# 5G Innovation

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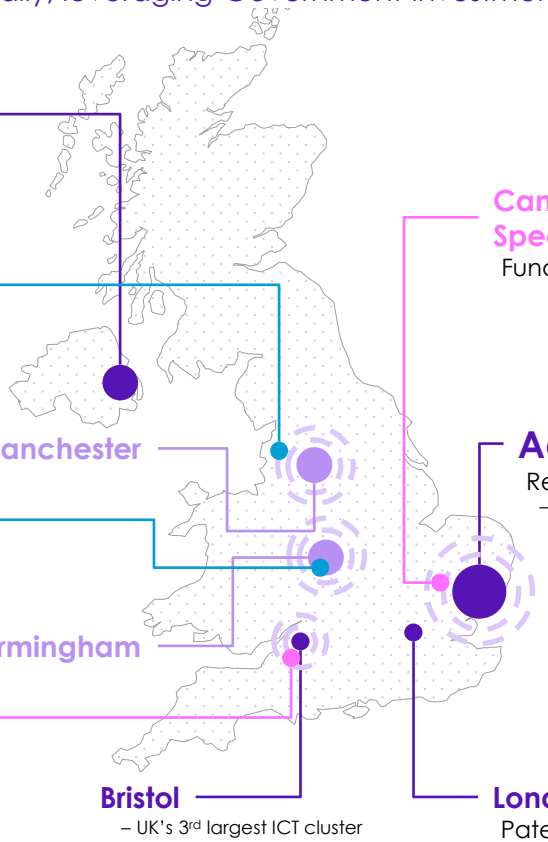
# Applied Research and Adastral Park – home BT Labs and much more…

Our world renowned innovation ecosystem and facilities mean that our research is open (152 companies on site), grounded in science (Universities) and purposeful (customer collaboration)

Maximise our use of key specialisms at Universities in the UK and globally, leveraging Government investment in UK science



**BT Ireland IC**
Innovation Centre

**Lancaster University Specialist Lab**
Operational Optimisation

**Manchester**

**Birmingham University Specialist Lab**
Quantum Sensing

**Birmingham**

**University of Bristol Specialist Lab**
Cyber, Mobile, Optics, Quantum, Wireless, & AI

**Bristol**
– UK's 3rd largest ICT cluster

**Cambridge University Specialist Lab**
Fundamentals

**Adastral Park**
Research HQ
– Largest UK ICT Cluster

**High Potential Opportunity location**
Department for International Trade

**London**
Patenting team
– Co-located with legal team

**Applied Research** **Strategic Universities** **Specialist Universities** **Technology**

| | | | |
|---|---|---|---|
| **BT - MIT** Boston, USA | **EBTIC** Abu Dhabi, UAE | **BT IRC** Bangalore, India | **BT CRC** Beijing, China |

