# 5G

## The Next Step in Mobile Communications

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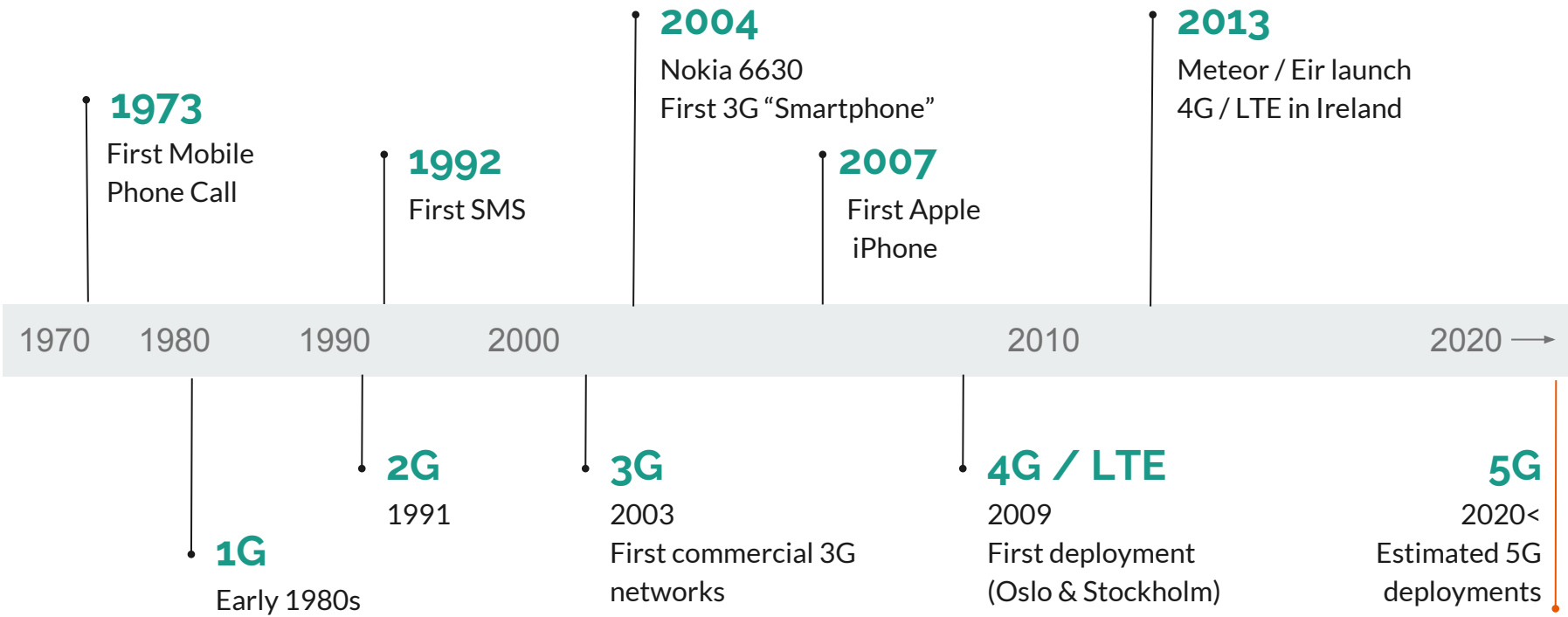
# A Brief History



