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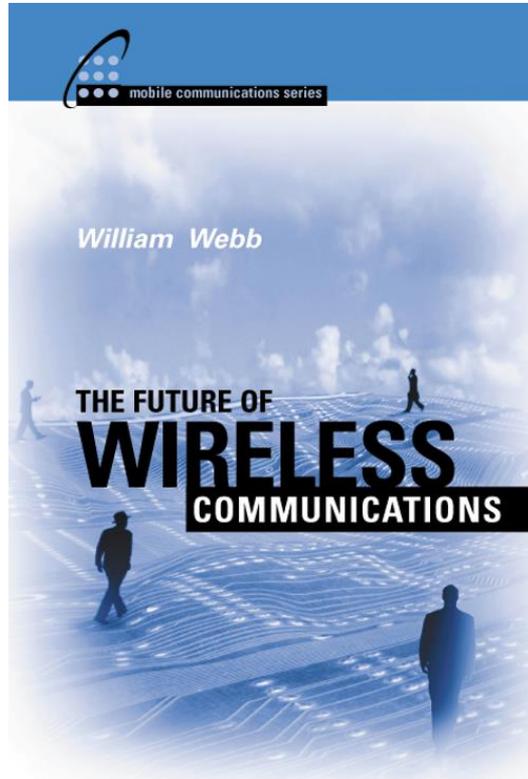
# Tomorrow's Mobile Networks

*Implications for regulators, governments and industry*

**Professor William Webb**

**February 2017**

# Can we predict the future?



Written in 2000



In 2001, Google received a patent for its PageRank mechanism

To date a mere 100,000 homes get high-speed access via ADSL

# In 2020 we will...

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- Book flights with our personal communicator
- Communicator will work out when to wake us up based on diary
- Have home automation such as coffee machine that pre-heats automatically
- Have a home security system that can automatically lock doors
- Have a personalised news feed to our communicators
- Have robots that cut the grass
- Have excellent speech recognition
- Check in at airports using the phone
- Link communicator to seat-back display on aircraft
- Pre-order coffee at nearest Starbucks ready for collection on arrival, provide directions to get there
- Measure biometrics with sensors integrated into clothing
- Provide recommendations to nearby restaurants and automatically book
- Have average data rates to the home of 60Mbits/s

# What did I miss?



## What would you lose?

What would you rather give up, instead of **losing Wi-Fi access** for a month?



Survey conducted by OnePoll, with a sample of 1500 US smartphone owners in April 2016.



# And then?

- “Most of the foreseeable requirements of the end user have now been met and the user will have gone through a period of very substantial change. It will take time for these changes to ripple through society and for their implications to become apparent.”



# The 5G community has mapped out the next decade for us, hasn't it?

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- Incredibly fast – Gbits/s speeds
- Incredible capacity – 1000x current networks
- Broadband everywhere
- Massive machine connectivity
- Ultra-low latency and complete reliability

5G will be instrumental in the next evolution of connected devices, including cars, smart homes, and wearables, due to its superior network speeds (10 times faster than 4G) and capacity (1,000 times the capacity of 4G). [Business Insider]

