



Network
2020

5G

Moving from a **technical**
to a **business perspective**



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Welcome
Henry Calvert
Head of Network 2020
GSMA



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Moderator

David Pringle



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Bruno Jacobfeuerborn
Group CTO & Chair of Network 2020
Deutsche Telekom



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Panel



Moderator - David Pringle

Panelists

- Dan Warren, **Samsung**
- Peter Virk, **Jaguar Land Rover**
- Seizo Onoe, **NTT DOCOMO, INC**
- Adam Koeppel, **Verizon**



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Adam Koeppe

VP, Access Technology Planning
Verizon

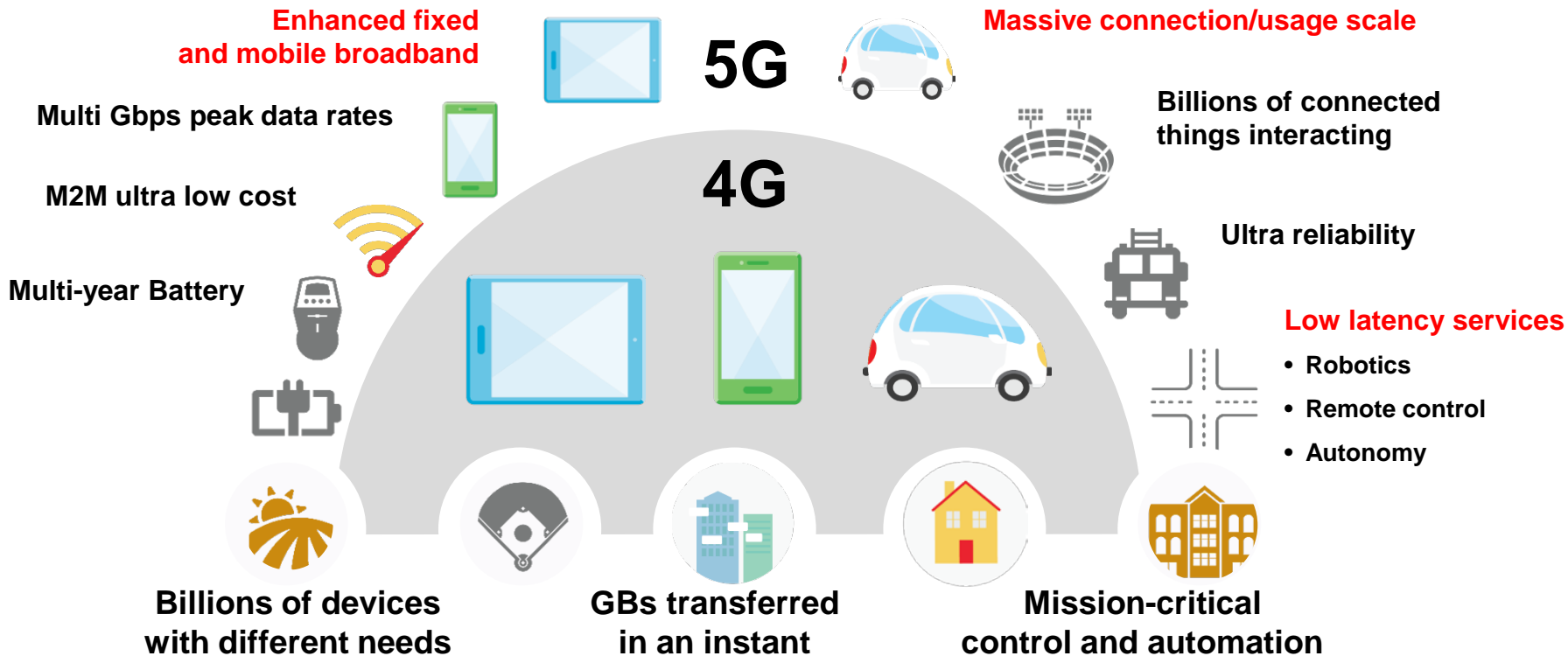
Verizon 5G.

**Adam Koeppe, VP
Technology Planning
February 2017**



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Wide range of technical development.



Verizon 5G snapshot.

