

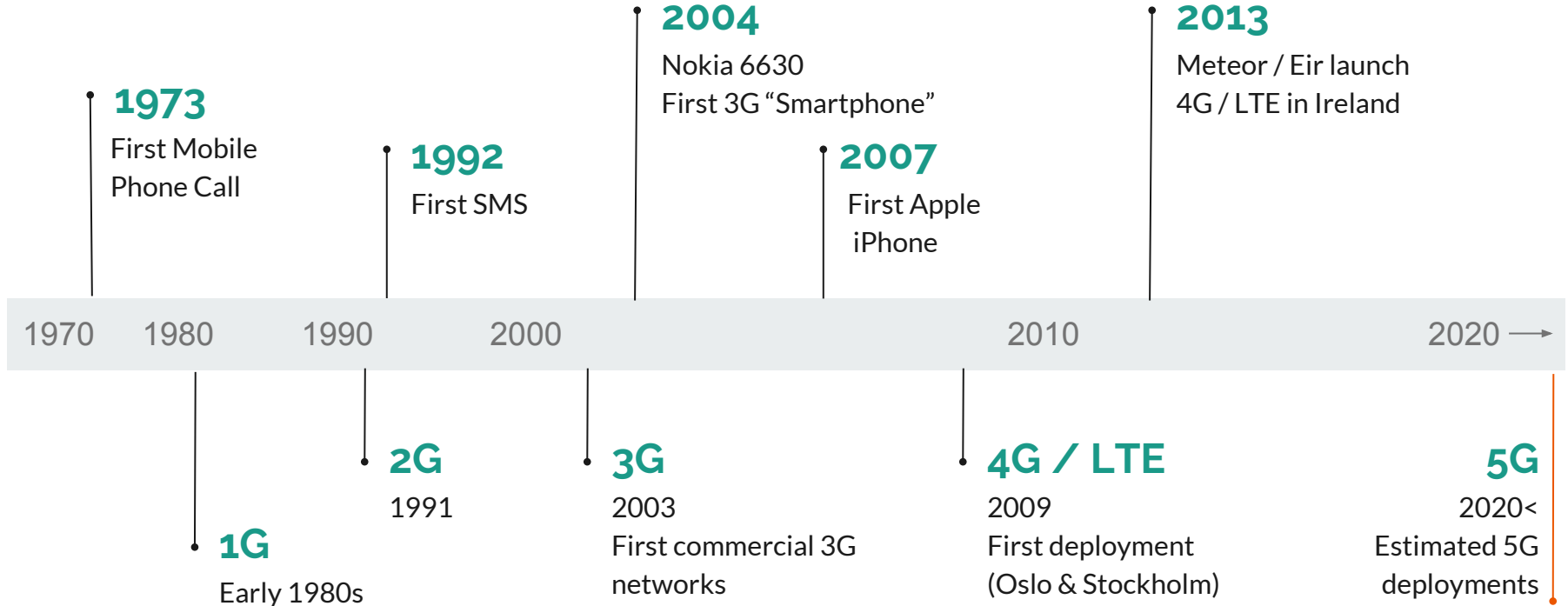


# 5G

## The Next Step in Mobile Communications

*Rebecca Kane*

# A Brief History



# 18 Billion

Connected Devices, 2017

**7.5 Billion**  
People

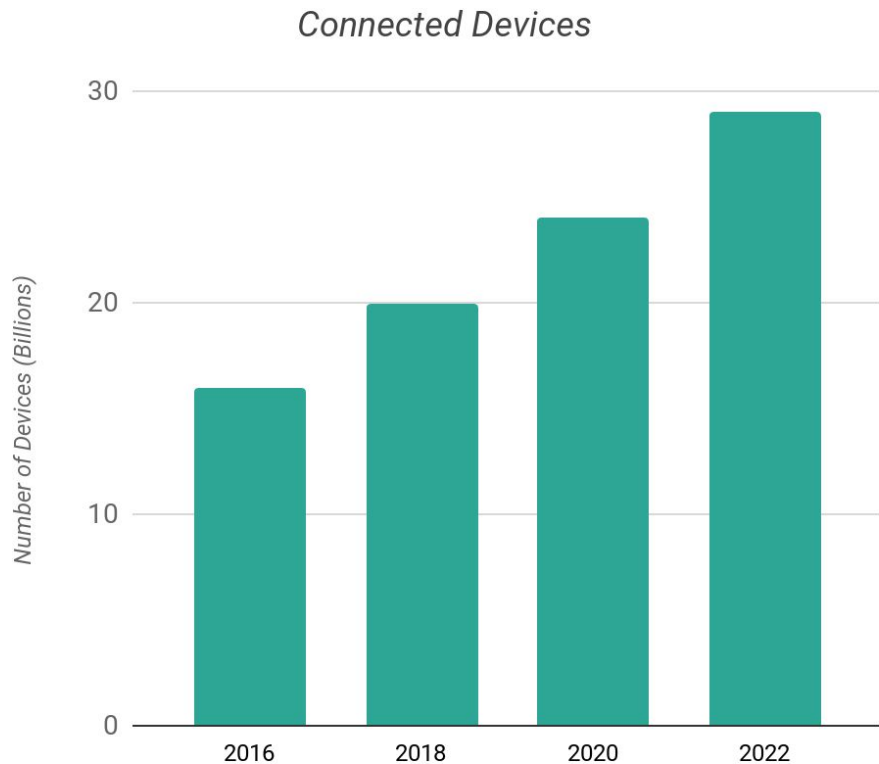
*2.4 Devices Per Person*

# 29 Billion

Estimated Connected Devices, 2022

**7.7 Billion**  
People

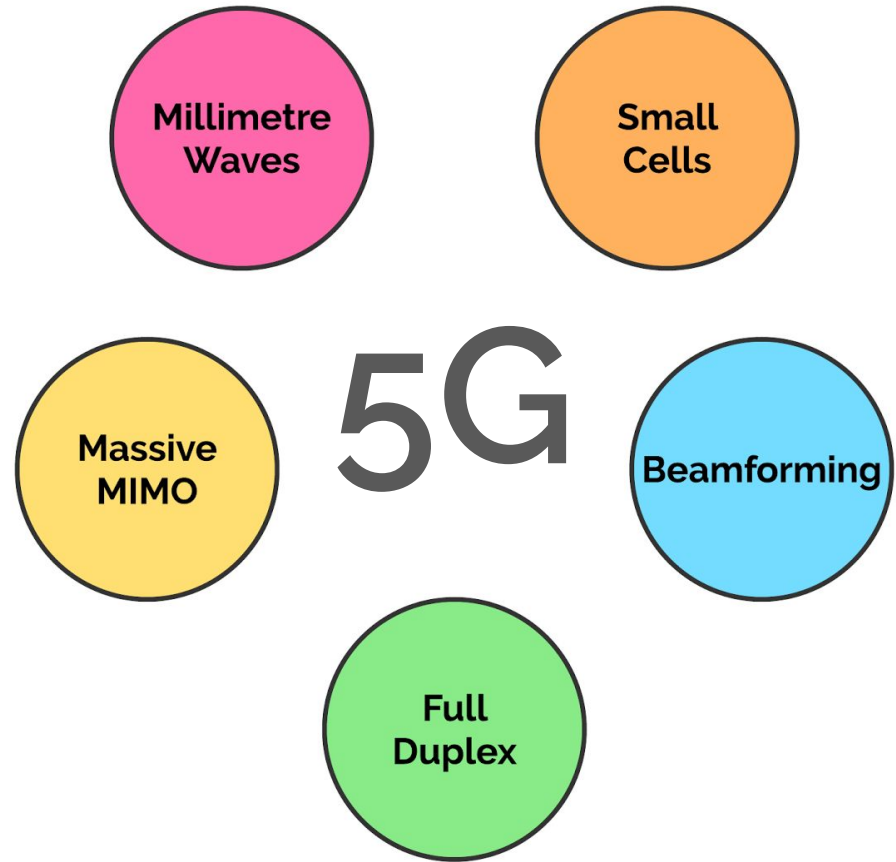
*3.7 Devices Per Person*



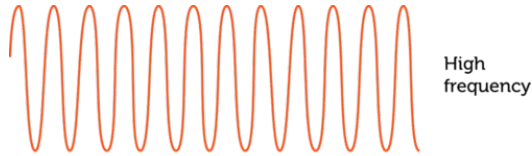
Source: Ericsson IoT Outlook, 2017



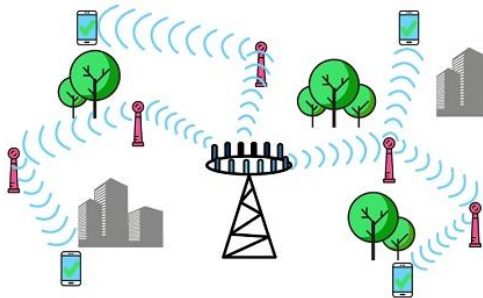
## Proposed Technologies



# 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*

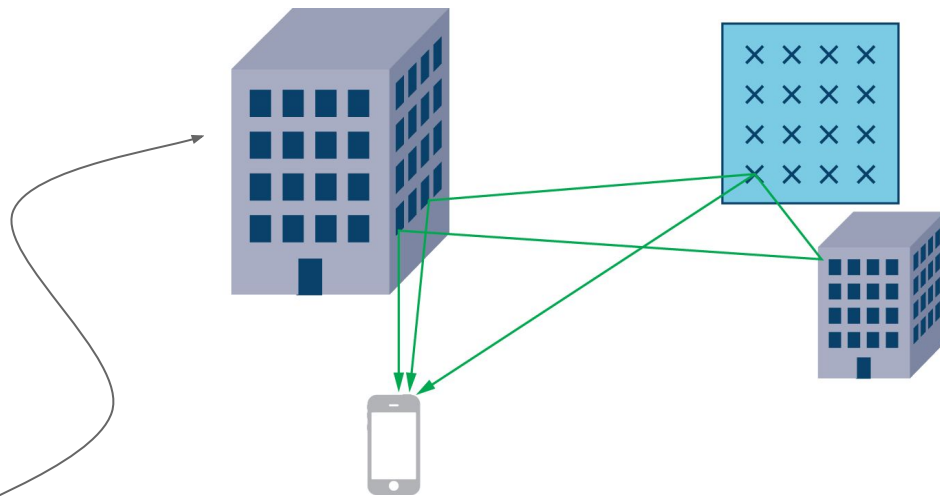
4G Stations > 12 Ports  
> 8 Transmitting  
> 4 Receiving

5G Stations > **100 Ports**

*Handling more data at once*