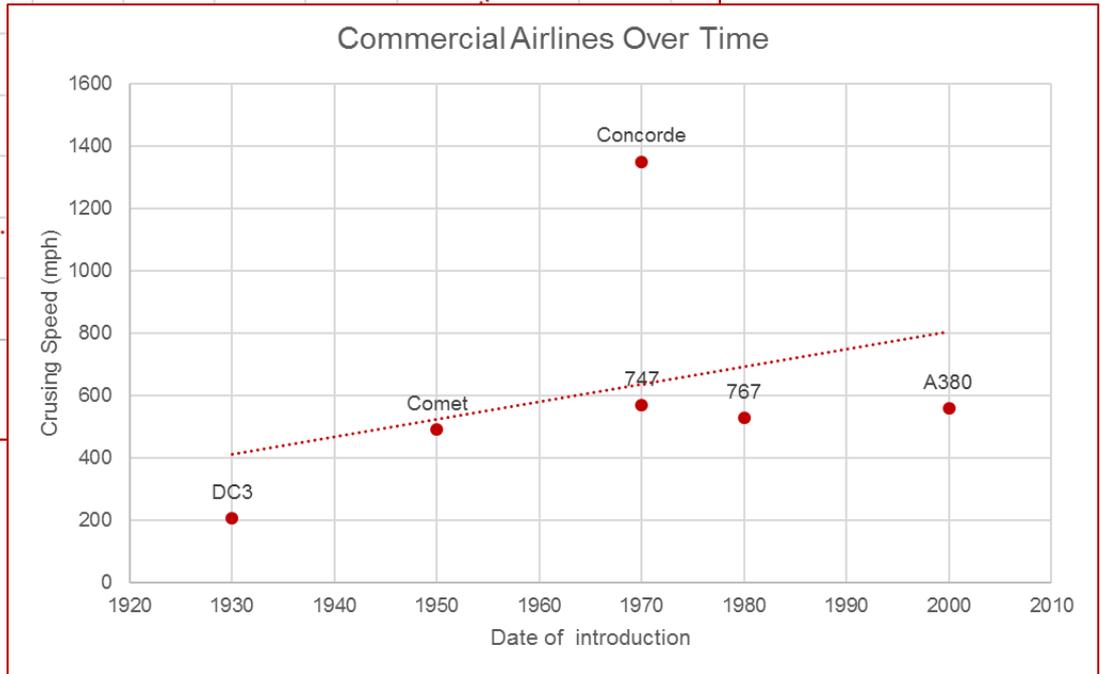
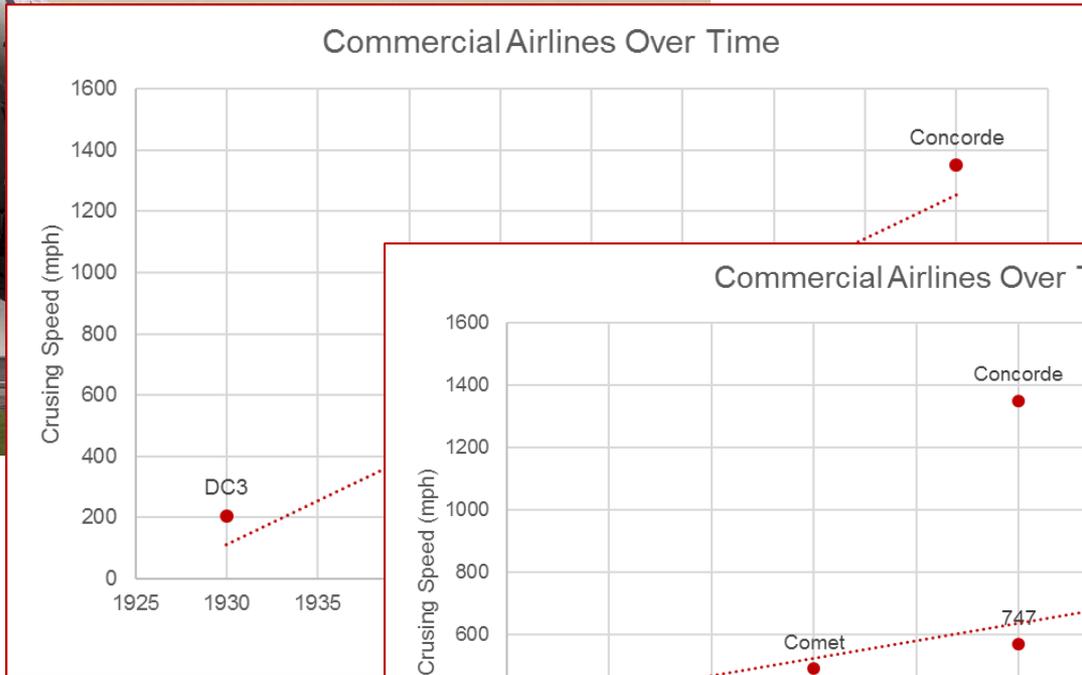
There is a general industry consensus which indicates that traffic volumes will be multiplied 1,000 times; 100 times more devices will require connectivity; some applications will demand data rates 100 times the speeds that average networks currently deliver; some will require near-zero latency [Ericsson]

Optus and Huawei have claimed a single user transmission speed of 35 gigabits per second was achieved over the 73 GHz band in a 5G speed trial just completed in Sydney. [Huawei]