5G Tech Forum

Innovation sessions across infra, chipset, device, VC partners

Field technical trials

Robust real-world testing

Public specifications

5GTF spec published, development underway

Pre-commercial customer pilots underway

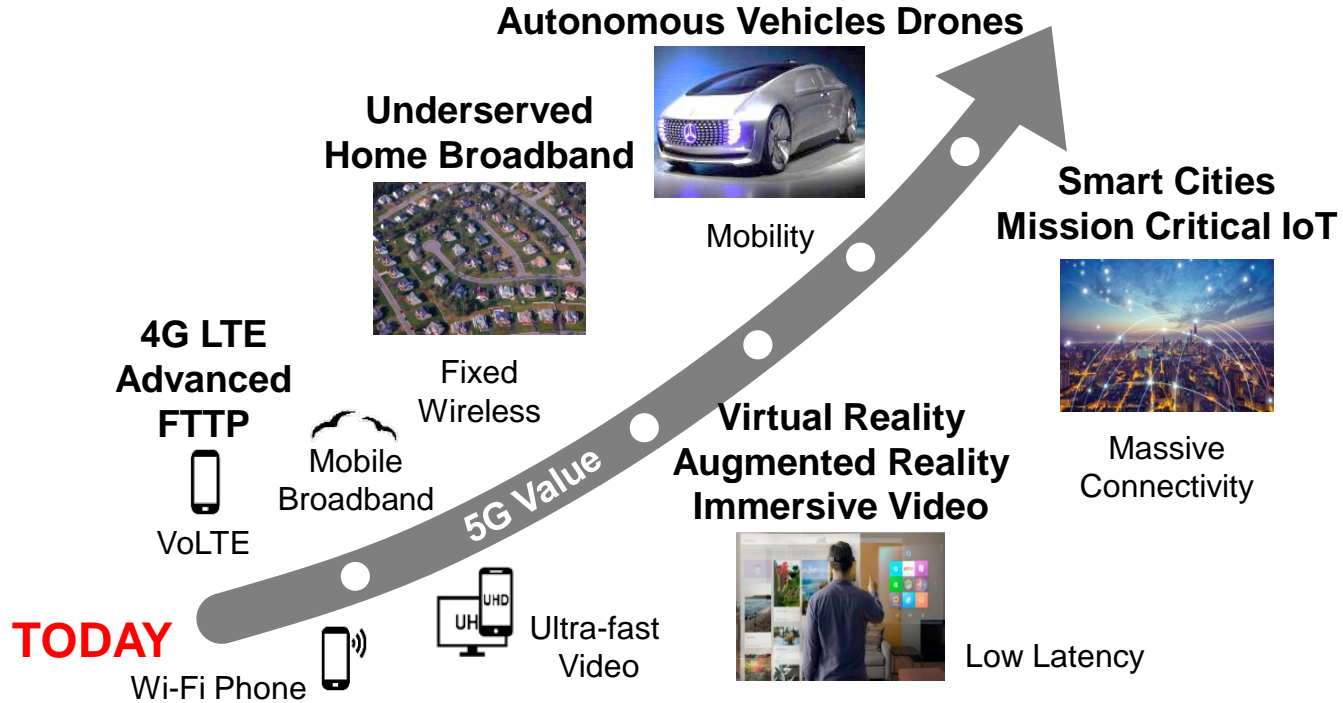
Largest 5G test bed for fixed and mobile

Verizon is leading and accelerating the 5G evolution



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5G enables new opportunities & markets . . .

