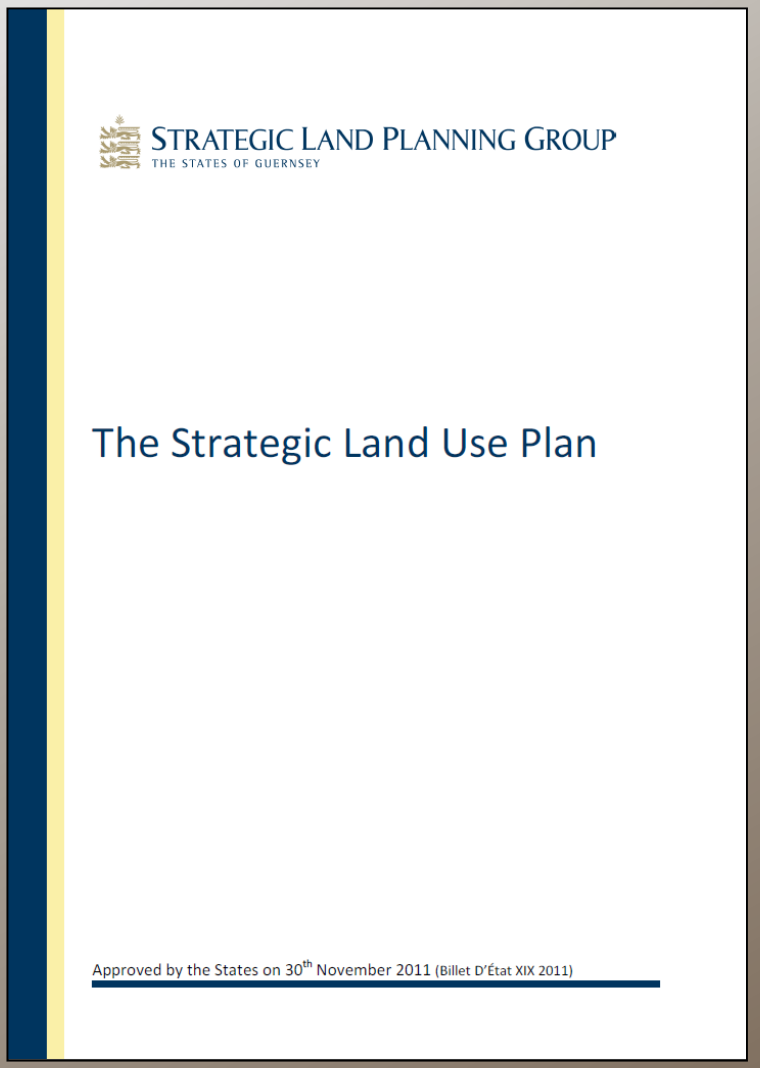
States of Jersey

Growth, Housing and Environment

26th November 2018

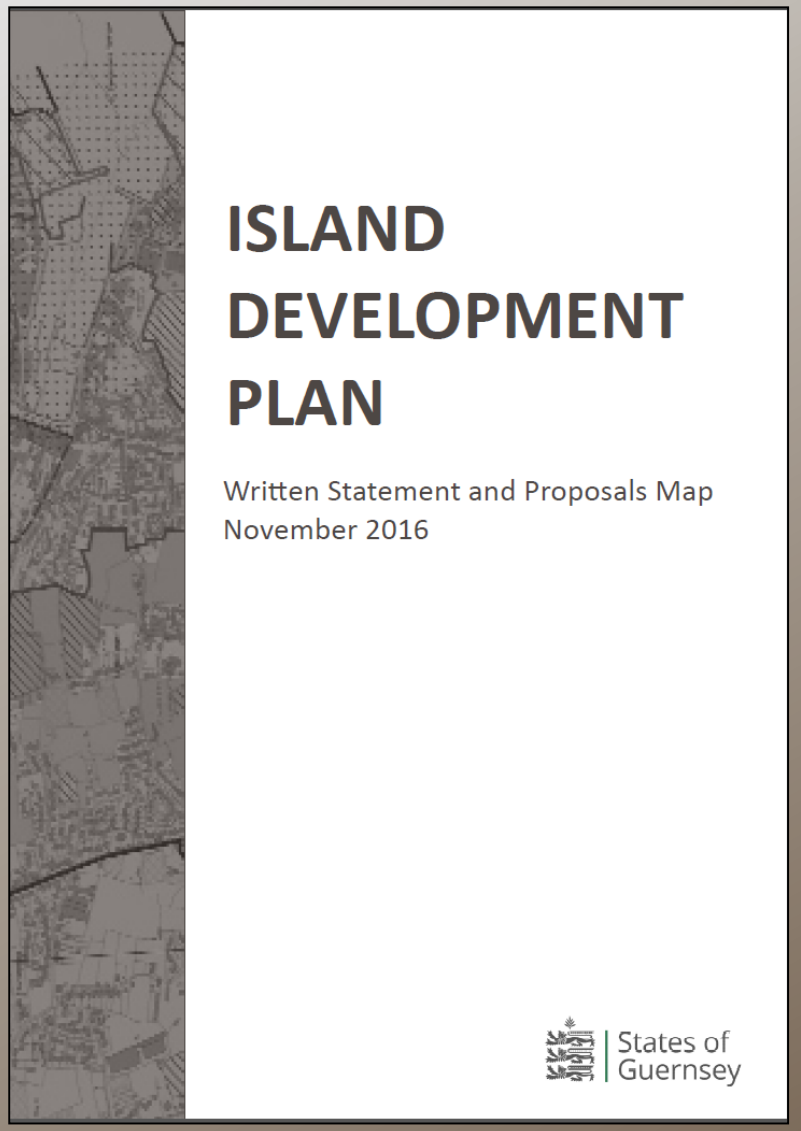
Planning Policy Overview

- **Strategic Land Use Plan, 2011**
  - Infrastructure objectives



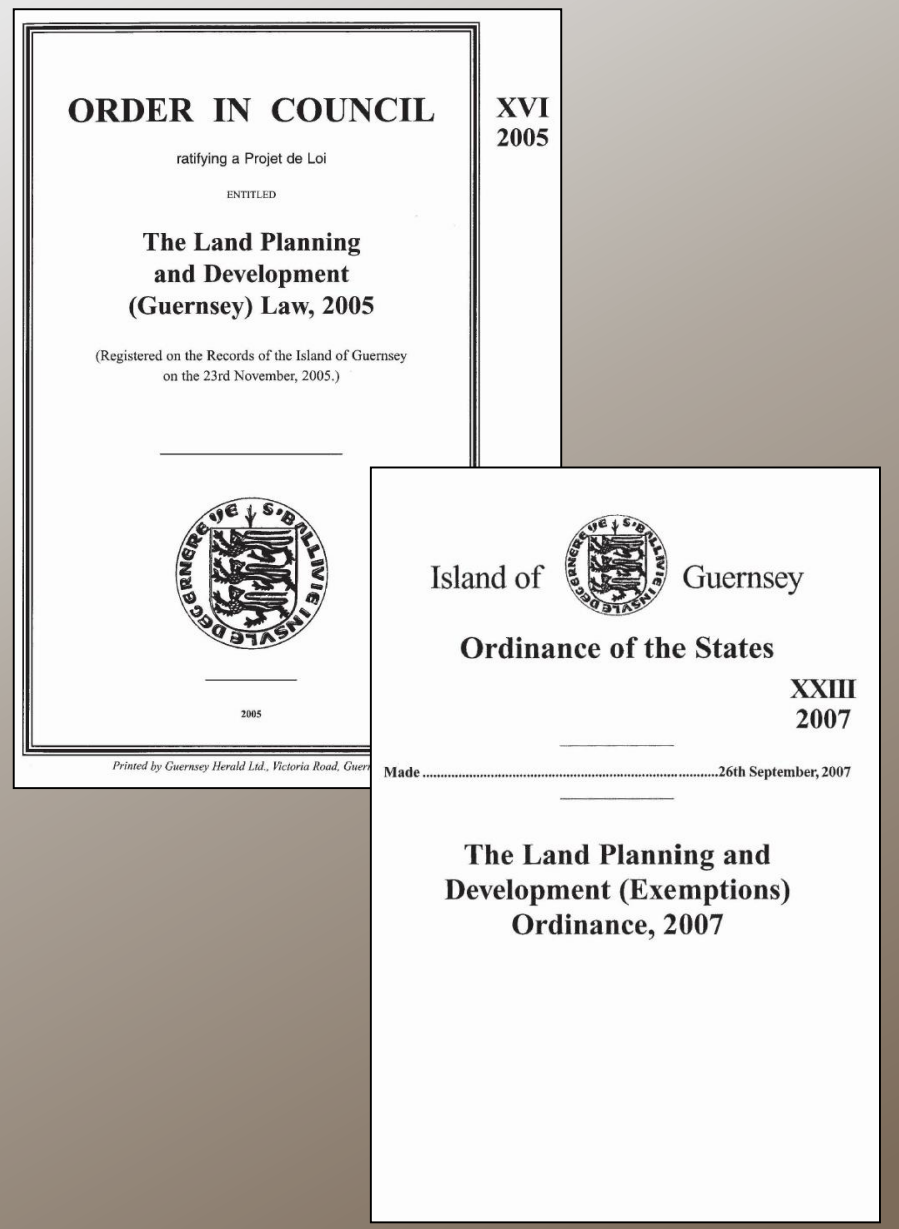
Planning Policy Overview

- Strategic Land Use Plan, 2011
  - Infrastructure objectives
- **Island Development Plan, 2016**
  - Policy S5, BPEO



Planning Policy Overview

- Strategic Land Use Plan, 2011
  - Infrastructure objectives
- Island Development Plan, 2016
  - Policy S5, BPEO
- **Planning Law and Exemptions**
  - Requirements for planning consent



Current Policies – Jersey

- Revised Island Plan 2011
  - Natural Resources and Utilities
  - Policy NR10 – Telecoms Masts
  - Policy NR11 – Communication Antennae
- Planning and Building (General Development Order) 2011
  - Street furniture

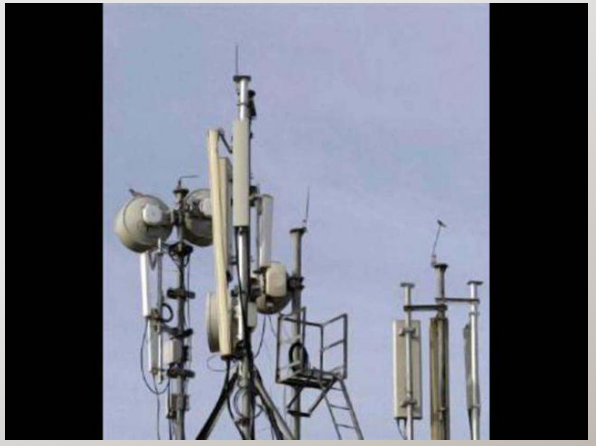
5G - Benefits and Issues

- **'Known unknowns'**
  - Equipment specification and network design
- **Economic and social benefits**
  - IOT, Improved public services, health, transportation, etc
- **Environmental issues and potential costs**
  - Key issue for planning process and delivery

Network development

- **The Netco/Infraco approach – opportunities and challenges**
  - Single network minimising potential adverse environmental impacts
  - Efficient delivery and effective co-ordination
- **Alternative approaches – enhanced risks and challenges**
  - Proliferation and unacceptable environmental impacts
  - Policy conflicts and impact on decision-making process

Environmental impact and visual intrusion



Public and political opposition

Network development

- **Utilisation of existing mast/cell sites**
  - Requirement for sharing, phasing, consolidation
- **New mast/cell sites**
  - IDP Policy S5, BPEO
  - Effectively facilitates new single network delivery
- **Smaller scale/Pico cells**
  - Opportunity for innovative design and appearance
  - Minimising visual/environmental impacts

Planning support to deliver preferred network:

- Established, flexible and consistent policy base
- Commitment to streamlined process
- Open and collaborative approach
- Working positively with operators to deliver preferred single network solution
- Digital application process benefits
- Let’s not regulate multiple small scale planning applications, review planning rules

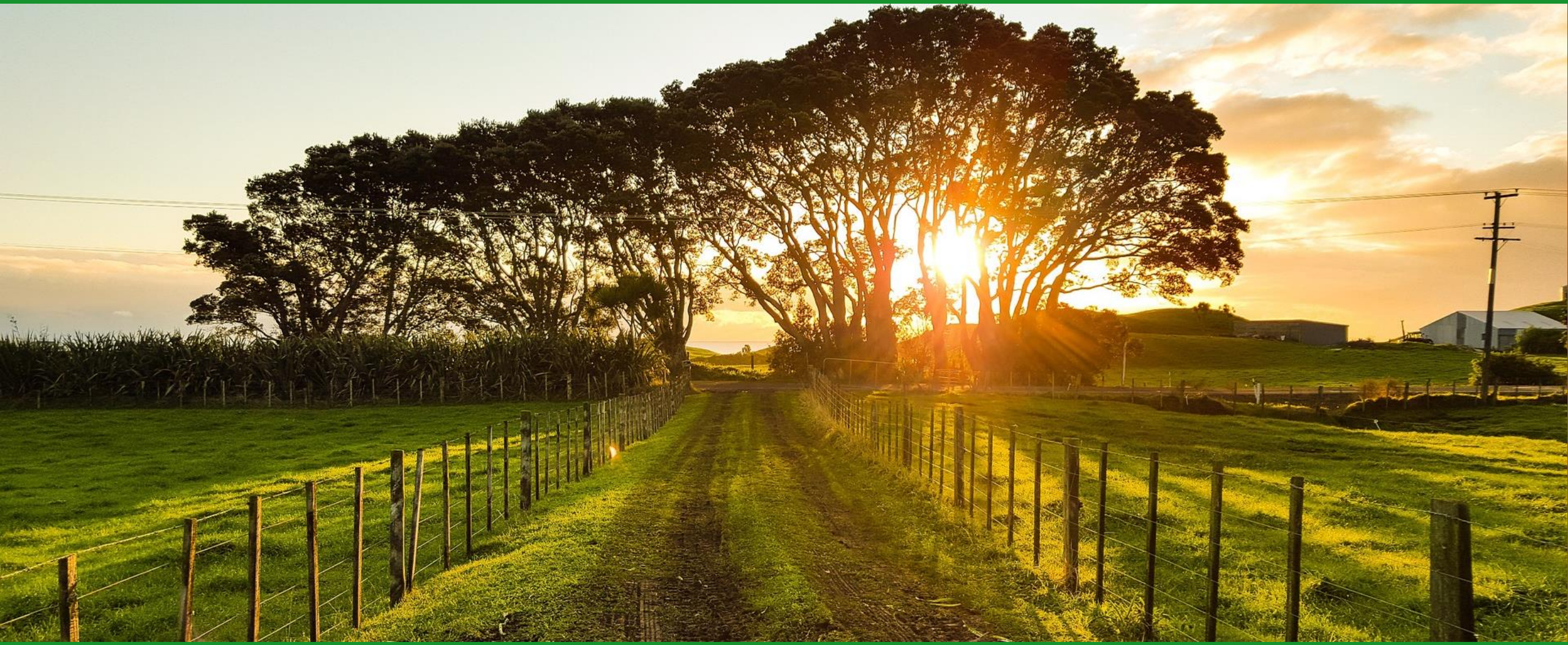
DIGITAL GREENHOUSE GUERNSEY

Lucy Kirby

HEAD OF DIGITAL, ECONOMIC DEVELOPMENT

GROWING HUMAN NETWORKS

PATHWAYS TO CONFIDENCE



BUILDING HUMAN CAPITAL

ECOSYSTEM COLLABORATION

WELCOME TO THE 5G PLAYGROUND

DIGITAL JERSEY

5G Summit

26th November 2018

Tony Moretta
CEO

digital.je

Agenda

- What we are
- What we do
- Focus areas
- Sandbox Jersey
- DJX
- Connectivity
- 5G