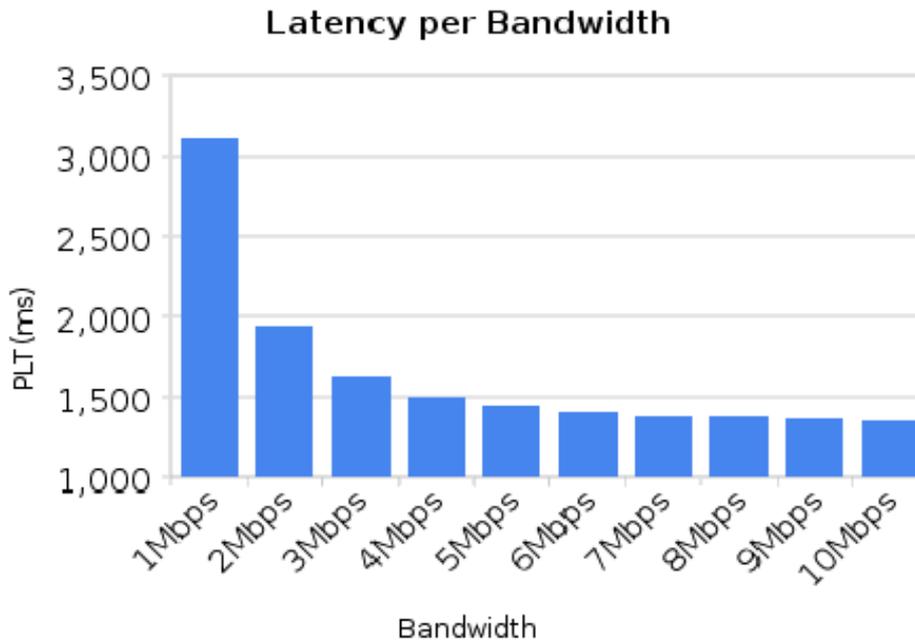
# But sometimes more speed isn't the right answer

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# Why higher speed is not needed