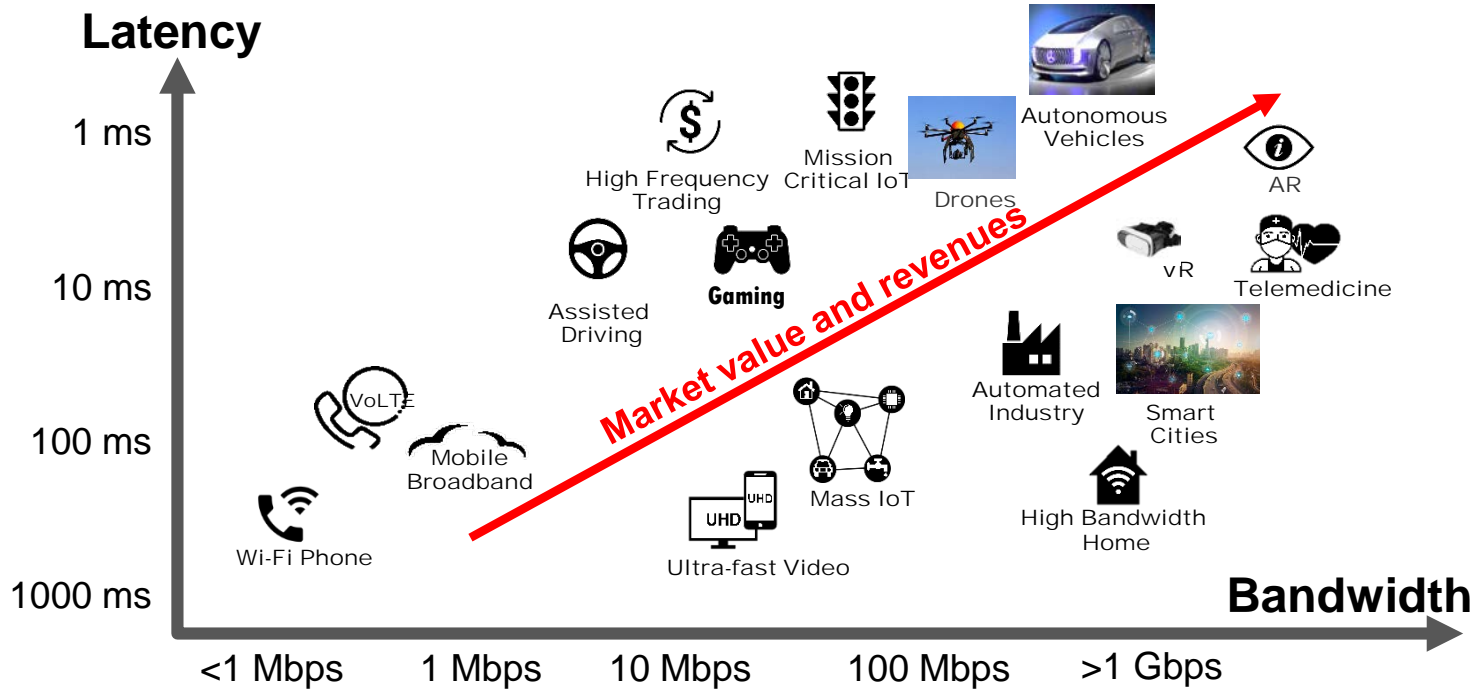


Verizon 5G rapidly extending beyond Fixed Wireless



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... and a broad set of new use cases.



Today
Bandwidth

Future
Bandwidth • Latency • Connectivity



Value Measure

Thank you.



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Seizo Onoe
CTO and EVP
NTT DOCOMO, INC