Think Digital
Think Jersey

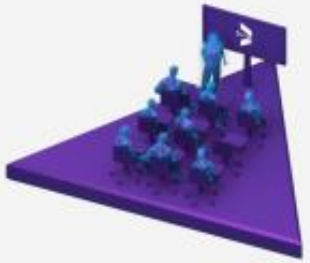
Digital Jersey is the government-backed economic development agency and industry association dedicated to the growth of the digital sector. We work to upskill the Island's workforce, create new digital jobs, help companies to increase their productivity, and develop strategies to make Jersey a world-leading base for digital innovation.

digital.je

Think Digital Think Jersey

To support sustainable economic growth in Jersey's Digital Industry

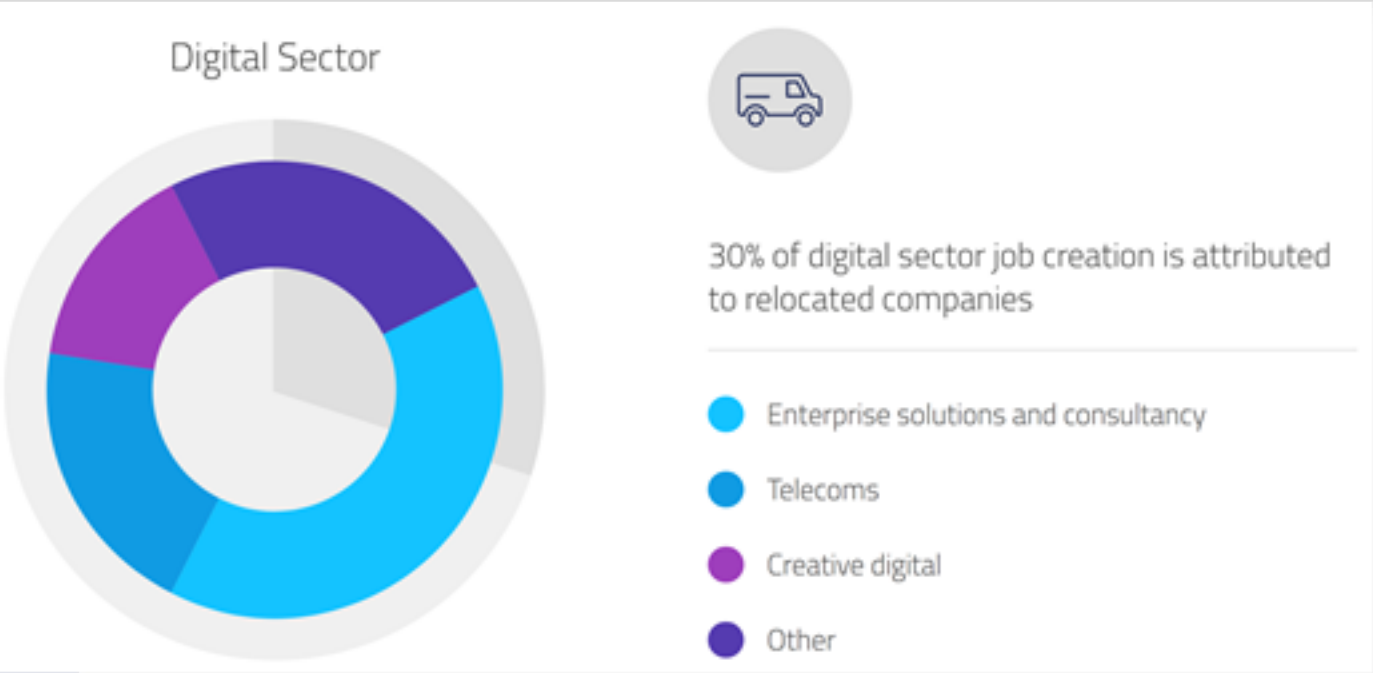
To establish Jersey as an internationally well-regarded 'digital centre'



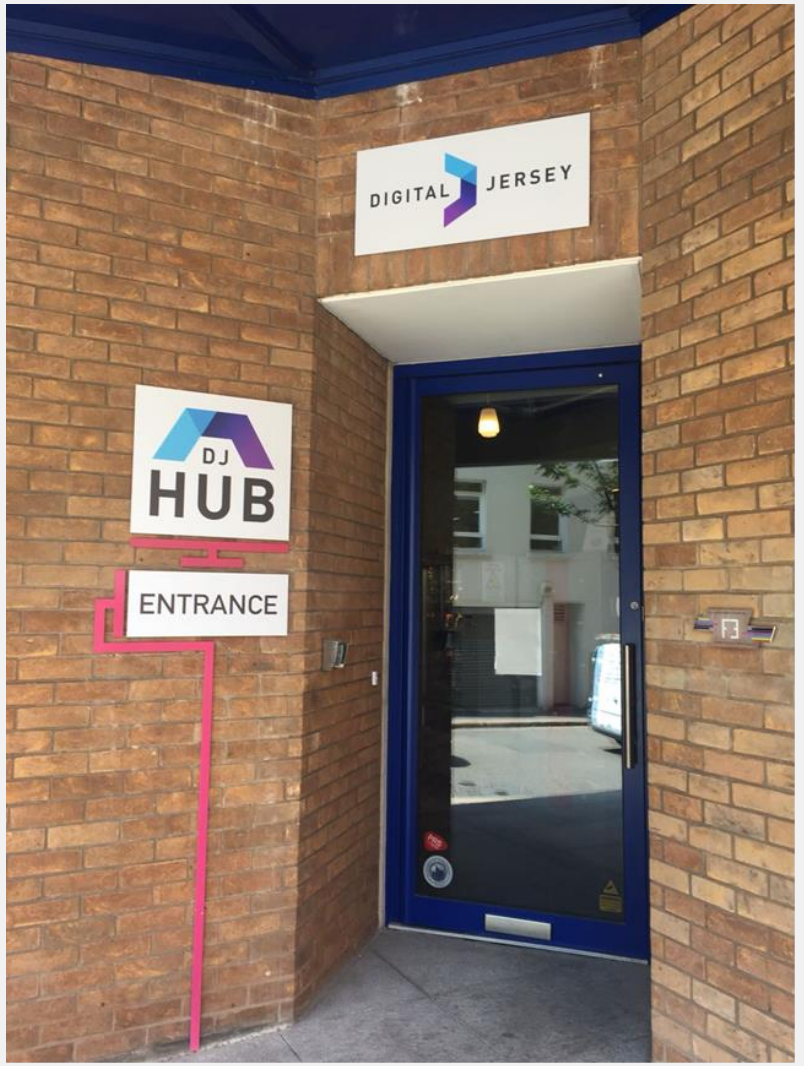
To enable a connected, digital society and enhanced quality of life in Jersey

Digital Sector

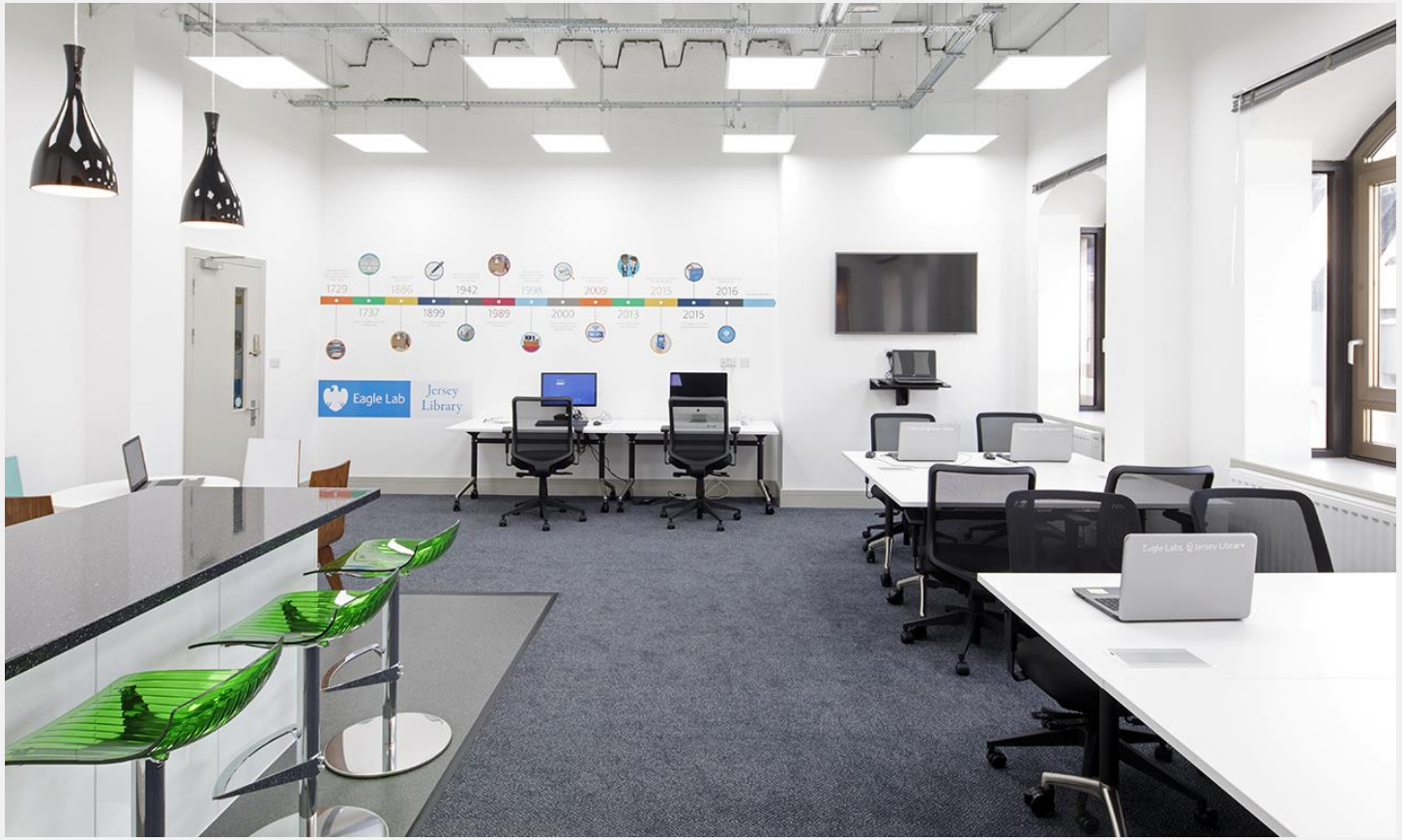
3,000+	2	420+	269
people in digital tech economy	digital co-working spaces	members	Digital Jersey events in 2017