## Co-location

**BT Security**
BT's main security presence benefitting from Research

openreach

**Openreach**
Direct engagement between OR and Applied Research

**24x7 National Operations Centre**
UK Network Operation Centre

**Link to Academia**
University of Suffolk, UEA, Cambridge and Essex

**Partners**
Innovation Martlesham: Largest UK ICT cluster with 141 companies

**Quantum Network Link**
Commercial-grade quantum key distribution link

**Long range radio propagation test facilities**
Equipment and open space required

**Network Test Facility**
Largest test and integration facility in Europe

5G-VINNI

**5G Lab, IoT testbed / T&D license**
Rolled out at Adastral Park with 11 companies testing

**Drone test facility**
Nearby RAF Bentwaters

**TV, laser and optical fibre labs**

openreach

**Openreach Ultrafast lab**
Test and development of the latest access technologies

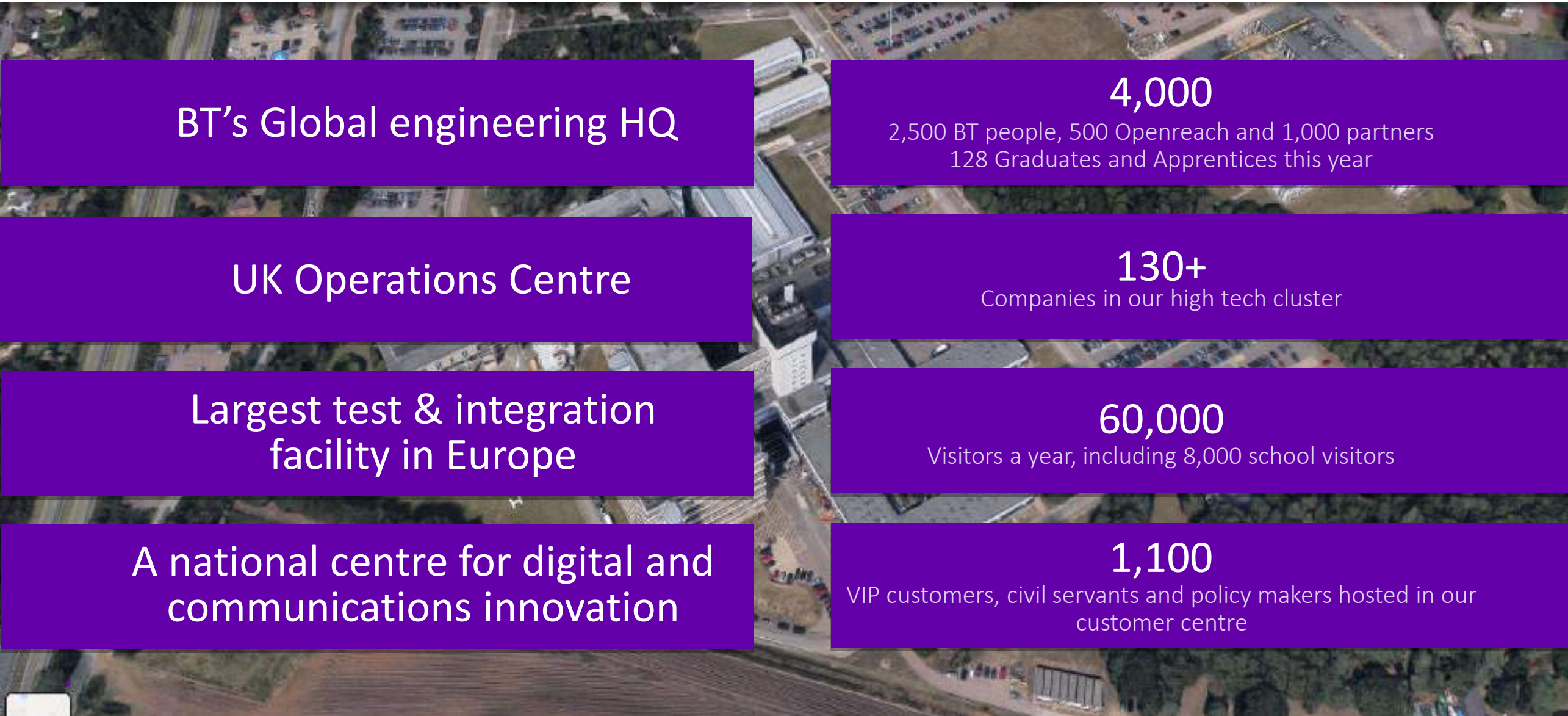
**DC, network & data analytic test platform**