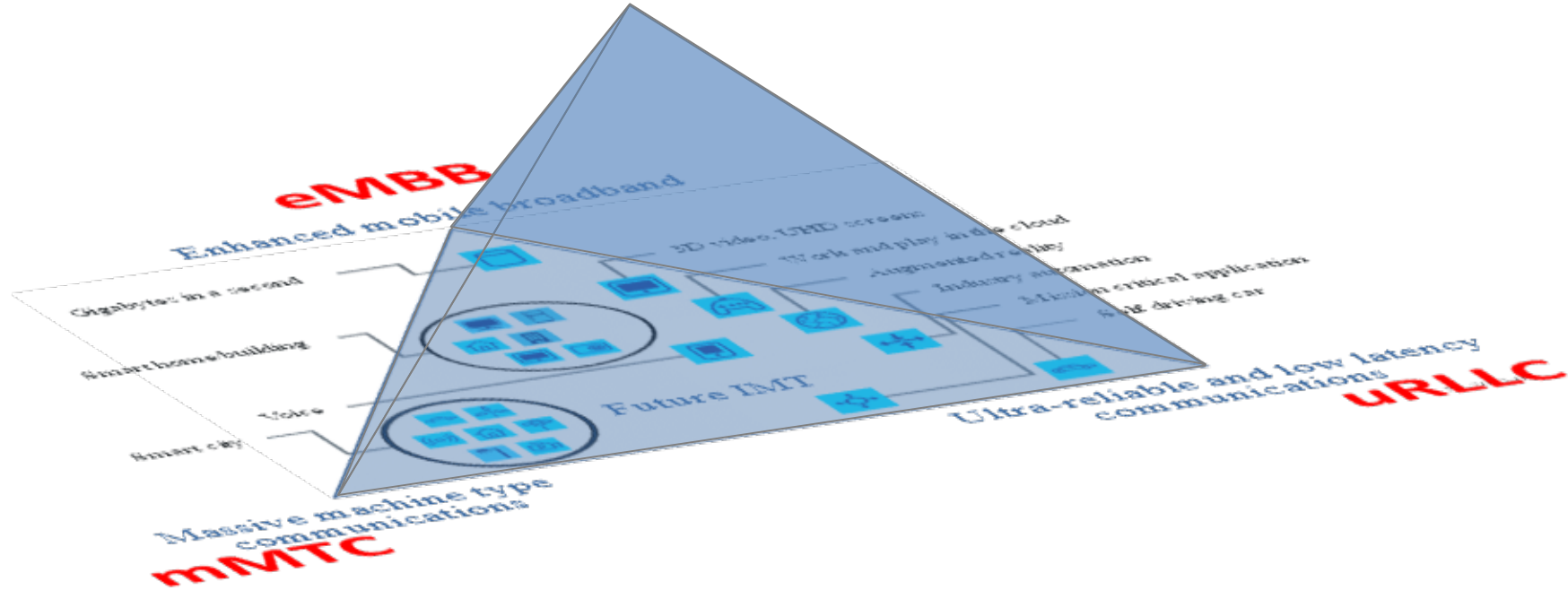
5G Potential and Reality

Seizo ONOE
CTO and EVP
NTT DOCOMO, INC.