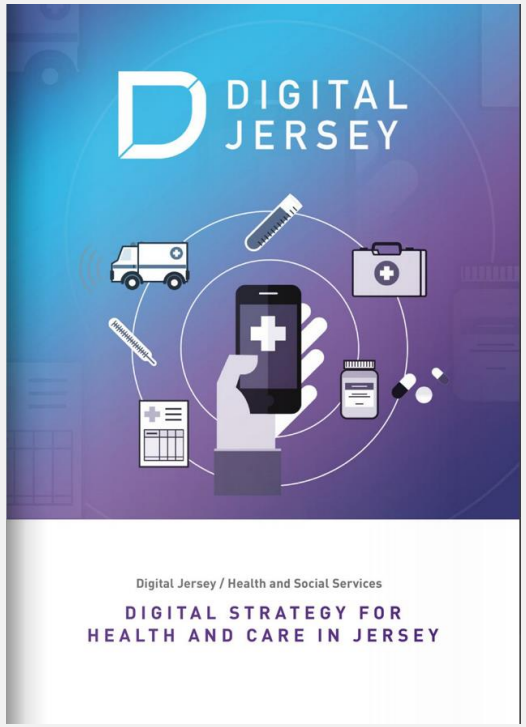
Co-Working Spaces

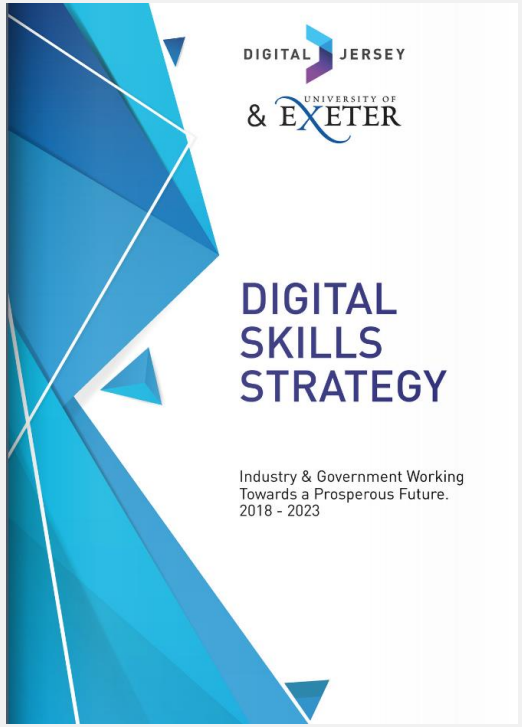


Co-Working Spaces



Strategy Development





Internet of Things
IoT and smart technologies

Fintech & Regtech
Fintech & Regtech cluster

Digital Health
New health technologies

Working Permissions
Access talent to grow

Start-up Support
For entrepreneurs within the EEA

Sandbox Jersey
Testbed infrastructure for new tech

DJ Hub
The centre of Jersey's tech community

DJ Xchange
Internet of things and DJX facility

Digital Skills
Digital skills for everybody

Focus Areas

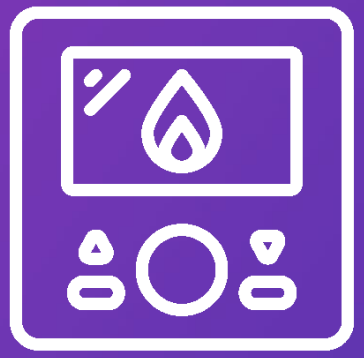
IoT

Fintech

Digital Health

IoT Use Cases

Sony



Honeywell

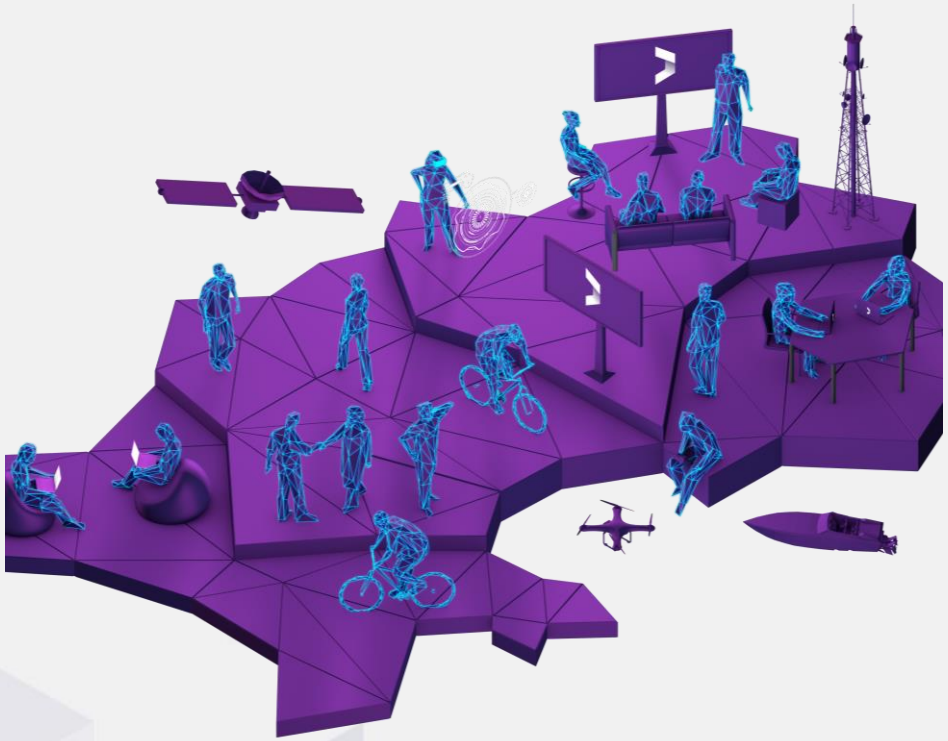
Meteomatics

Jersey Royal Company

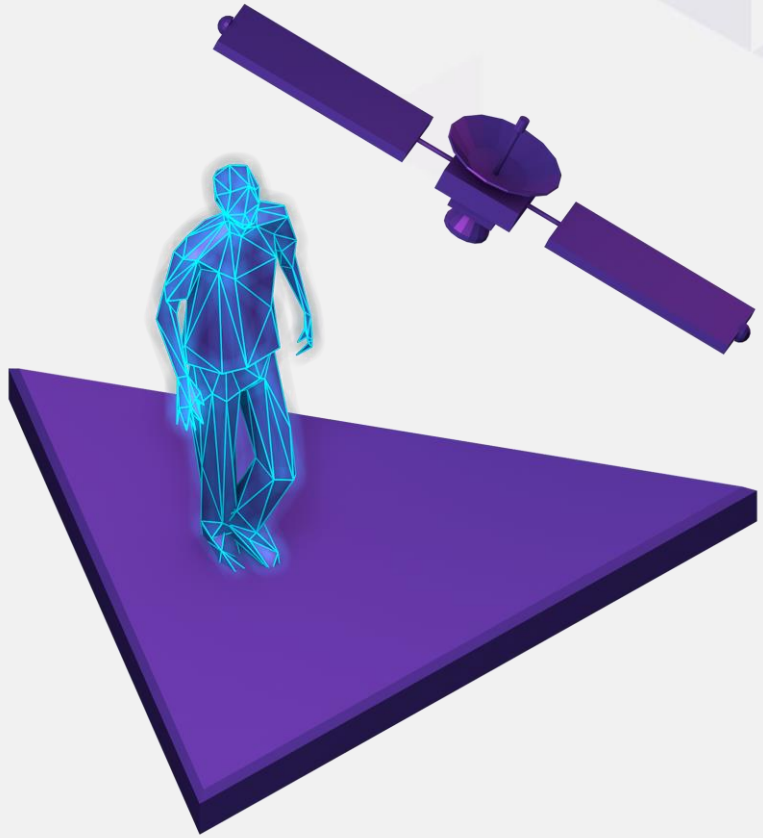
DIGITAL JERSEY

Meteomatics

Sandbox Jersey

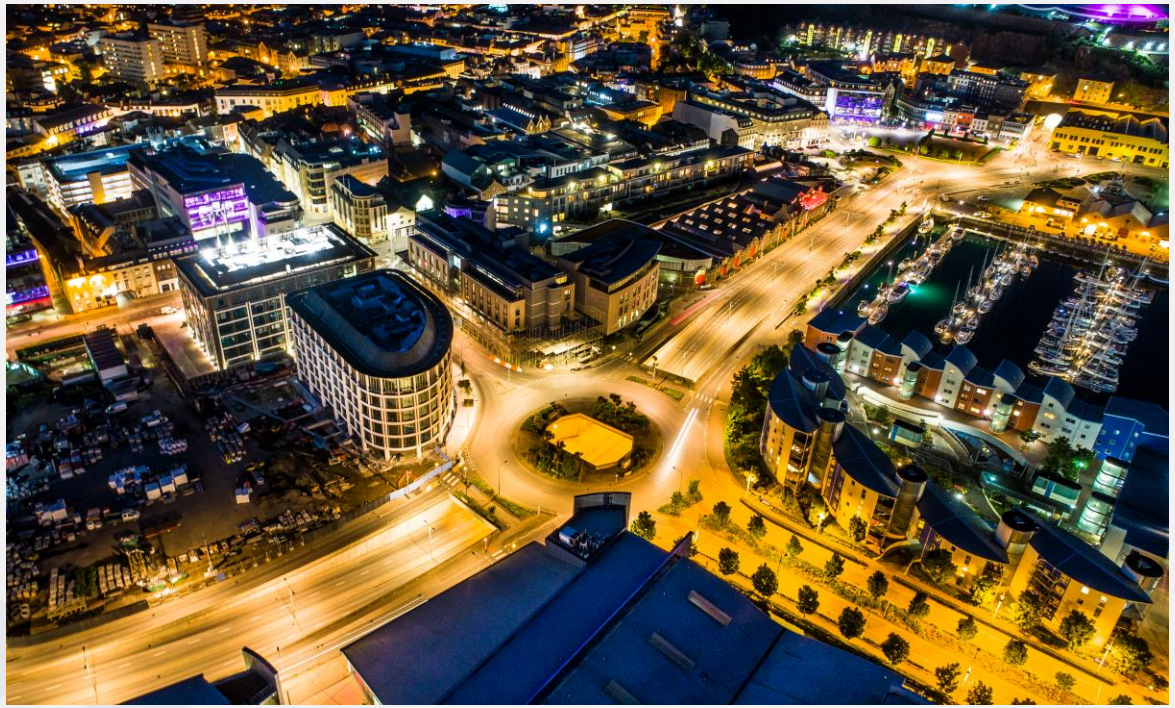


Sandbox



Networks

Diversity



Urban

Rural/Coastal

DJX


DJ
XCHANGE


DJ
XCHANGE
DIGITAL JERSEY
digital.je/djx
St Aubin
St Helier
A13
Airport
St Peter
B36
St Brelade's
Bay
B45

DJX

DJ XCHANGE

Digital Twin

Data Management Platform

DIGITAL JERSEY

Top Ten Countries

1st in the world

Percentage of households connected

DIGITAL JERSEY

Fibre island: How Jersey went ultra-fast

Rory Cellan-Jones
Technology correspondent
@BBCRoryCJ

10 October 2018 Share

WATCH: Lessons from Jersey's full-fibre internet

Full-fibre broadband for everyone - right to the door.

That was the new standard set by the UK government back in the summer. Just 5% of homes can get that right now, so making it available nationwide will take years of work and billions of pounds of investment.

5G

total telecom

TELECOMSWORLD Asia 2019

25 - 2
Bang

HOME TECHNOLOGY BUSINESS GLOBAL EVENTS INSIGHT

ZTE and JT to launch 5G test network in Jersey

By Chris Kelly, Total Telecom
Thursday 22 November 18

ZTE will build on its existing partnership with Jersey Telecom and will supply kit for JT's 5G network rollout

Jersey Telecom has signed a partnership agreement with Chinese kit manufacturer, ZTE, to build a new 5G mobile network in the Channel Islands. Representatives from the two companies met in Shenzhen, China, earlier this week, to formalise the details of the agreement.

With the contracts now being signed, JT will begin working with ZTE to launch a pre-commercial 5G test bed in the Channel Islands by the middle of 2019. The pair have previously worked together to launch 4G services on the Channel Islands.

"Our goal is to build the best networks we possibly can for islanders to enjoy. We aspire to build on our island's world beating fibre network and now offer Channel Islanders the best 5G service in the world. Our role is to support our customers, providing them the technology to do whatever they want. By building these information super highways we make this possible," said Graeme Millar, CEO of Jersey Telecom.

Conclusions

1. Connectivity just one piece of a complex jigsaw
2. Already have a futureproof telecoms infrastructure
3. Sandbox Jersey contains full fibre, 3*4G, 3*IoT networks
4. Short term – no need for 5G
5. Medium term – 5G testbed
6. Long term – commercial rollout when ready & justified

DIGITAL JERSEY

Thank you

tony.moretta@digital.je

digital.je


5G – The future is exciting...
Ready?
airtel
vodafone

Our Partners –

Tried, Tested and Trusted

NOKIA

airtel

airtel | vodafone

Airtel

- India's 1st 5G capable network
- Airtel X labs – driving innovation

Vodafone

- Made 1st UK live holographic call using 5G
- Setting the standards globally in NB IoT

Nokia

- Leading the way in 5G innovation globally
- Over 60 5G agreements signed globally

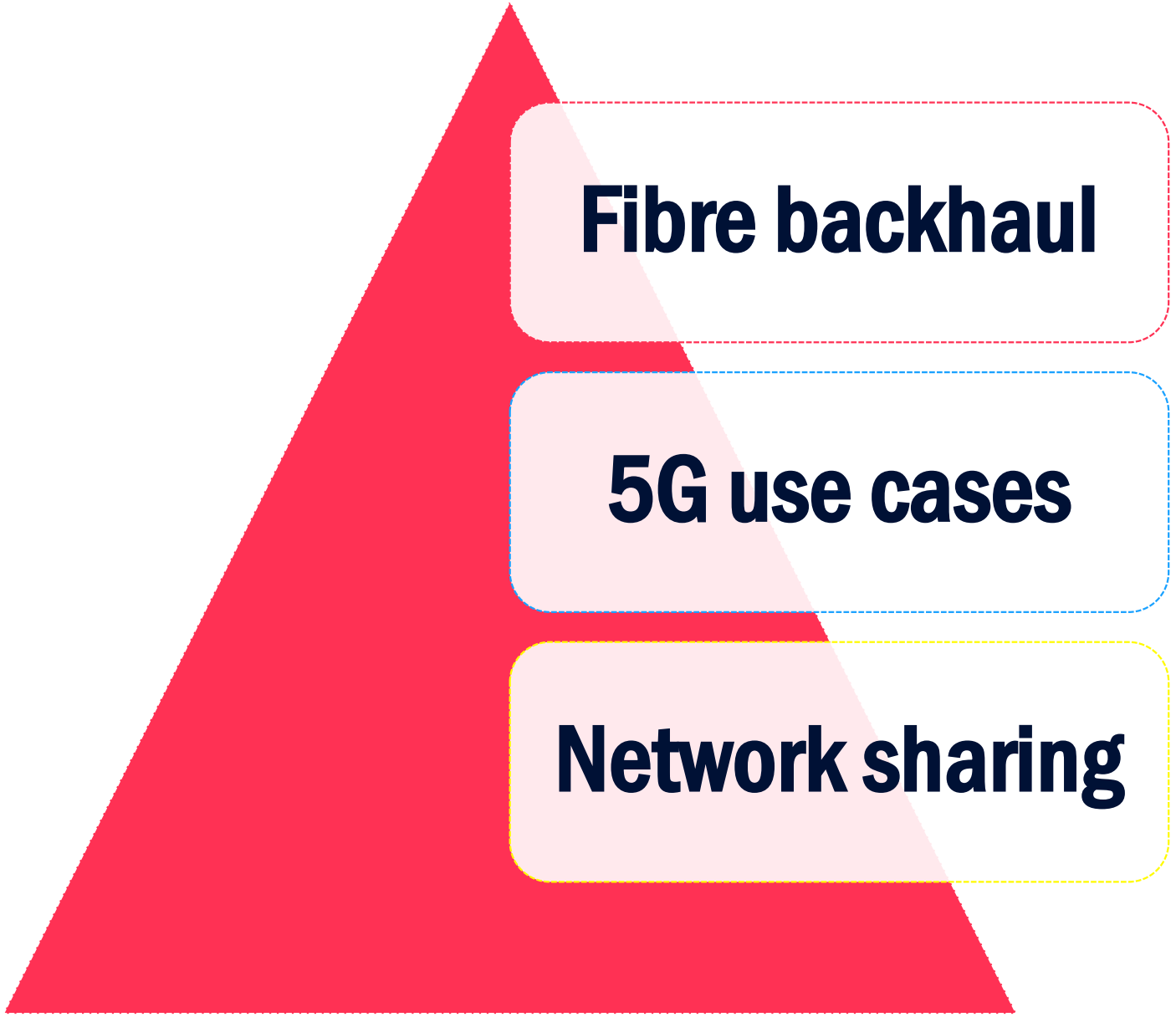
What will 5G bring in the Channel Islands?