**RF & Acoustic anechoic chambers**

**Customer Showcase and Hothouse**
Average £0.5bn annual bid wins

# BT Labs @ Adastral Park

# Adastral Park



BT's Global engineering HQ

UK Operations Centre

Largest test & integration facility in Europe

A national centre for digital and communications innovation

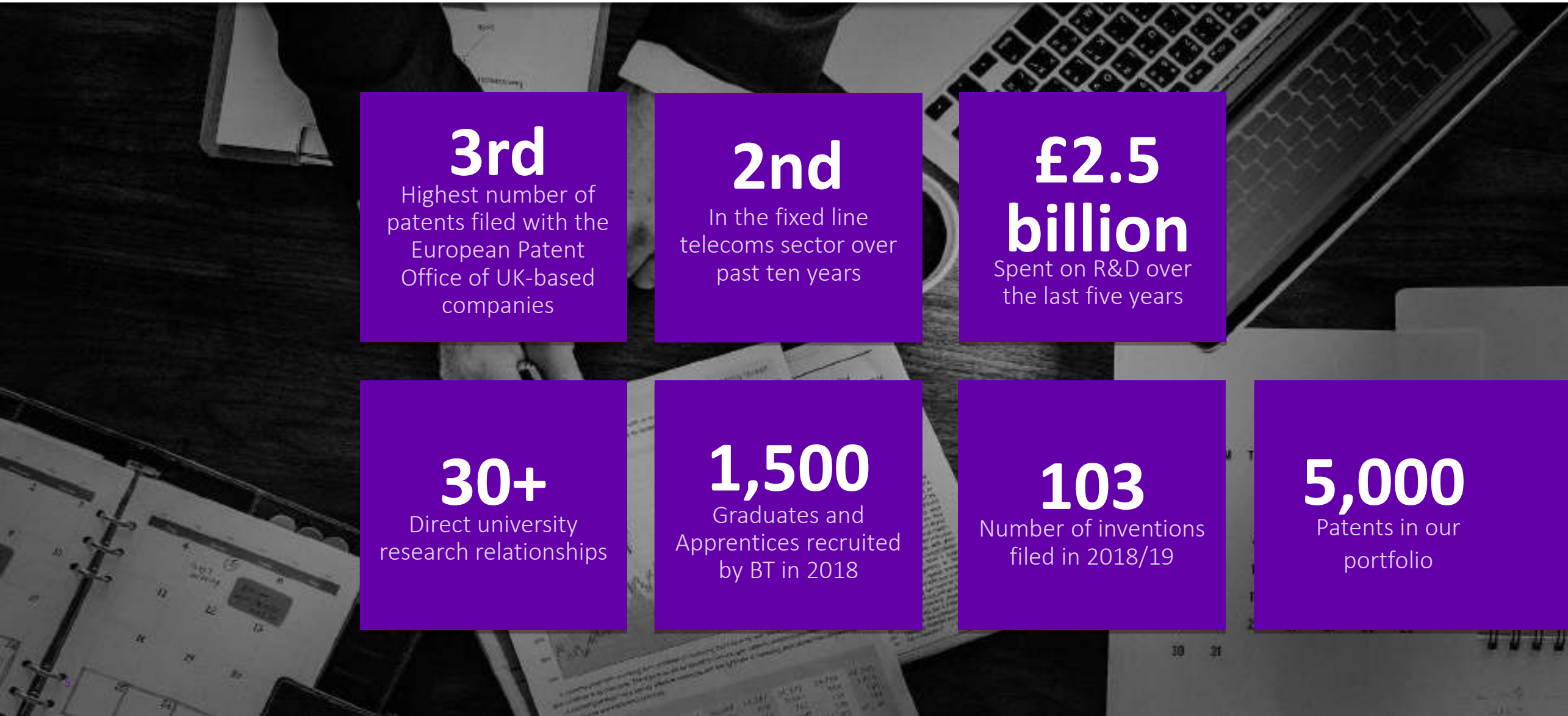
**4,000**
2,500 BT people, 500 Openreach and 1,000 partners
128 Graduates and Apprentices this year

**130+**
Companies in our high tech cluster

**60,000**
Visitors a year, including 8,000 school visitors

**1,100**
VIP customers, civil servants and policy makers hosted in our customer centre

# Investing in Research & Development



**3rd**
Highest number of patents filed with the European Patent Office of UK-based companies

**2nd**
In the fixed line telecoms sector over past ten years

**£2.5 billion**
Spent on R&D over the last five years

**30+**
Direct university research relationships

**1,500**
Graduates and Apprentices recruited by BT in 2018

**103**
Number of inventions filed in 2018/19

**5,000**
Patents in our portfolio

# Adastral Park Research Facilities

There are key assets at Adastral Park that are necessary for Research, and additional benefits from being co-located with BT's technology assets such as Gemini Network Integration Facility, Adhara Operations Centre and Global Security team.