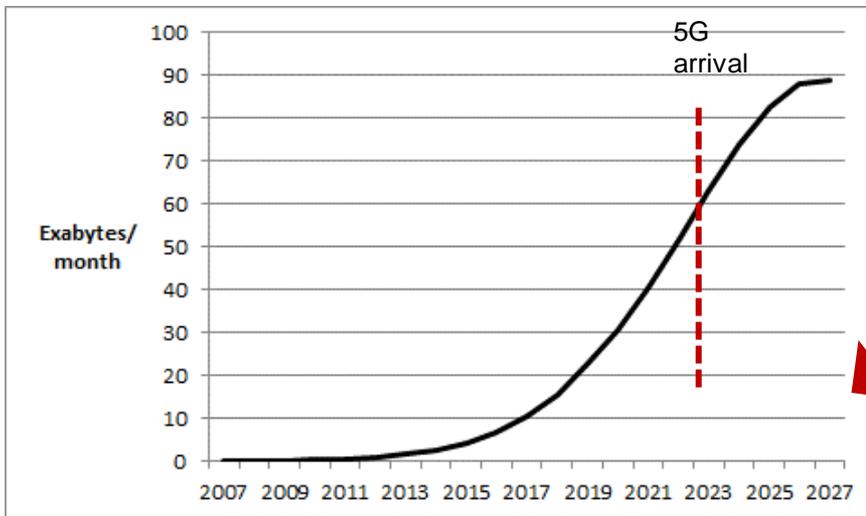
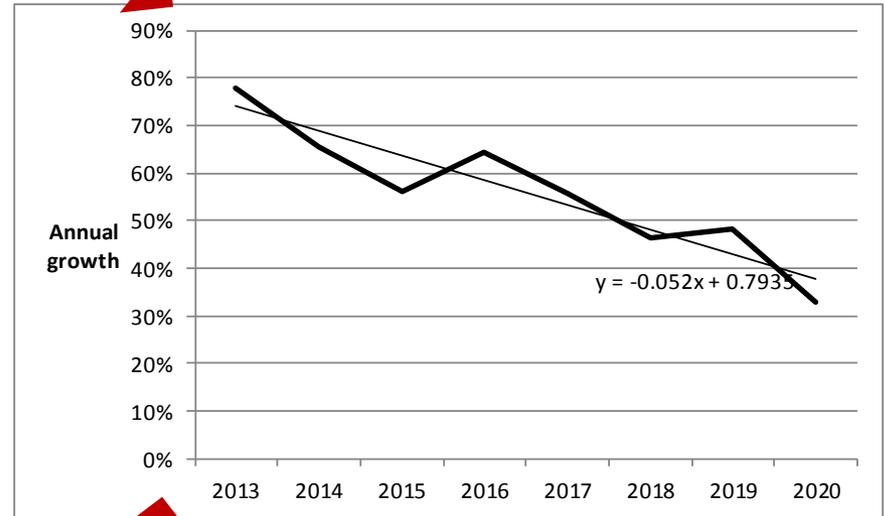
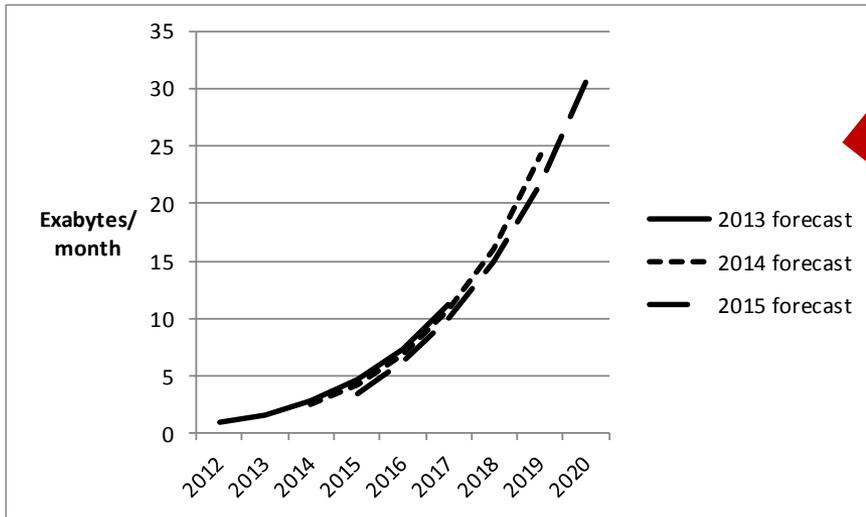


BCG said: “Put simply, telcos have overrated the role that speed plays in customer satisfaction. For video, we saw that once speeds reach 1.5 Mbps, further increases have little or no impact on users’ perception of performance.”

# Only 10x capacity is needed – and 4G can do that

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The 50 billion devices add 0.03% to network load

# More of a problem is coverage

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# Broadband everywhere is better achieved with Wi-Fi and LTE

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- Trains – Wi-Fi
- Buildings – Wi-Fi
- Rural – 700/800MHz LTE (ideally with long-range mode)
- We live in a *Wi-Fi first* world



# So the next 20 years

The Evolution of the Apple Laptop:  
1989 to 2014



Macintosh Portable 89



PowerBook 100



PowerBook Duo 210



PowerBook 190



PowerBook 5300



PowerBook G3



iBook



PowerBook G4



iBook (14.1 inch)



Powerbook G4



Macbook Pro 2006



MacBook Pro (17 inch)



MacBook 2006



MacBookAir Late 2008



Macbook Pro Retina Display



# Huge change in data and productivity



# Regulatory and Governmental implications

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- **Spectrum:** more focus on unlicensed and shared for IoT and Wi-Fi and better monitoring and management
- **Competition:** Relax competition rules to enable new players to aggregate WiFi capacity, deliver IoT solutions, provide small-cell systems, and allow MNOs to adapt and merge
- **Investment:** Pay for uneconomic coverage in some manner

# The future could be bright

- What we don't need
  - Speeds above 10Mbps/s to handsets
  - Much more outdoor capacity
- What we do need
  - More capacity indoors via Wi-Fi
  - IoT solutions
  - Coverage improvements in rural areas, in not-spots, on trains...
  - A viable regulatory framework for provision of broadband comms where declining ARPUs still allow for investment



We've created a world where many see mobile connectivity as more important than sex.

Now we need to make sure we don't let them down