***More Antennae = More Interference***

# Beamforming



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

# Full Duplex

4G stations operate on a stop go system ( or on different frequencies if user wishes to transmit and receive data at the same time) - 5G transceivers will be able to transmit and receive data at the same time, on the same frequency. Two trains one track analogy.



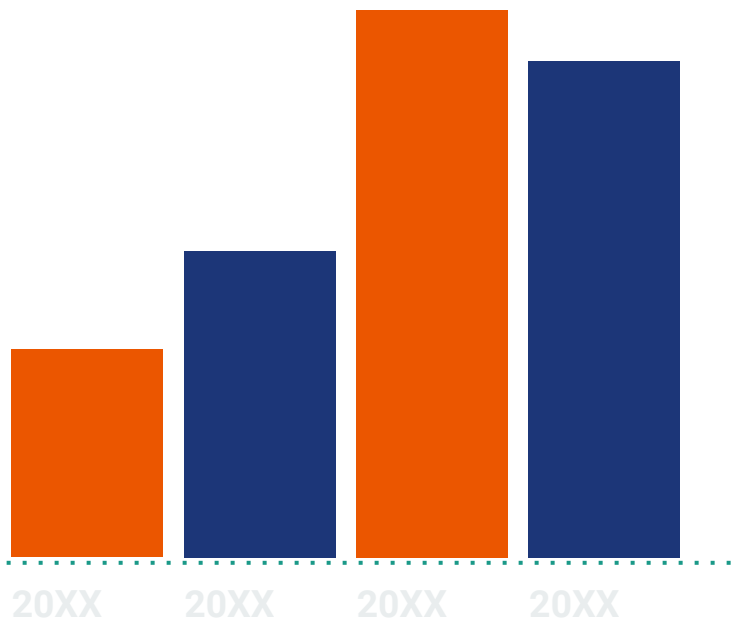
# The Need for 5G - Why?

Obvious reason of more devices / more connectivity (connected home etc)

Lead into use cases -

... personal level (streaming etc)

... societal level (schools & hospitals)





An aerial photograph of the Chicago skyline at dusk. The city is densely packed with skyscrapers, including the Willis Tower and the Trump Tower. The city extends to the edge of Lake Michigan, which is visible in the background under a twilight sky with scattered clouds. The text "[ Conclusion Slide ]" is overlaid in white on the right side of the image.

[ Conclusion Slide ]

# Proposed Technology



**mmWave**

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**Abby Author**

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An aerial photograph of the New York City skyline at dusk. The sky is a mix of dark purple, blue, and orange. The city lights are visible, and the Empire State Building is prominently featured in the center, with its top section illuminated in red and green. Other skyscrapers are visible on either side, and the Hudson River is in the background.

# The technology: GPS + RFID

Why now?

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