Laser and optical fibre labs

Long range radio propagation test facilities

Network and Data Analytic test platform

Network and Data Analytic test platform

Network Integration test Facility - Gemini

Acoustic Anechoic Chambers for antenna characterisation

RF Anechoic Chambers for antenna characterisation

# Adastral Park Showcases

✓ Win bids ✓ Generate opportunities ✓ Test innovations with customers

Agile Bank

The Street

Connected Industry

Retail

Healthcare

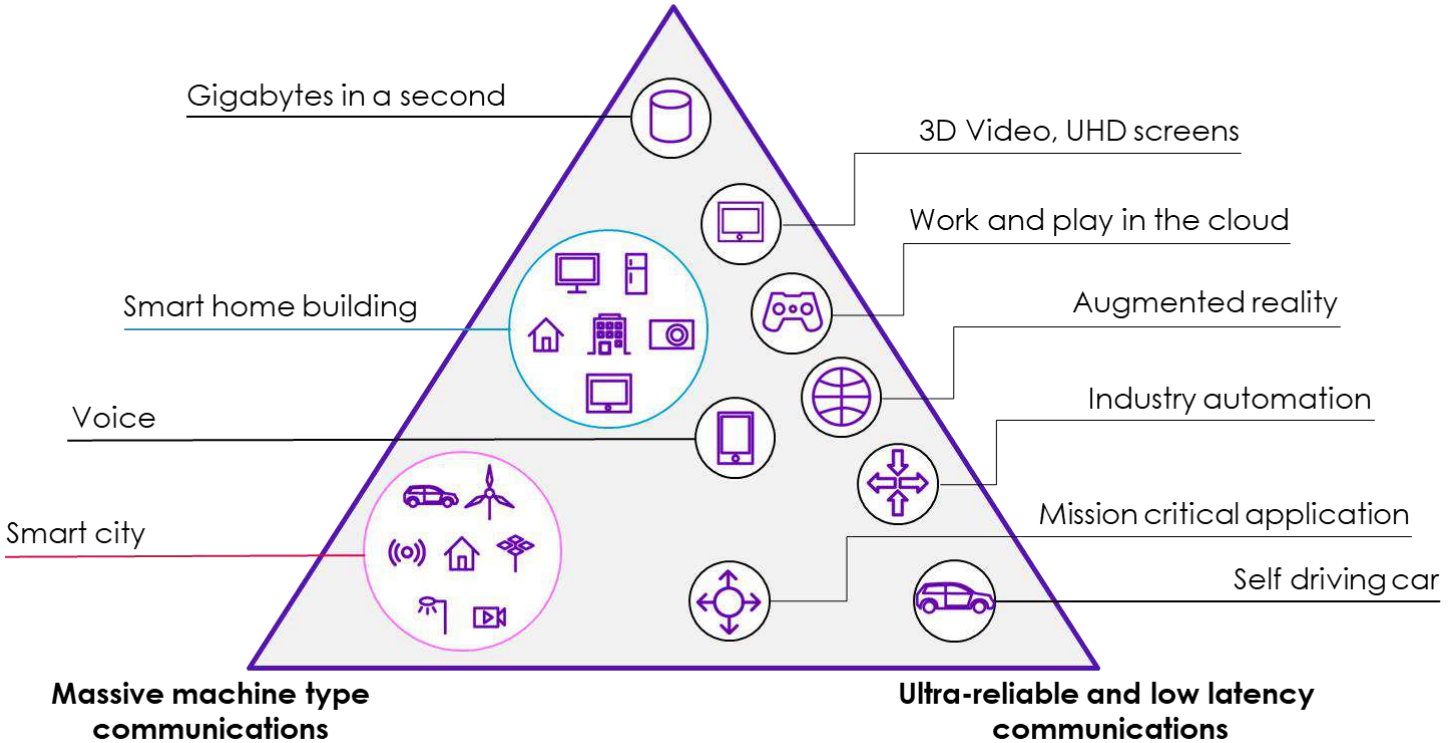
Connected Home

# 5G will enable new use cases

10 Gbps peak data rate
1 Gbps average data rate

**Enhanced Mobile Broadband**

1m connections /Km2
10 year battery




1msec latency
Ultra high reliability/availability

BT

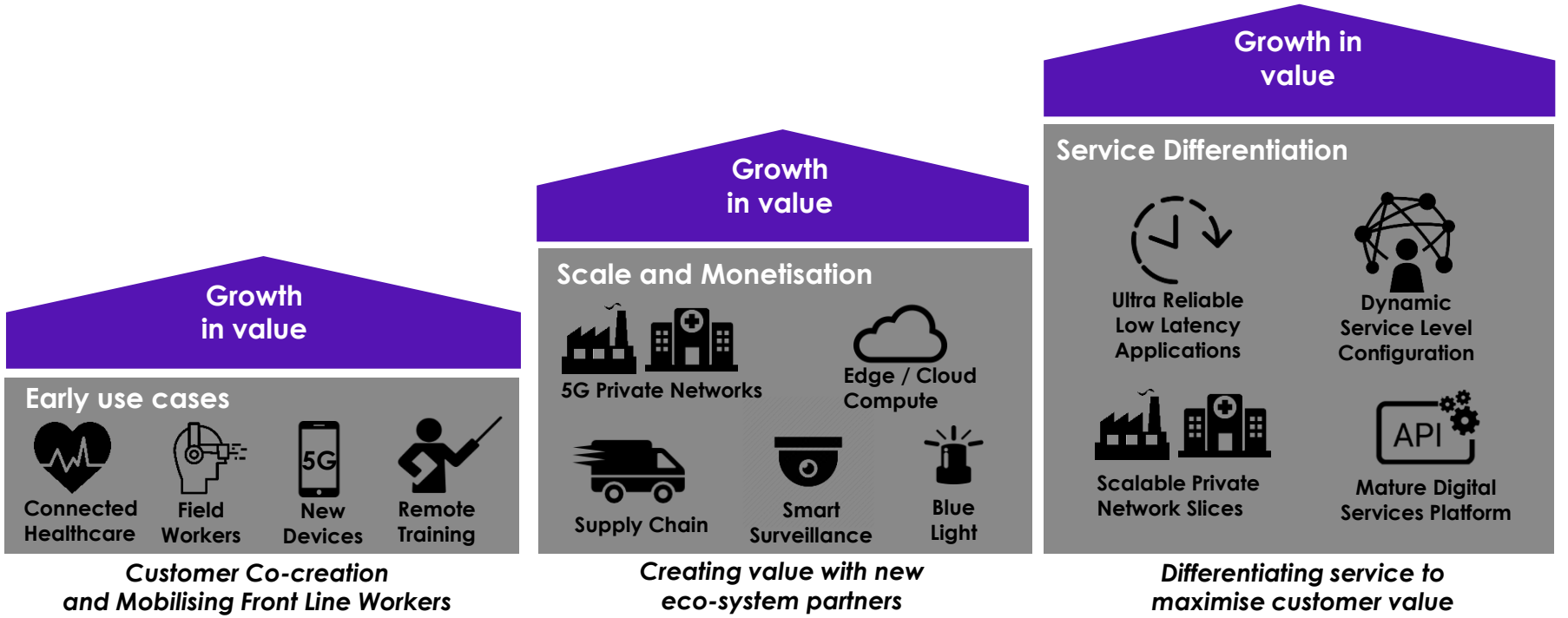
# 5G Evolution

## New releases of technology will deliver new business outcomes

**5G Release 15:**
AR/VR and mixed reality, remote field workers, remote healthcare, immersive training and education

**5G Release 16:**
Standalone private networks, new lower latency industry use cases, growth in edge and hybrid cloud

**5G Release 17:**
Network slicing, virtualisation, dynamically configurable service levels, ultra-reliable low latency




*Customer Co-creation and Mobilising Front Line Workers*

*Creating value with new eco-system partners*

*Differentiating service to maximise customer value*

**Early 5G use cases driving demand for higher performance and lower latency:**

- **Connected Healthcare:** Ambulances, multi-disciplinary teams, remote patient monitoring
- **Connected Field Worker**: Utilities, 3rd party telco
- **Remote Immersive Education:** Universities, construction, utilities
- **Smart Surveillance**: Blue light, connected officers, connected armed response, public sector
- **Connected Supply Chain:** Logistics