New Business Models and Ecosystem across Industries



eMBB

Virtual Reality



Augmented Reality



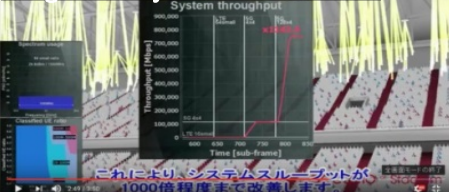
Free-viewpoint



Sense of Presence



High density traffic



Uplink Traffic



mMTC

Smart City/Home



Wearable



Smart Manufacturing



uRLLC

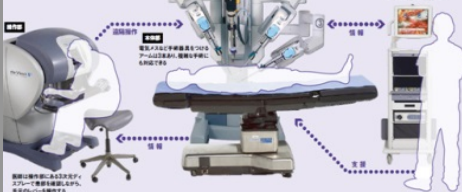
Drone Management



Tactile sensation Communication



Remote Operation



New Business Models and Ecosystem across Industries

Broadcast



Automotive



Transportation



Medical/Healthcare



Agriculture



Manufacturing



Myths about 5G



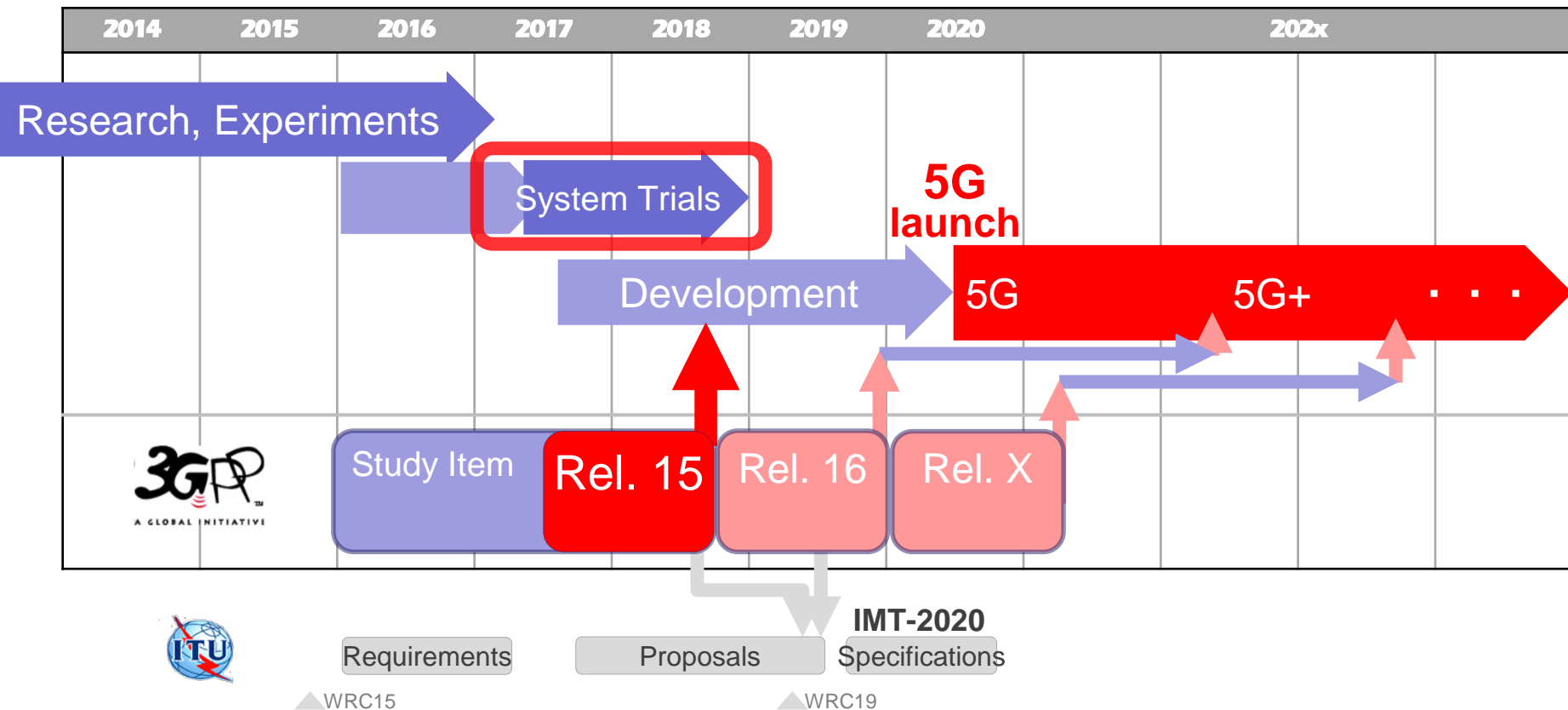
People are trying to jump on the 5G bandwagon.

➤ **For 5G, all things need something new.**

➤ **5G needs significant investment.**

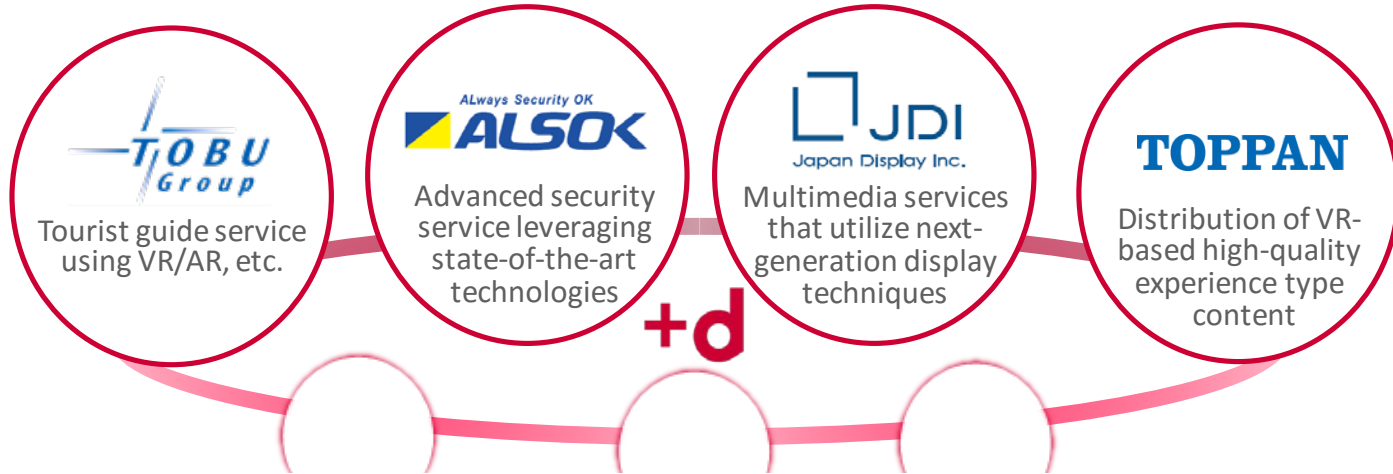
**Let's get on the 5G bandwagon
and create new business models
through collaborations across industries.**