**18 Billion**
Connected Devices, 2017

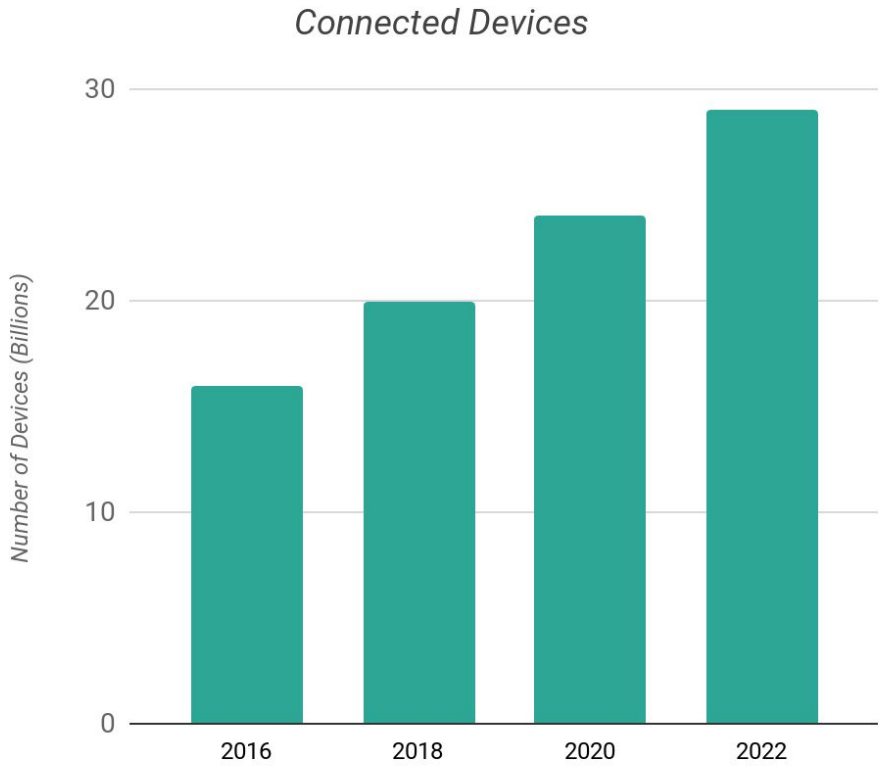
***7.5 Billion***
*People*

*2.4 Devices Per Person*

**29 Billion**
Estimated Connected Devices, 2022

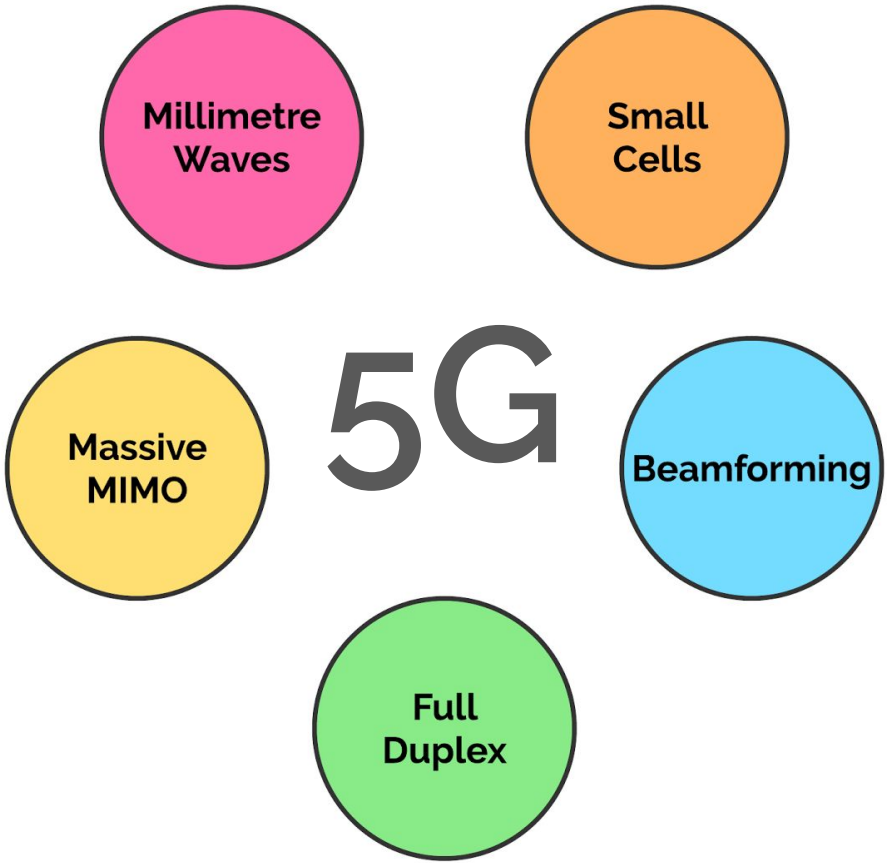
***7.7 Billion***
*People*

*3.7 Devices Per Person*

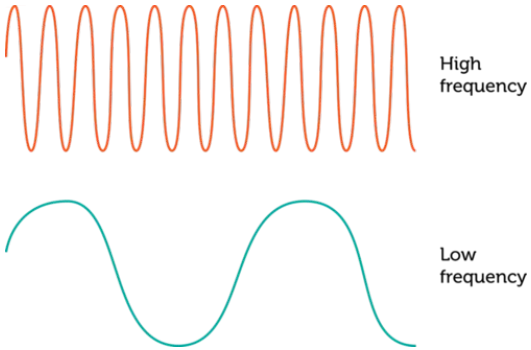



*Source: Ericsson IoT Outlook, 2017*

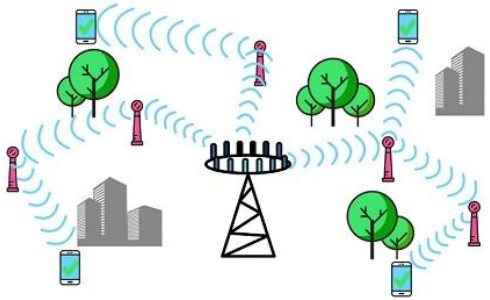
# Proposed Technologies



# Millimetre Waves




# Small Cells



*Electromagnetic Spectrum in GHz*


Whole New Area of the Spectrum

=

More Bandwidth for Everyone

***What about the obstacles?***

Portable Miniature Base Stations

=

Stronger Signals

# Massive MIMO

*Multiple Input Multiple Output*