- **Enhanced mobile broadband** – Fibre speeds without cables >1Gbps
  - 4K video, virtual reality
  - AR on the go – Enterprise and Consumer

- **Mission critical services** – ultra reliable low latency connection
  - Order fulfilment in warehouses, wireless production lines

- **Massive IoT communication**
  - E-health
  - Smart City

3 critical success factors to make 5G viable



airtel vodafone

airtel vodafone

Public concern over mobile mast proliferation

Glyn Mitchell With the IPCC and the International Meteorological report both saying we are reaching the tipping point of Co2 in the atmosphere, how is JT drawing down it Co2 footprint which must be growing as fast as its G Network?

Like · Reply · 5h

Cassie Colligny How worrying if this is to go ahead.. so dangerous.. this means only one thing.... more cancer.... 😢 I can only hope this mast is put in an isolated position and not near schools or residential...

And anyway.. what's wrong with 4g....!? Who the hell needs internet to be that fast...!? Since when was the internet more important than our Health...!?

Like · Reply · 18h

Cassie Colligny Andrew Muir I don't think it's a case of people don't like change.. it's more a case of some people naturally question is this really needed..? How safe is this..? And what implications will the harmful radiation have on ours and our children's future health..?

Ignorance is bliss.. but unfortunately not everyone is ignorant to such changes...

Give people in the world of technology an inch and they'll take a mile.. always wanting bigger, better, faster.... seriously when does it end.. 😔

Like · Reply · 15h

Shelley Laffoley 5g is a shorter wave and will need more masts than 4g. It's a weapon! Please go research it instead of being led to believe that this is only for faster better internet connections!!!

Like · Reply · 18h

Russ Allchin Say no!! It's damaging animals where they are testing it. The 5G micro waves penetrate 4 mm or more into the skin. Watch serious illness go up!!

1

Like · Reply · 22h

Sue Fossey No way - 5G is already destroying lives ....

3

Like · Reply · 21h

Andrew Muir Cassie Colligny mast? There are over 200 masts across the island the the entire system will change. It's no different to your dual band router in your home

Like · Reply · 16h

Cassie Colligny Andrew Muir yes I'm well aware of the masts across the island.. some large, and some subtle right next to housing estates, schools etc.. shocking..!!

So why the need for a more powerful and even more harmful one..? if we have so many what's the point in another...!!!??

Like · Reply · 16h

Parker Hoffman I'm more worried about the vendor they have chosen! The NCSC have black listed ZTE and warned UK providers that they pose a nation security risk.
https://www.bbc.co.uk/news/technology-43784990

1

Like · Reply · 20h

Airtel–Vodafone 5G test launch in 2019

Background to current structure of telecom markets

Pre-2002:

Incumbent government-owned statutory monopolies

2002/2003:

States Assembly decisions to establish independent regulatory authorities

2002/2003:

Regulatory decisions to introduce infrastructure-based competition

guernsey telecoms

Jersey Telecoms

STATES OF GUERNSEY

States of Jersey

CICRA
CHANNEL ISLANDS COMPETITION & REGULATORY AUTHORITIES

Multi-million pounds investments by owners

What have these investments secured in the fixed network?

Rank	Country	Download
1	Singapore	189 Mbps
2	**Jersey**	**155 Mbps**
3	Iceland	147 Mbps
4	Hong Kong	139 Mbps
5	Monaco	130 Mbps
6	Romania	107 Mbps
7	South Korea	103 Mbps
8	United States	100 Mbps
9	Hungary	99 Mbps
10	Luxembourg	96 Mbps

OOKLA SPEEDTEST

1st October 2018

What have these investments secured in the mobile network?

Speedtest ranking	Jersey	Guernsey
1	**JT = 42.8 Mb/s**	**JT = 36.3 Mb/s**
2	Sure = 27.3 Mb/s	Sure = 34.6 Mb/s
3	Airtel = 12.8 Mb/s	Airtel = 12.5 Mb/s
Number of unique speedtests	6,339	9,074

OOKLA SPEEDTEST

Q3 2018

What have these investments secured in the mobile network?

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1	**JT = 42.8 Mb/s**	**JT =36.3 Mb/s**
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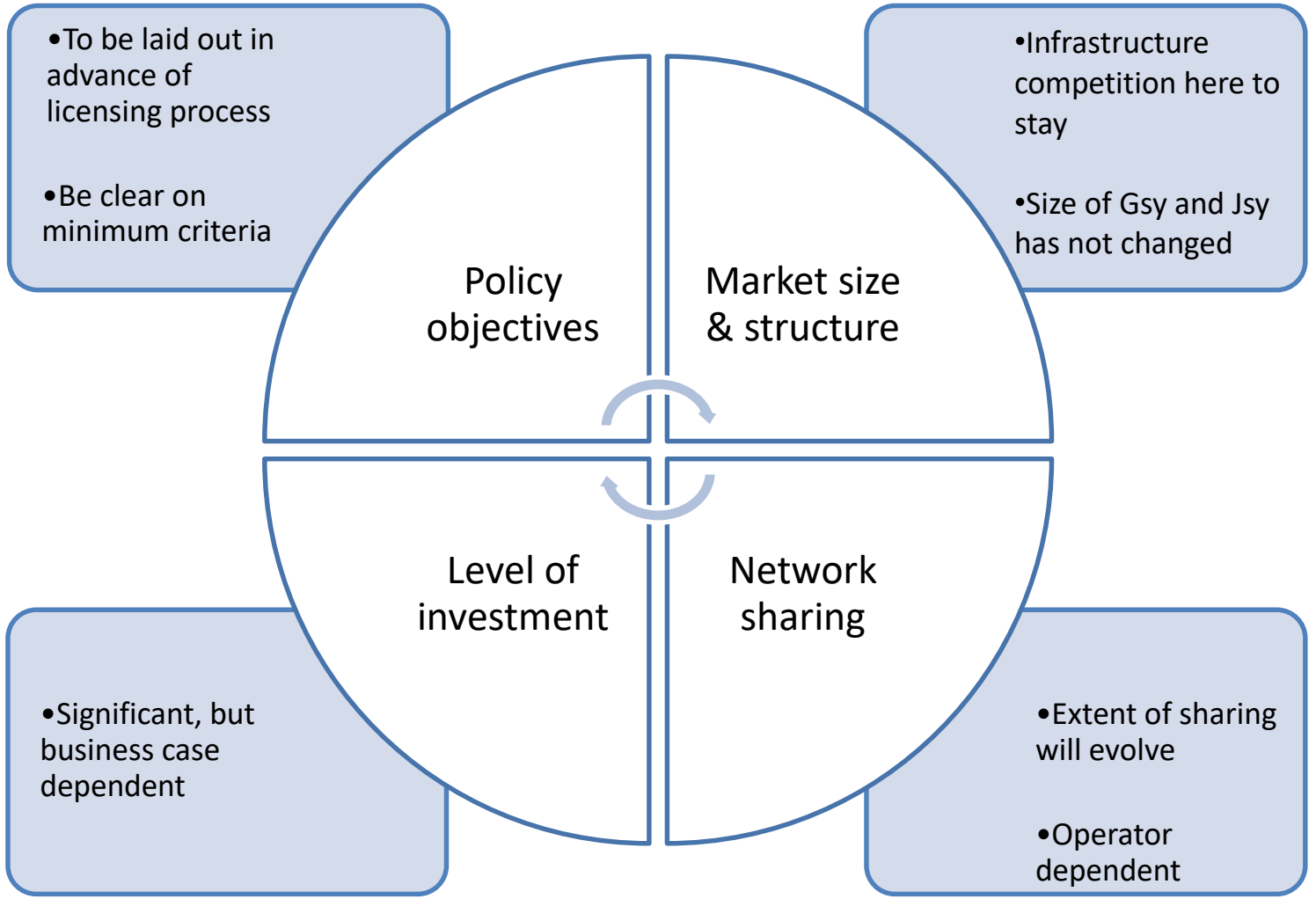
3	Airtel = 12.8 Mb/s	Airtel = 12.5 Mb/s
Number of unique speedtests	6,339	9,074

Selected other jurisdictions		
Norway	67 Mb/s	Global ranking = 1
Iceland	67 Mb/s	Global ranking = 2
France	37 Mb/s	Global ranking = 30
United Kingdom	27 Mb/s	Global ranking = 55

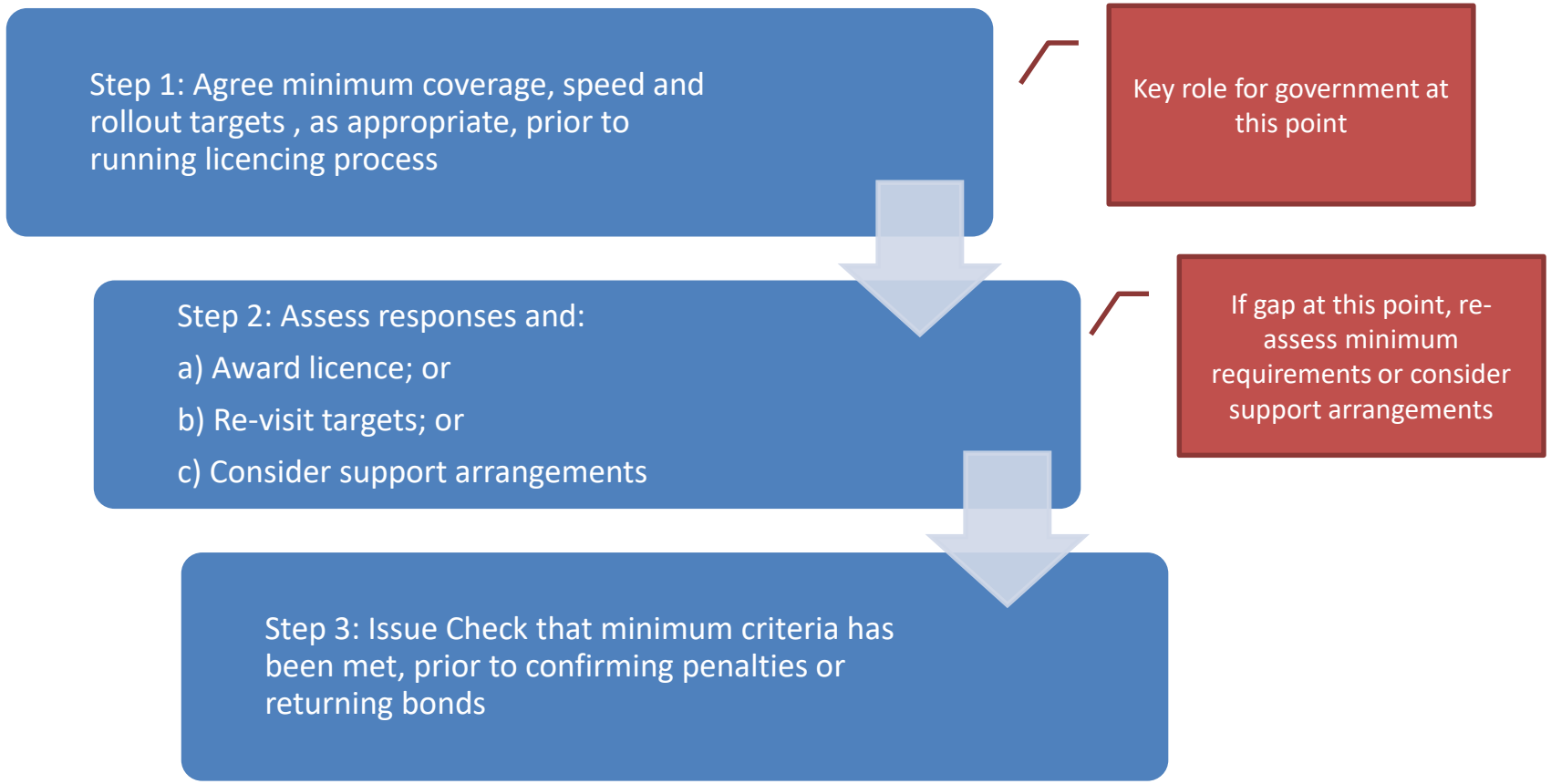
OOKLA SPEEDTEST

Q3 2018

Relevant factors for 5G licencing



JT recommended approach to licensing:
Achieve 5G policy objectives by utilising 4G award process



JT signs 5G Network Supply Agreement

total telecom

HOME TECHNOLOGY BUSINESS

ZTE and JT to launch 5G

Jersey Evening Post

JT paves the way for 5G network

By Ed Taylor

JT has signed a deal to build the Channel Islands' first 5G mobile network, which could be in operation as early as 2021.

The contract, between the

ers experience the benefits this technology offers.

'It was an honour to sign this deal during a formal trade delegation visit to China, when we were also able to support Jersey in developing business in Asia.'