DOCOMO's Time Plan



5G Trial Sites

Building an environment to experience new services employing 5G



No. of partner companies continue to grow

<u>Trial Sites</u>	<u>Trial launch date (planned)</u>
Tokyo Waterfront City area Areas near TOKYO SKYTREE TOWN®	May 2017 or beyond

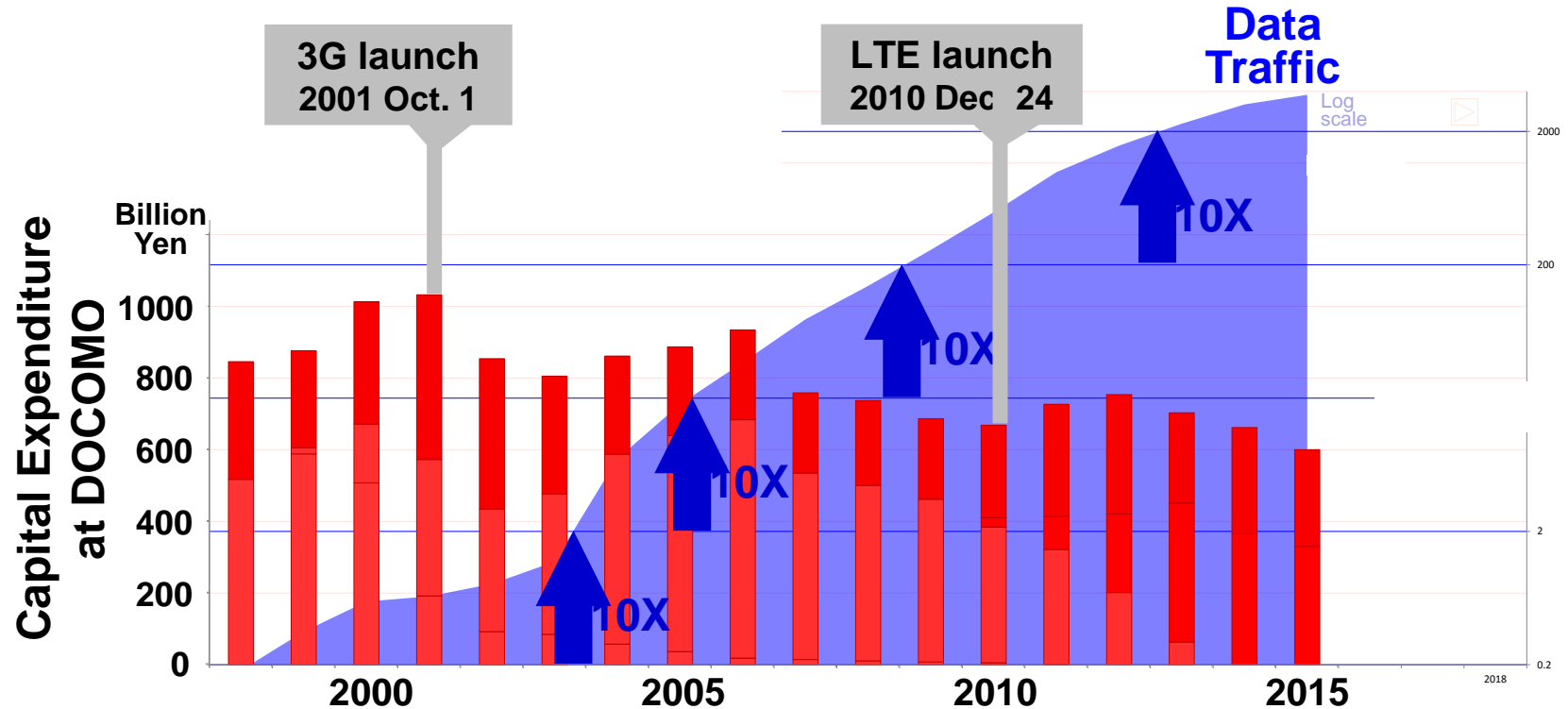
Myths about 5G

- 5G is millimeter wave technology.
- 5G is a hot spot system.
- 5G launch needs new 5G spectra.

A vague sense of worry

- For 5G, all things need something new.
- **5G needs significant investment.**

The data capacity enhancement with no increasing trend in CAPEX can be one of the 5G killer services.