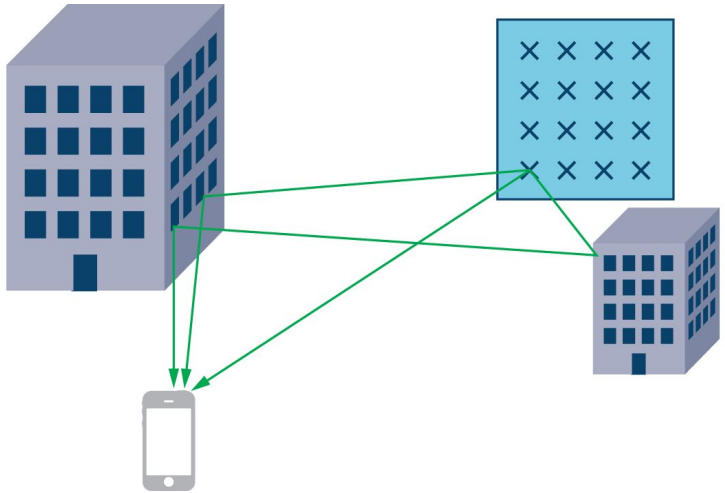
4G Stations > 12 Ports
- > 8 Transmitting
- > 4 Receiving

5G Stations > *100 Ports*

*Handling more data at once*

***More Antennae = More Interference***

# Beamforming



*Identify the most efficient route,*
*reduce interference*

# Full Duplex

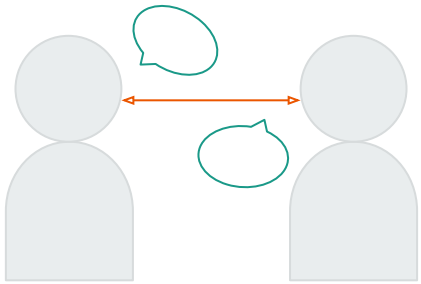
Half Duplex :

*Information can flow both ways on the same frequency, but not at once.*

Full Duplex :

*Send and receive data simultaneously over the same frequency.*

→ *Twice as fast*



# Use Cases

Personal

- Always Connected
- Accessible Media

Societal

- Hospitals
- Schools
- Smart Vehicles
- Heavy Machinery (Remote)
- Business - Monitoring, tracking and automation (agriculture)


[ Conclusion Slide ]