Meanwhile, Tony Moret-

Guernsey Press

JT signs deal for first 5G network in CI

JT HAS signed a deal to build the first 5G mobile network in the Channel Islands, which it hopes will be in operation by 2021.

The company has partnered with Chinese firm ZTE, which it worked with on its 4G network.

by Mark Ogier

5G standard is not yet complete, is intends to roll out improvements incrementally as standards solidify.

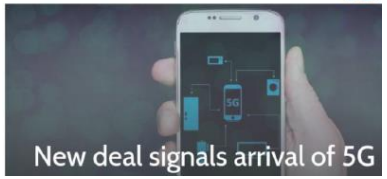
The change from 4G to 5G will be a major one, said JT

'As we did through our 4G partnership, ZTE are determined and committed to provide the best possible 5G solution and service to JT and for the Channel Islands.'

4G enables download speeds up to 10x faster than today's speeds, together with

BAILIWICK EXPRESS | JERSEY NEWS

News Business Life Sport UK Weather CONNECT



telecomlead

3G 4G 5G STATISTICS OPERATOR INTERNET BROADCAST NETWORK

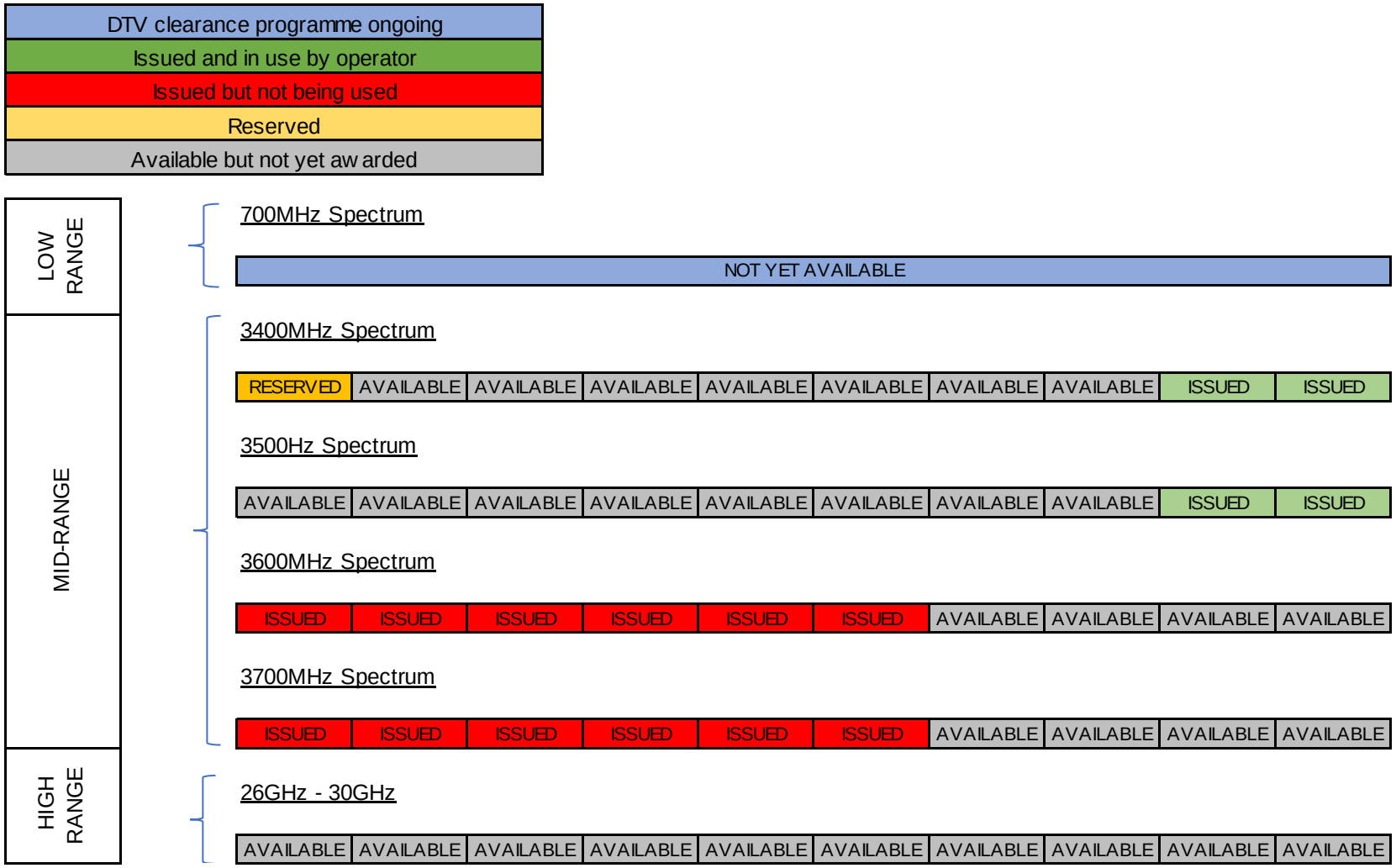
Telecom Equipment

ZTE signs 5G network deal with JT Global

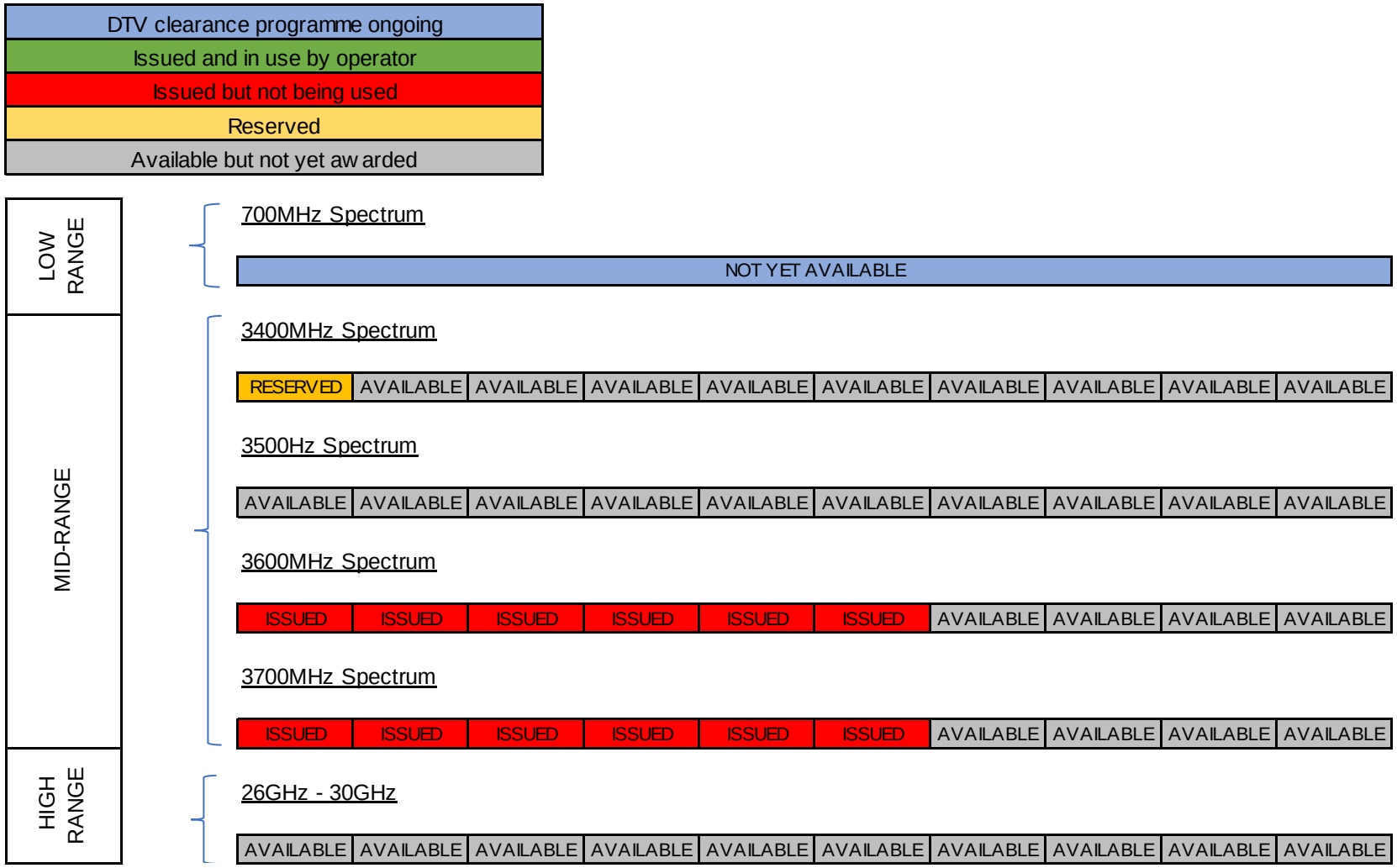
JT perspective on 5G rollout

Requirement element	Guernsey	Jersey
Network Supply Agreement	Signed	Signed
Agreed budget	Yes	Yes
Availability of fibre backhaul	Partial	Yes
Spectrum	Significant work required – timeline and process to be led by CICRA	Significant work required – timeline and process to be led by CICRA

Key dilemma: steps to resolving and issuing Jsy 5G spectrum



Key dilemma: steps to resolving and issuing Gsy 5G spectrum



5G & its transformational potential

Alistair Beak, CMO, Sure

November 2018

sure.

Sure Group – Headquartered in Guernsey

Your Logo

Isle of Man – 572km² - pop 83k
- 33 FTE
- 51 mobile sites

Guernsey – 65km² - pop 63k
- 181 FTE
- 49 mobile sites, 478km fibre

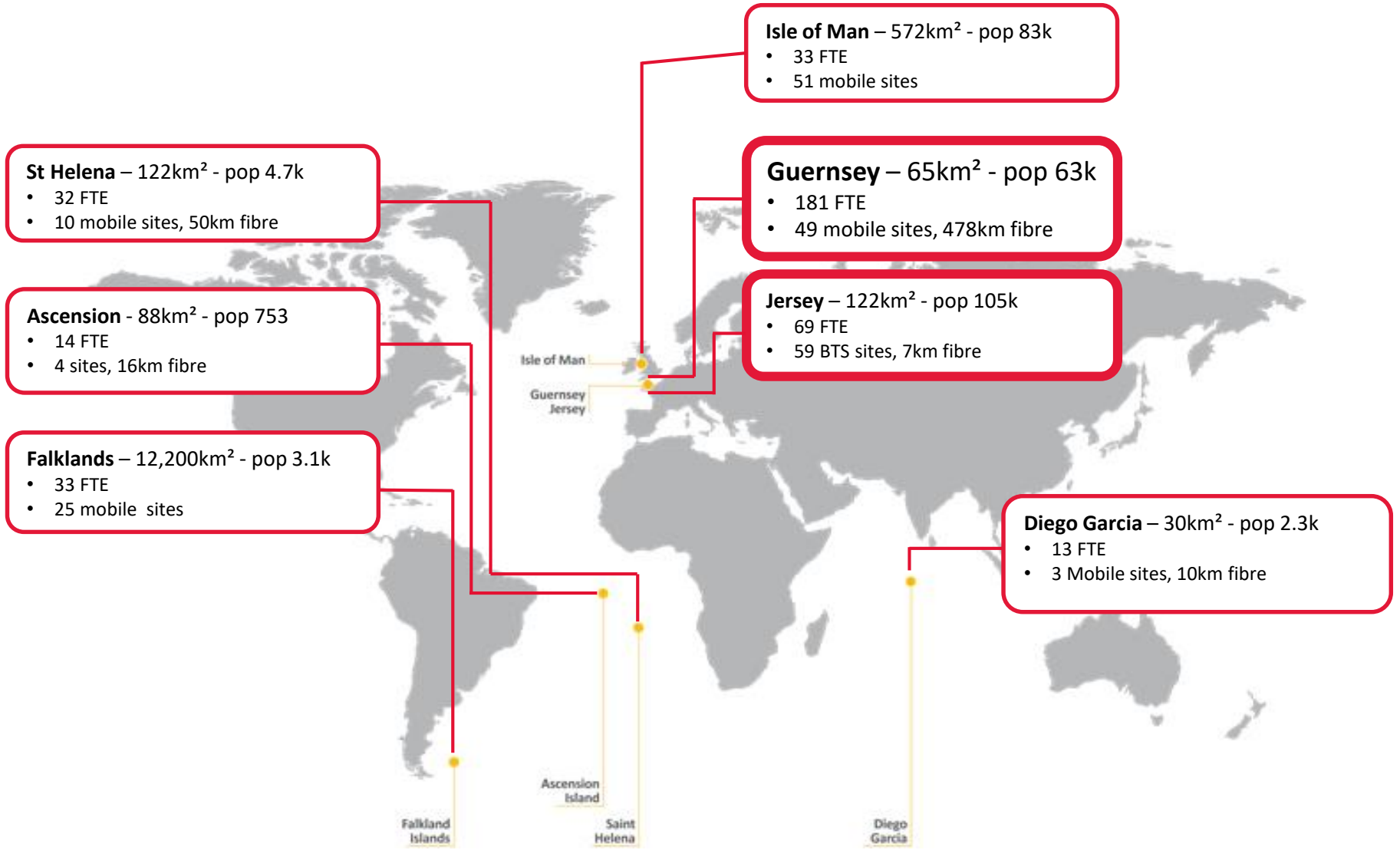
Jersey – 122km² - pop 105k
- 69 FTE
- 59 BTS sites, 7km fibre

St Helena – 122km² - pop 4.7k
- 32 FTE
- 10 mobile sites, 50km fibre

Ascension - 88km² - pop 753
- 14 FTE
- 4 sites, 16km fibre

Falklands – 12,200km² - pop 3.1k
- 33 FTE
- 25 mobile sites

Diego Garcia – 30km² - pop 2.3k
- 13 FTE
- 3 Mobile sites, 10km fibre



What is 5G?