Conclusion: 5G Potential

- eMBB, mMTC and uRLLC will provide various use cases for enterprises and consumers.
- 5G will create new business models and ecosystems through collaborations across verticals.
- The capacity enhancement with reasonable CAPEX can be a killer service.

Conclusion: 5G Reality

- **There is no service that can be provided only in 5G and not in 4G.**

A service that is reasonably good in 4G but surprisingly better in 5G is a "5G" service.

- **5G will not change the world overnight, but over time.**

5G networks and devices will not be built or deployed in a day.

- **Users themselves create new use cases.**

In the past generations, telecom carriers designed services for the next generation; but those actually became popular were unexpected ones that had been created by someone else.

The services that actually became popular after the launch were different from ones that were expected before the launch.

- **It is a fact that 5G is attracting interest from a wide variety of industries.**

We should not miss the potential of 5G as a business opportunity for creating new business and services.



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Peter Virk

Director of Connected Technologies & Apps
- Connected Car
Jaguar Land Rover



PETER VIRK
DIRECTOR OF CONNECTED TECHNOLOGIES & APPS
JAGUAR LAND ROVER

RUNNING TITLE ARIAL16PT BOLD (EDIT IN SLIDE FOOTER)



TIMES HAVE CHANGED



TIMES HAVE CHANGED



1960's Jaguar E-Type

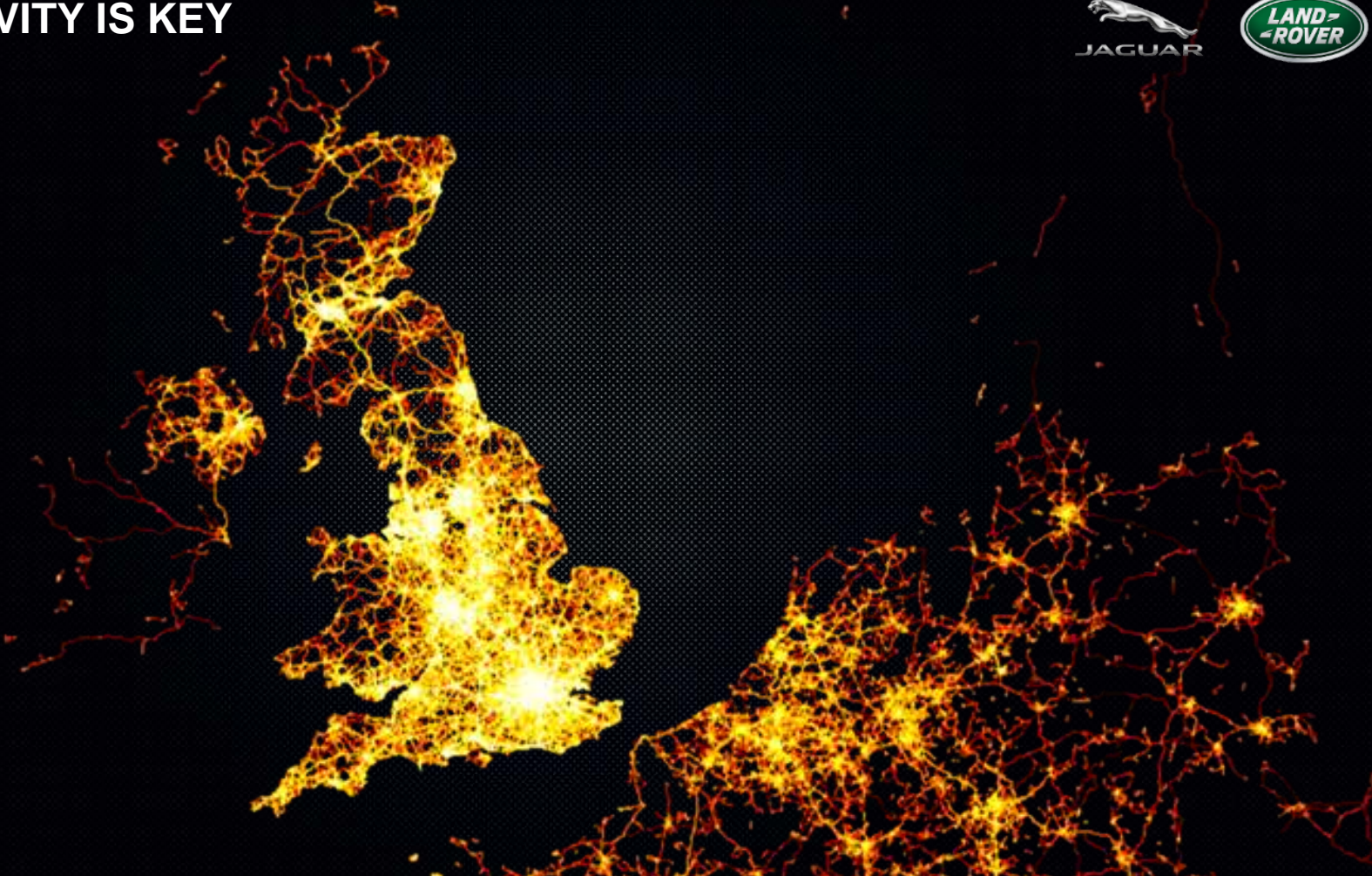


New Jaguar XF

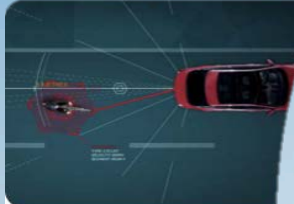
AUTOMOTIVE OF THINGS



CONNECTIVITY IS KEY



HOW WILL 5G BENEFIT AUTOMOTIVE?





PETER VIRK

DIRECTOR OF CONNECTED TECHNOLOGIES & APPS

JAGUAR LAND ROVER



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Dan Warren

Head of 5G Research Samsung R&D Institute
Samsung

Requirements

- 10x bandwidth per connection
- Low-ms latency
- Five 9's reliability
- 100% coverage
- >10x connections
- 50Mbps per connection everywhere
- More cells
- 1000x bandwidth

Applications

- Connected vehicles
- AR/VR
- S-UHD/3D Video
- Haptics/Sensing
- Massive IoT
- Remote machine control
- Mission critical services
- Fixed-wireless access
- eMBB
- ...

Customer segments

- Consumer
- Auto industry
- Health
- Industry 4.0
- Agriculture
- Smart City/Public sector
- Smart building
- Utilities
- Education
- ...

MNO biz model

- B2C
- B2B
- B2B2C



The MNO is the first 'B'

Requirements

- 10x bandwidth per connection
- Low-ms latency