**Evolution of 5G coupled with growth in Private Networks could create new opportunities for Network Edge capability:**

- Industry 4.0
- Ports
- Airports (Hybrid)
- Hospitals (Hybrid)
- Mines

## Business outcomes for Enterprise / Global Customers

| Increased Productivity | Operational Efficiency | Increased margin | Cost reduction | Safer workplaces | Revenue growth |
|---|---|---|---|---|---|

# 5G private networks provide a dedicated, secure mobile network for critical network operations that need reliable mobile coverage across a wide area

**A private network is a dedicated, secure mobile network for a specific site**


| Customer benefits | Coverage & reliability | Control | Security |
|---|---|---|---|

**Shifts mobile into mission critical networking – linking mobile assets to cloud applications in ways that have not been possible previously - hugely transformational**

# A world of opportunity awaits, underpinned by evolving telecoms

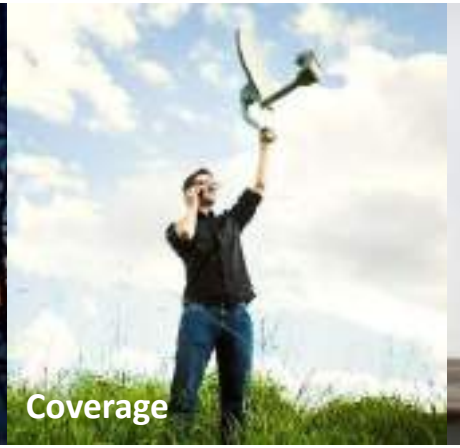






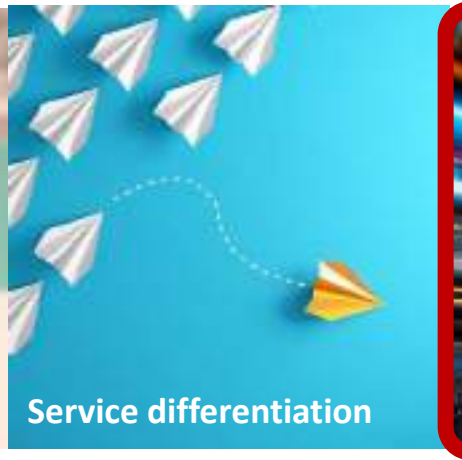


# What do we need to focus on as a technical community?



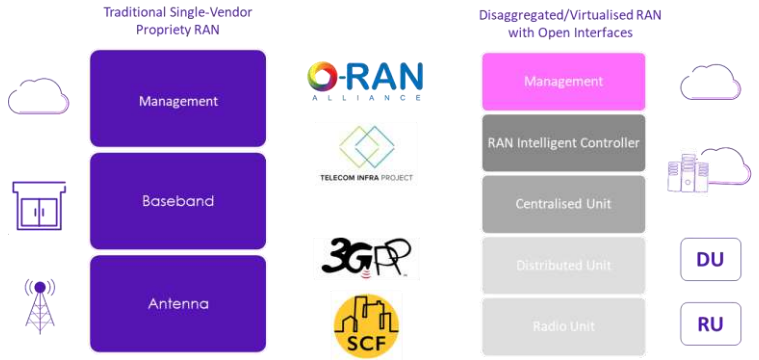


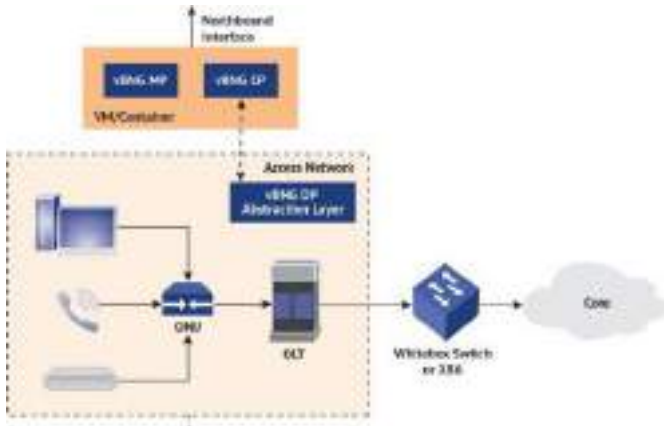



# Innovation fueled by a diverse and competitive supply chain

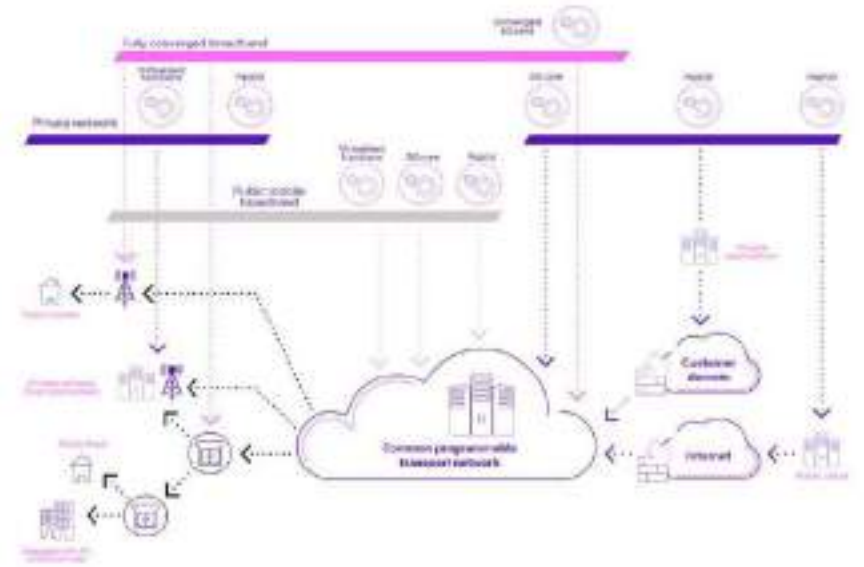
*Virtualisation, Disaggregation and Open architectures are key*




Virtualised, Disaggregated, Open Radio solutions