5G –

Fibre in the air - everywhere

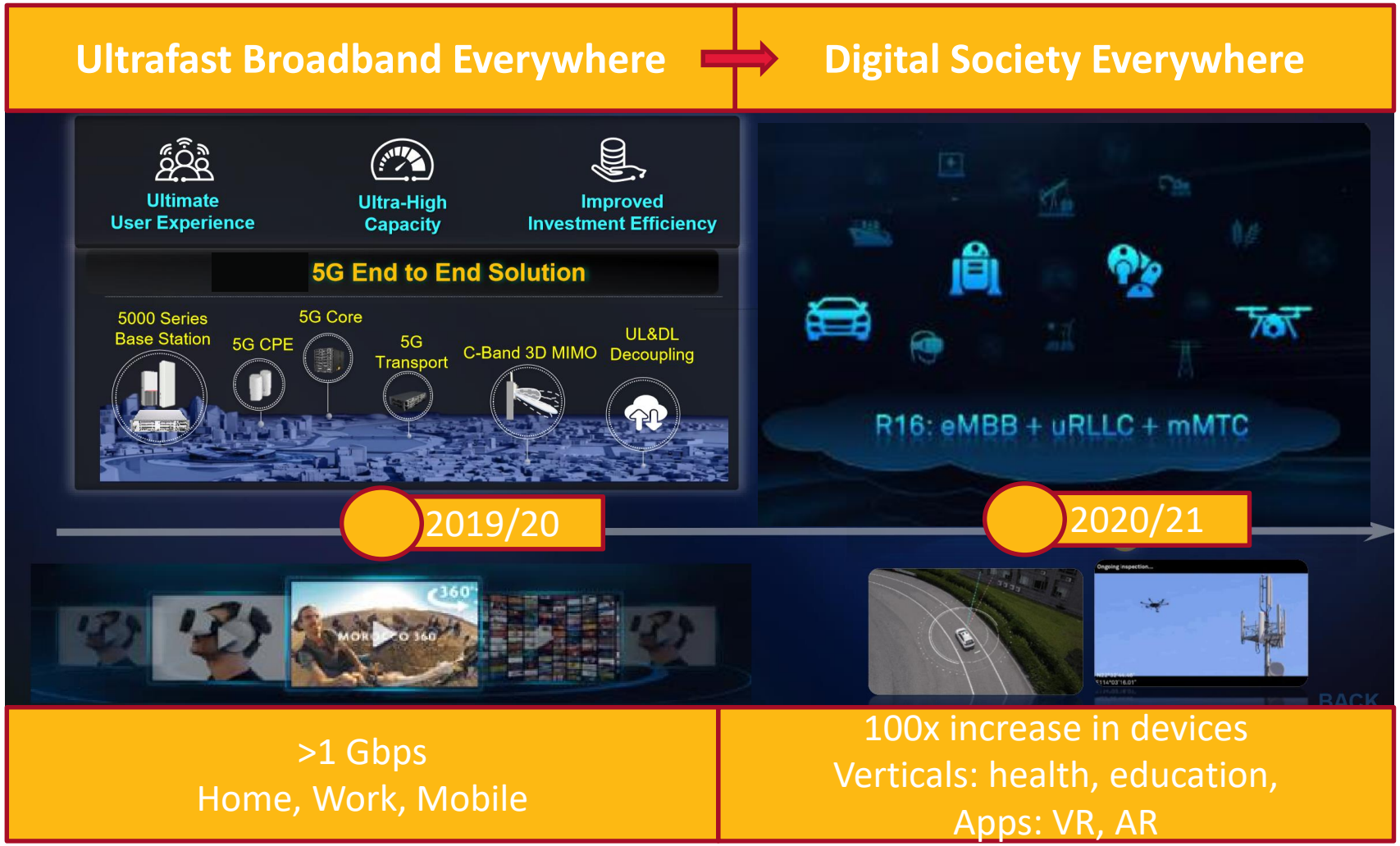
5G offers gigabit speeds, ultra low latency, and the ability to connect millions of devices

More than 20x Speed, capacity, latency			
	4G	5G	Impact
Speed	40 Mbps*	1-2 Gbps	20x-40x
Devices	10 / person	1,000 pp	100x
Latency	50 Ms	1 Ms	50x

* Sure's network is 2x speed of competitors

https://www.youtube.com/watch?v=cmyHpFf0hIE

Two main opportunities & phases from 5G



Sure's 5G Showcase

VR Drone Example

sure.

sure.

5G can be rolled out in relatively short time frame

5G will require upgrading and adding new sites

But will take less time and disruption than fibre, and less investment

5G supports the SOG Telecoms Policy

States of Guernsey – The Future of Telecoms Policy (2018)		
Objective	**By When**	**5G potential**
100 Mbps to 85% of homes	2-3 years	Exceed by 10x minimum
Fibre to business districts	2-3 years	Augment fibre, great for small business
5G	In line or earlier than UK	Exceed as UK coverage will be limited

Policy also states

- Possibility of direct funding
- Single, resilient 5G network – network sharing
- Regulated backhaul, spectrum availability, planning policy

5G supports the SOJ Telecoms Policy

States of Jersey Telecommunications Strategy (2017)	
Objective	**5G**
Promotion of Next Generation Technologies	Mobile innovation, complement Jersey's fibre network
Promotion of Retail (not network) competition	5G will provide broadband retail competition CICRA to ensure FRAND access to Jersey's fibre network
Ensure the resilience of connectivity	5G will be a robust credible alternative to fixed
Measurement of outcomes	Quality (coverage, speed etc.) and H&S

Gigabit networks, for everyone, has involved public funding

UK Funding for BT

openreach

BT

- > £1 Bn Government investment
- Fibre will take until 2033

Italy funding

Italy's €6bn broadband plan: Spread 100Mbps far and wide, fill in the rural notspots

The government has laid down €6bn to give Italy better broadband, and it's hoping local telcos will do the same.

- £5Bn incentives for Italy to reach 100 Mbps

sure.

Fibre in the air - everywhere

Leap to multigigabit

Supports Guernsey Telecom Policy

Digital society

Benefits everyone

Technological Awakening

UK Channel Islands

Harpal Mann
Founder, CEO
harpal.mann@clearmobitel.com
+1 510 585 5674 USA

ClearMobitel

Clear Mobitel's Mission is to deliver real 5G connectivity to the Island and people of Guernsey and not to join the pack of other operators making do with 4G LTE

Driving Guernsey eCommerce and future connectivity

5G Summit 2018-11-26

Megatrends shaping the world in 2025

Physical

Autonomous Vehicles

3D Printing

Advanced Robotics

New Materials

Biological

Synthetic Biology

Genetic Engineering

Biological Printing

Neurotechnology

Digital

Internet of Things

Blockchain

On-Demand Economy

Platforms

Source: “Deep Shift – World Economic Forum”

The world in 2025 – tipping points with +60% probability

10% of people wearing clothes connected to the Internet

80% of people with a digital presence on the Internet

The first transplant of a 3D printed liver

The first 3D printed car in production

10% of reading glasses connected to Internet

First humans with fully artificial memory implanted in brain

Implantable mobiles phones available commercially

First governments replace census with Big Data sources

10% of cars in the US are driverless

First city with >50K inhabitants and no traffic lights

Source: “Deep Shift – World Economic Forum”

3 innovation areas to offset the mobile data conundrum

Relentless efficiency

- Spectrum use
- Automation
- Energy use

Unrivalled experience

- Densification
- Digital interface
- Service agility

Revenue expansion

- Industries
- Mobile & Fixed
- IoT

So far four mobile generations, changed peoples lives step by step, 5G Terminals to come.

1G – 1980s

- Phone in cars
- Business people
- National networks

2G – 1990s

- Phones in pockets
- SMS/TXT
- Digital networks

3G – 2000s

- Camera & MP3
- Laptop dongle
- Global roaming

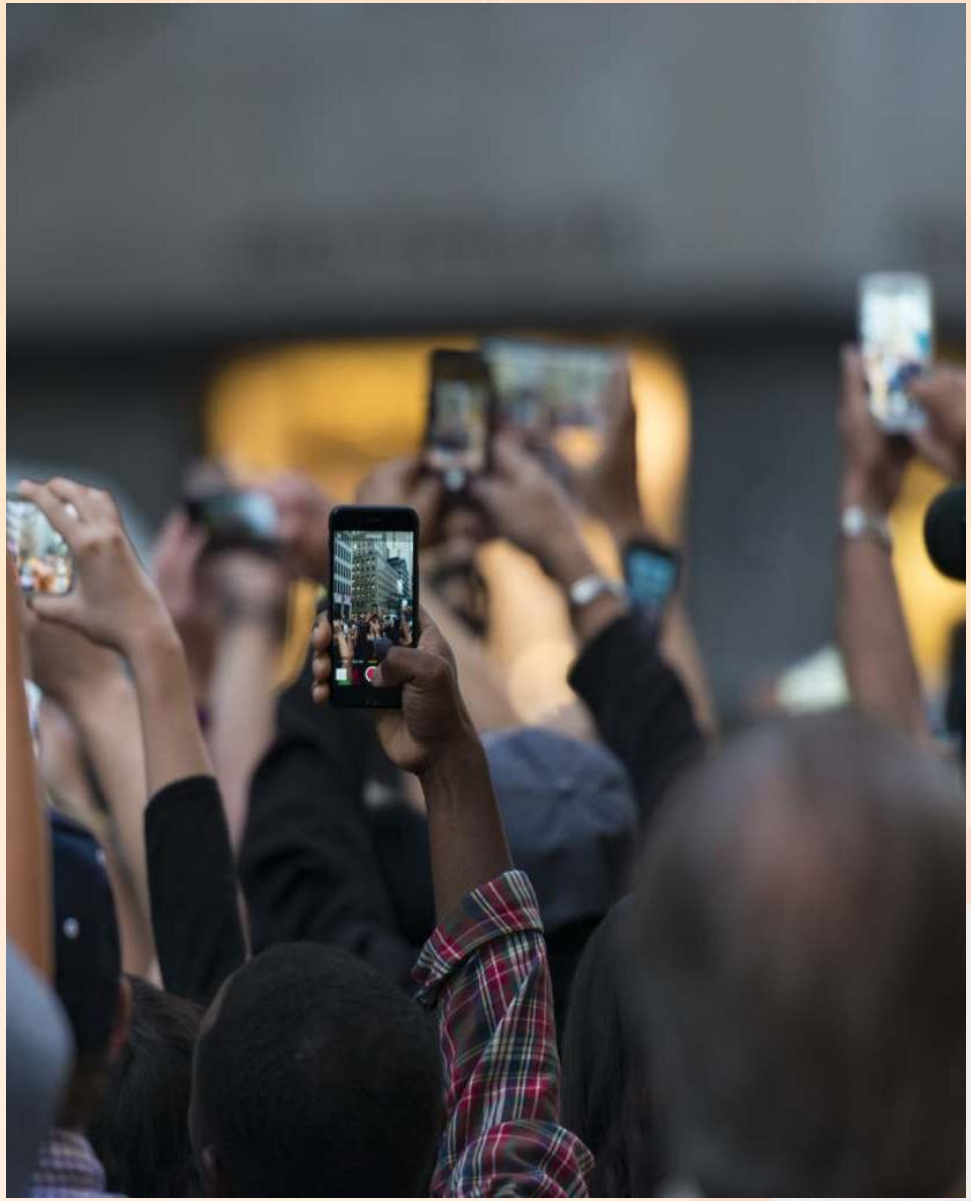
4G – 2010s

- Smartphone life
- Apps replace web
- 1 global standard

5G– 2020s

?

- Functionality – Replace Web
- E-learning
- E-health
- Iot in home and Business
- *Security*



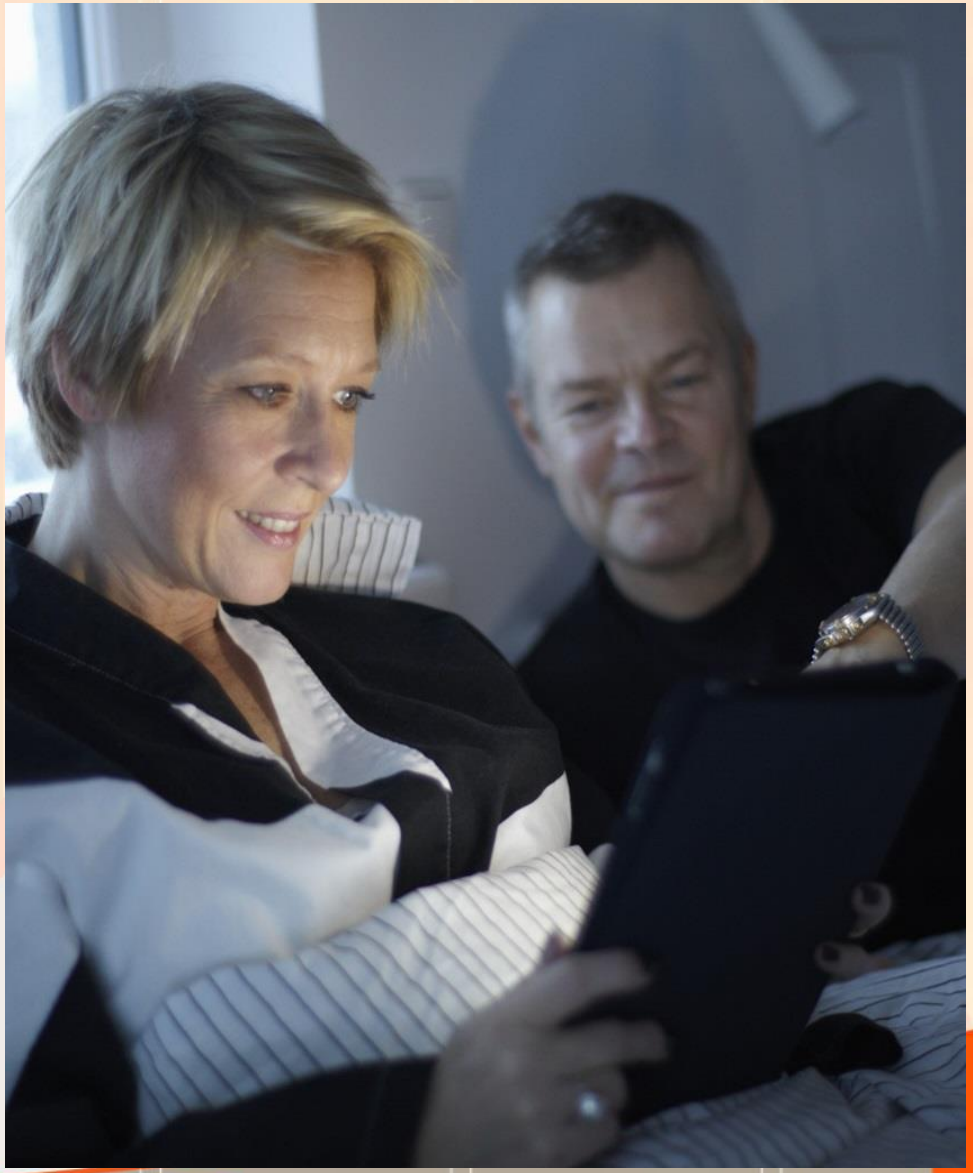
Enhance the Mobile Broadband we all know