- Five 9's reliability
- 100% coverage
- >10x connections
- 50Mbps per connection everywhere
- More cells
- 1000x bandwidth

The positive message...

Bandwidth is no longer an application limitation

Coverage is no longer a limitation

Reliability and availability is assured

The competitive implication

Bandwidth is no longer a differentiator

Coverage is no longer a differentiator

Reliability and availability are no longer differentiators

So, how will operators differentiate themselves from one another?

When you are the first 'B' in a B2B or B2B2C value chain, your price is the other B's cost

As a consequence, the second B will squeeze the first B's margins, reducing first B's profit in order to increase the second B's

Customer segments

- Consumer
- Auto industry
- Health
- Industry 4.0
- Agriculture
- Smart City/Public sector
- Smart building
- Utilities
- Education
- ...

The positive business impacts

Big contracts, lots of connections

Addressing previously untapped markets

New revenue streams

The implications

Contractual SLA's that must be met

Significant penalties for failure to deliver

Commercial and reputational damage if a contract is lost

Requirements

- 10x bandwidth per connection
- Low-ms latency
- Five 9's reliability
- 100% coverage
- >10x connections
- 50Mbps per connection everywhere
- More cells
- 1000x bandwidth

Some 'Requirements' become 'Contractual Obligations'
Significant CapEx and OpEx to deliver and maintain these metrics
Significant penalties incurred with failure to deliver and maintain

What is 5G's business motivation?

Is it delivering high availability, high coverage, low latency (and sometimes high bandwidth) connections to enable parallel industry opportunities to be addressed? Or is it enhanced mobile broadband for consumers? Or both?

5G is a long journey, not a single network launch

Early 5G launches will still deliver technical advances that offer MNOs differentiation on basis of connection bandwidth.

... but as more networks launch, parallel industries will expect coverage, latency and availability promises to be met.

These are MNO investment dependent, not technology dependent.

Therefore, MNOs must either invest in meeting all 5G requirements, and find the associated business cases that work...

... or face up to 5G being a consumer network that is just 'faster than 4G'.



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Panel debate



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Audience questions