Virtualised, Disaggregated Broadband Network Gateways



Converged 5G System – Service Based Architecture

- Cloud-Native
- Fully disaggregated
- Open and interoperable
- Convergence of fixed and mobile access

New supply chain players will emerge based on open source & emerging integration models



https://gonorthforge.com/virtual-and-disaggregated-broadband-network-gateway/

# 5G Use Cases in BT Applied Research


## Drone-based Video analytics

- ✓ Real-time object detection
- ✓ Drone-mounted camera
- ✓ Safety, inspections


## Video analytics

- ✓ People counting
- ✓ Social distancing
- ✓ Object detection

## Volumetric video real-time comms

- ✓ Holographic comms
- ✓ Mixed reality experiences
- ✓ Live Broadcasting


## Continuous Urban Scanner

- ✓ 3D urban mapping
- ✓ Live on street parking info
- ✓ Improved planning / safety


## Volumetric video live experiences

- ✓ Live Sports events
- ✓ Remote learning
- ✓ Design and collaboration


## Augmented remote operations

- ✓ Connected ambulance
- ✓ Remote logistics
- ✓ Remote crane operations


## AI-Autonomous Drone Control

- ✓ Emergency Response
- ✓ Medical deliveries
- ✓ Logistics, warehouse mgmt.


## Industry 4.0

- ✓ Remotely operated robots
- ✓ Synchronization capabilities
- ✓ Manufacturing, warehousing


BT

# Thank you

Maria Cuevas
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