- Cost efficient addition of capacity for mobile data growth
- Increase high quality video streaming, including virtual reality.
- Boost live sharing on social media at main attractions
- Match or exceed the digital experiences pioneered by over the top providers.
- Front runners achieved 10.8% CAGR vs rest of the market achieved 1.5%

Bring Fixed Wireless beyond fiber footprint

- *Wireless Fiber in dense urban areas*
- *Combined with mobile access in rural areas*
- *Connect businesses with a complement to fiber access*
- *Purpose built networks in new spectrum bands*

A global $10-100B opportunity



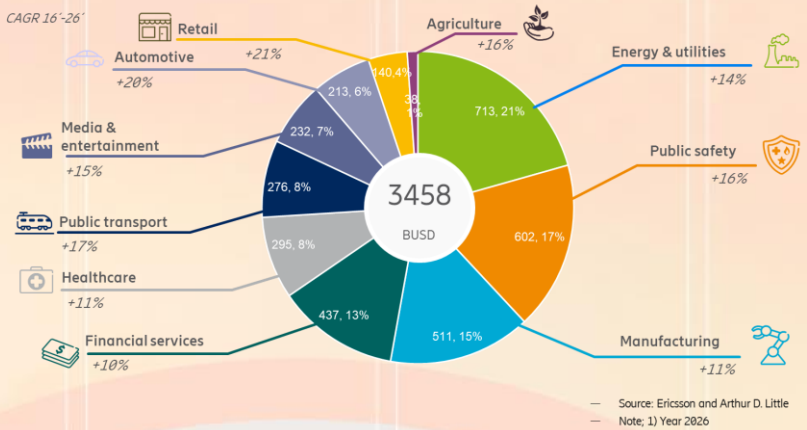
Global opportunity of USD 3.5 trillion

Estimated distribution across the value chain

	Market potential – value distribution per layer	Typical margin per segment	Global Revenue Forecast * (BUSD)
Applications & Value-added services	30-50% of total value	40-45%	1575
Application Platform	10-15% of total value	10-20%	560
Connectivity Management	<1-10% of total value	10%	175
Connectivity	5-20% of total value	10%	315
Devices	10-30% of total value	5-15%	875

— Source: Machina Research 2018; IDC 2018; McKinsey; SPP Analysis
— * Year 2026

Estimated distribution across the industries



— Source: Ericsson and Arthur D. Little
— Note; 1) Year 2026

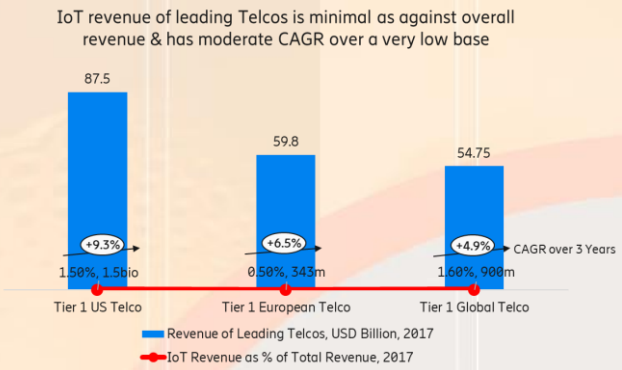
Opportunity to address new industries.
Higher you ramp up in layer, larger is the value and margin.

Operators have limited traction so far

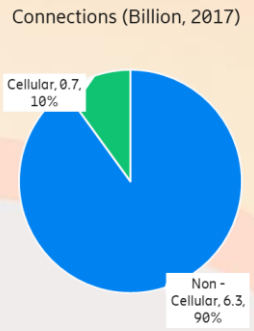
IoT has been top priority by many leading operators

- Verizon buys Fleetmatics for $2.4 billion
- Verizon acquired Hughes Telematics for $612 million
- Vodafone confirms Cobra acquisition for £115 million
- Telefonica invests $2 billion in building digital services over the past 5 years

However they have gained limited market traction



And cellular IoT is still a small percentage



– Source : Ericsson Mobility Report, June 2018

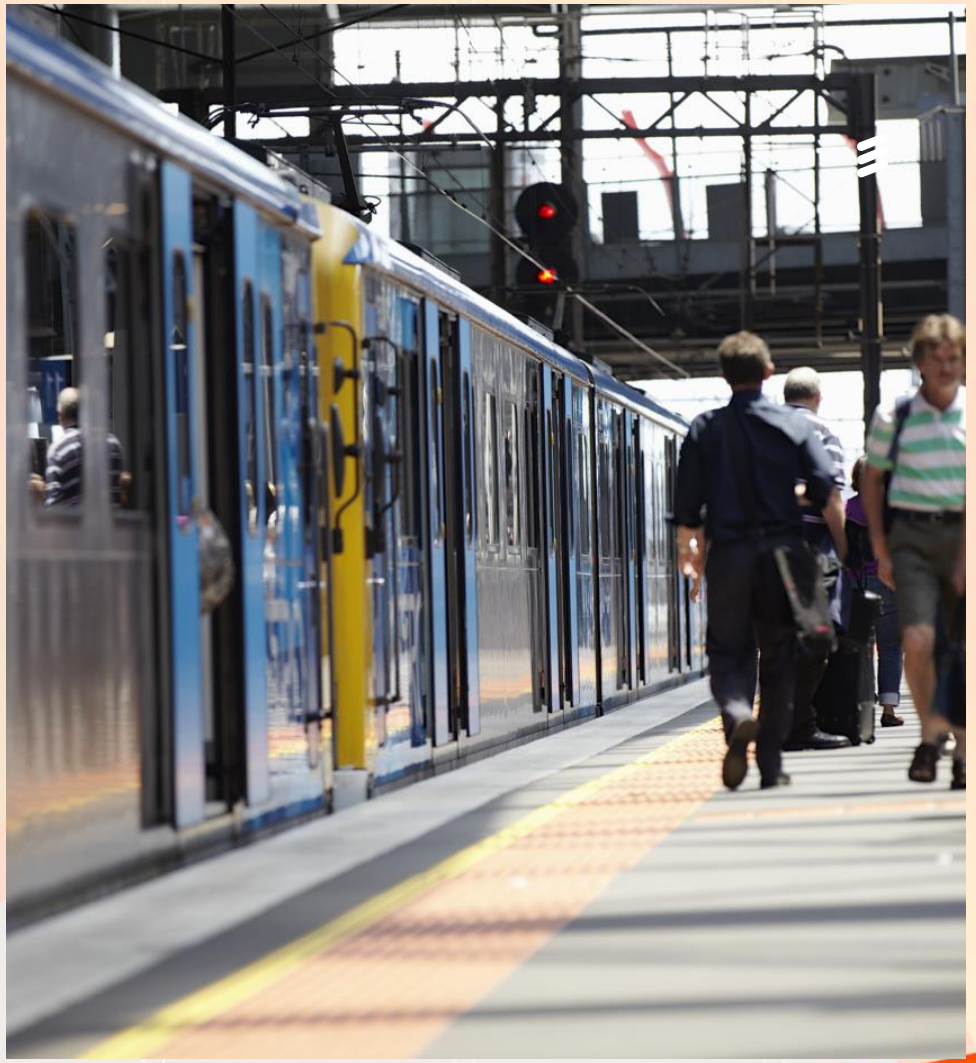
Operator – horizontal play

Attributes

- One stop shop for application development
- High barrier to entry

Key success factors

- Ease of use
- Global reach and scale
- Business models



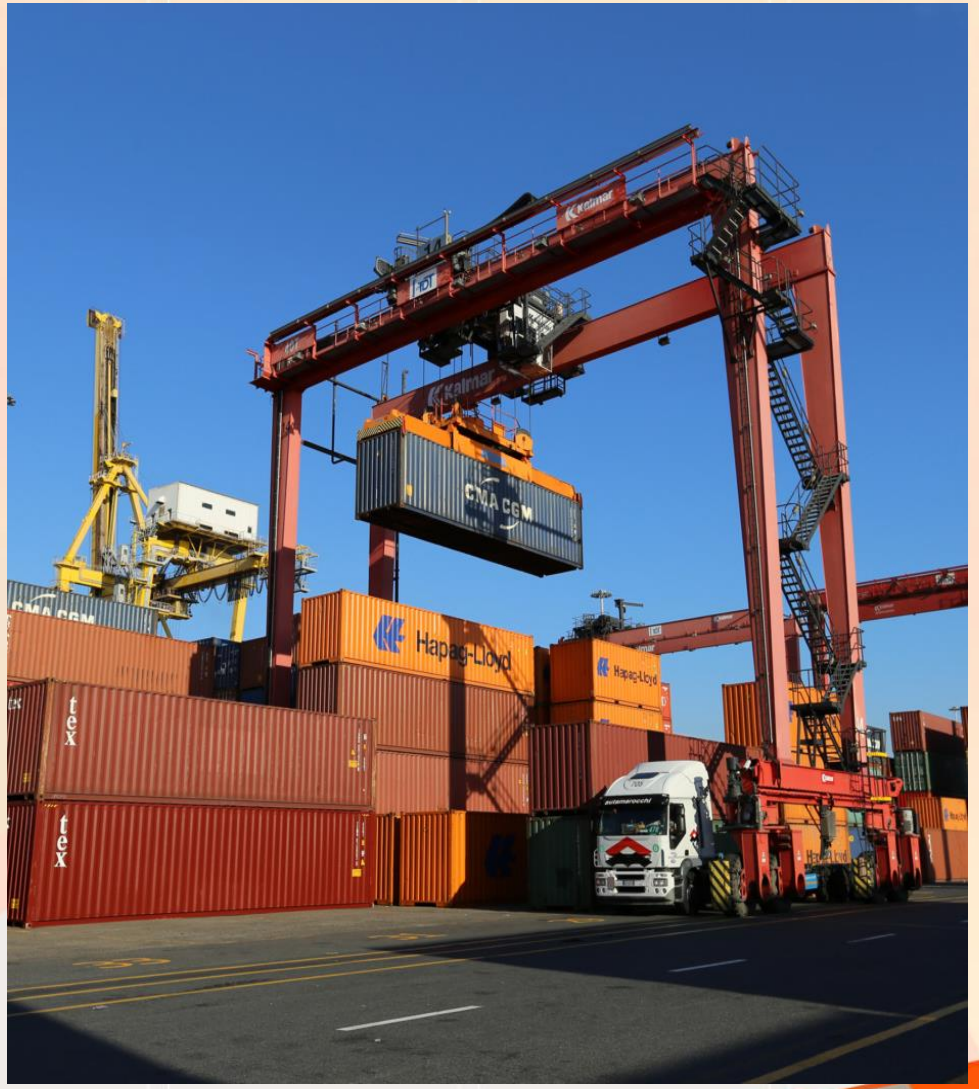
Operator – vertical play

Attributes

- Industry solutions
- Fragmented
- Difficult to scale

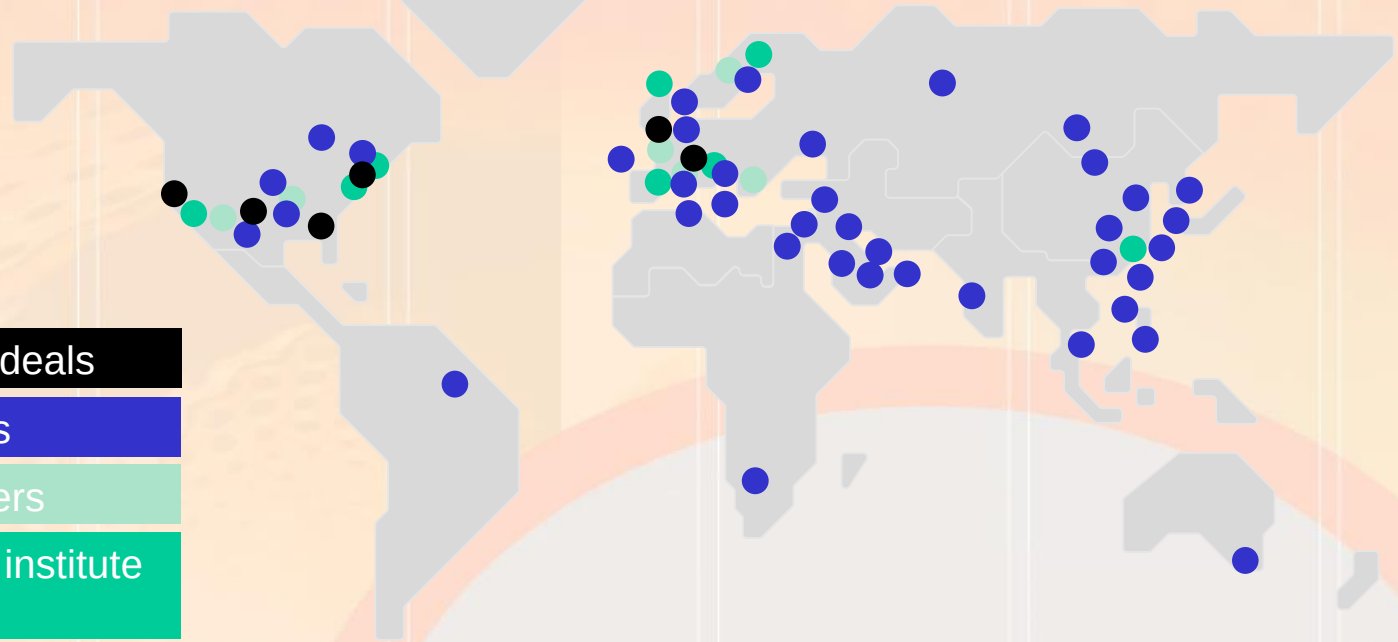
Key success factors

- Deep industry knowledge via partners or acquisitions
- Technical and SI capabilities
- Local presence and support



Ericsson has the biggest 5G momentum – collaborating with operators, industry partners and academia worldwide

- Clear Mobitel will work with European and American vendors on a 5G solution for the Islands.



6 announced 5G deals

41 operator MoUs

22 industry partners

45 university and institute collaborations

As of October 2018

Next Steps

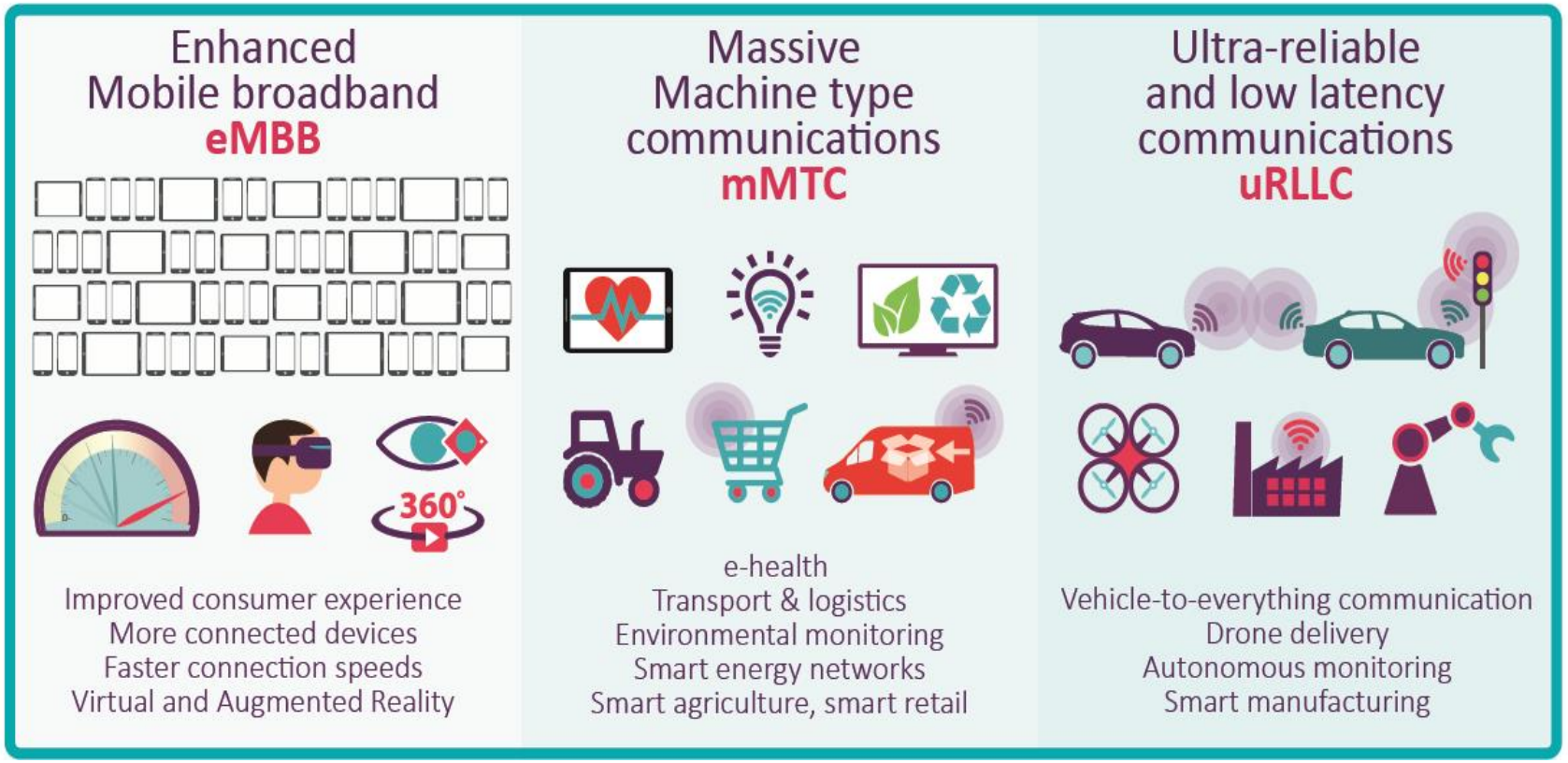
- We are not going to jump in and make the wrong technology choice
- We are not going to wait for the standards to catch up to new innovation
- We will choose a balance and investment strategy that will deliver mutual benefits to Guernsey and Clear Mobitel
- We will change the way people pay for capacity, 5G will destroy the fixed line Granny Bakerlite4 market
- Mobile mobility is the new global destiny. Clear Mobitel will ensure that Guernsey is at the forefront of this next technological phase.

Spectrum for 5G in the UK

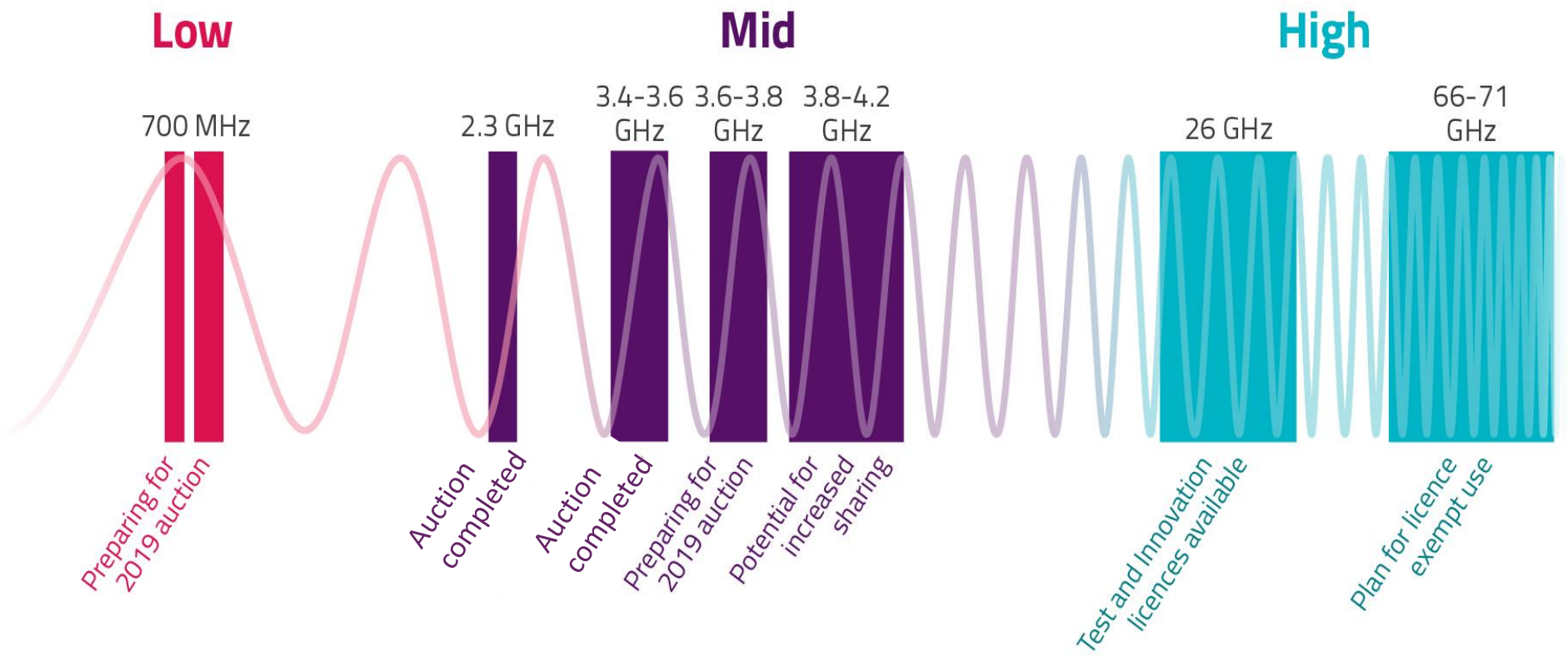
Chris Woolford – Director of International Spectrum Policy - Ofcom

November 2018

5G will enable different use cases across a broad range of industry sectors



We want to ensure that spectrum is not an inhibitor of 5G



Different authorisation methods may be needed

Low and Mid frequency spectrum for mobile services including 5G

700 MHz

- Provide wide area coverage
- Clearance well under way
- **Award in 2019**

3.4-3.8 GHz – “primary” band for 5G

- Large bandwidth can support higher data rates, provide increased capacity, and enable higher speeds
- **3.4-3.6 GHz - awarded**
- **Intention to award 3.6-3.8 GHz in 2019**

Enabling new users and uses to access the spectrum they need

3.8-4.2 GHz

- Exploring the potential for further sharing between existing and new uses

Our roadmap for 5G mmWave spectrum

Different bands, different characteristic and different authorisations to enable all 5G use cases

- **26 GHz**: Trial and Innovation licences available
- **66-71 GHz**: We have made this band available on licence exempt basis for 5G (as part of wider 57-71 GHz band)
- **40 GHz**: Support internationally as part of wider band for harmonisation of equipment (37-43.5 GHz)

The 26 GHz band: 24.25-27.5 GHz

Allocated to defence but currently appears to be largely unused in many European countries

Incumbent use, including for Fixed Links, Satellite Earth Stations, PMSE and SRDs

- A number of European countries are currently focusing interest in mmWave on the upper 1 GHz of the 26 GHz band for mobile broadband
  - Band is largely clear (especially in urban areas)
  - Understand manufacturers developing chipsets which include 26.5-27.5 GHz

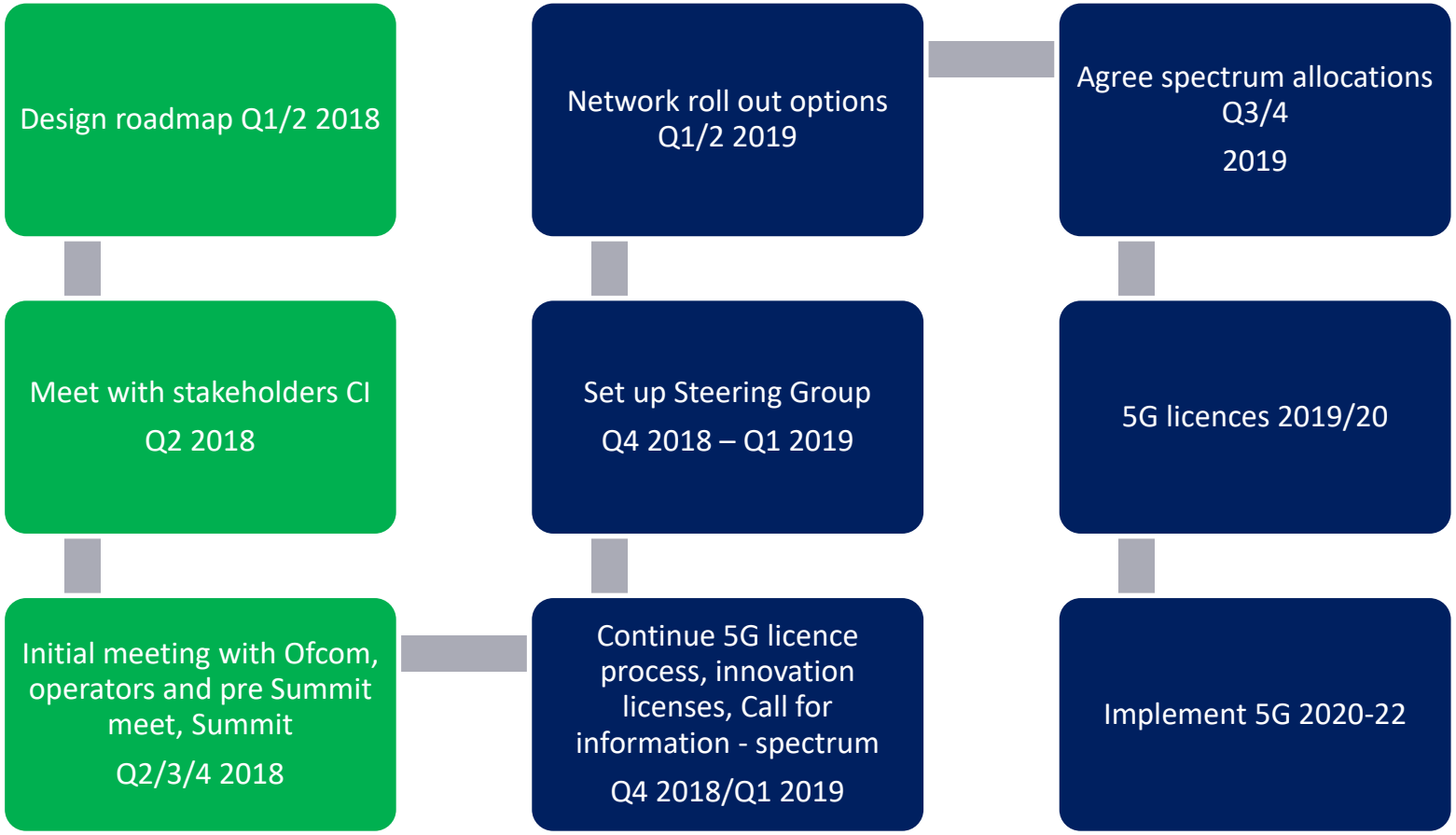
- Lower 2.25 GHs may be more appropriate for other types of use, e.g. industry verticals

Thank You

Tim Ringsdore

NEXT STEPS

CICRA Road Map



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