

# 5G Broadcast -

## Status update on the 5G networks



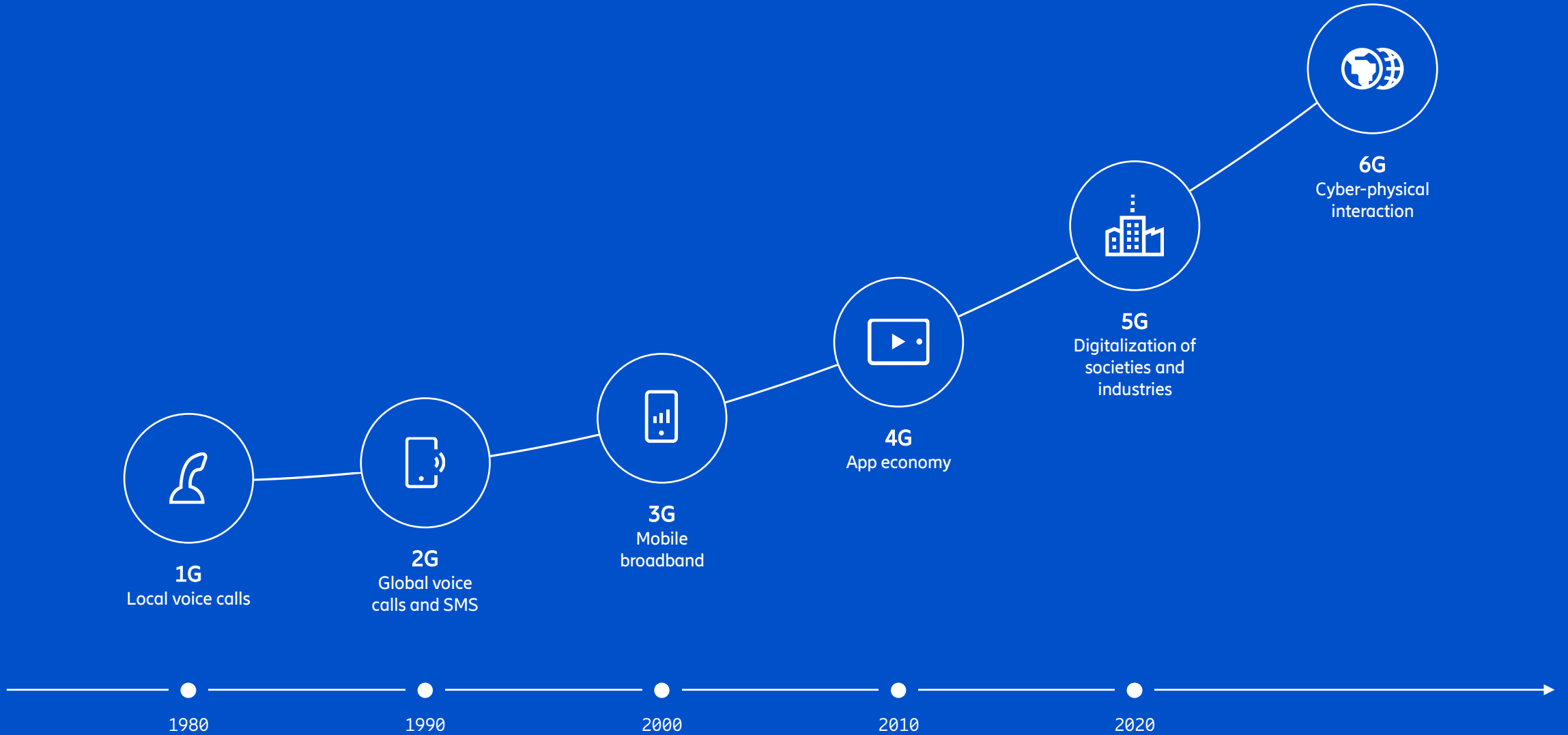
Jeroen Buijs,  
Head of Solutions Ericsson Netherlands,  
Dutch Media Guild  
April 6<sup>th</sup> Eindhoven

# Agenda

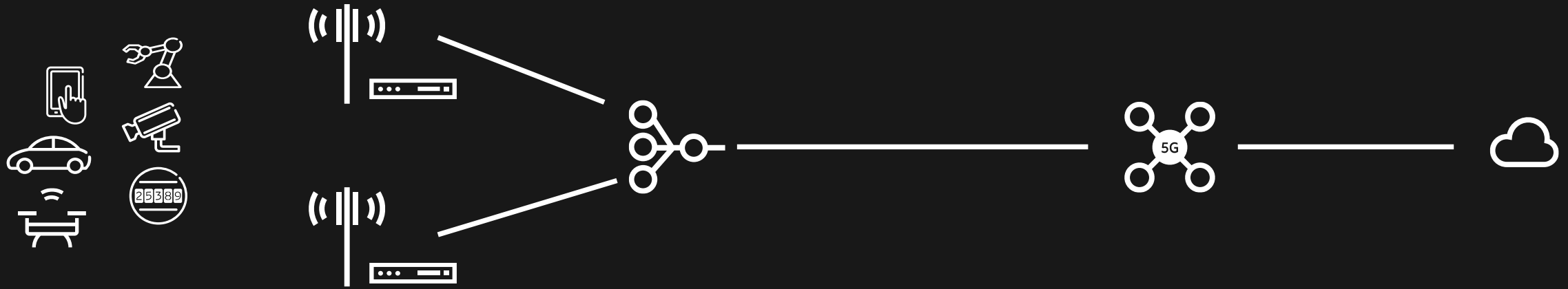
- 5G Overview
- Fixed Wireless Access
- Media Distribution in Cellular networks



# Driving the evolution of mobile networks



# Mobile Network overview: Low-Tower, Low-Power



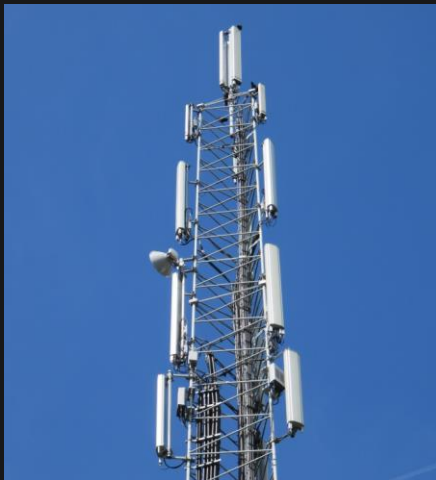
Devices

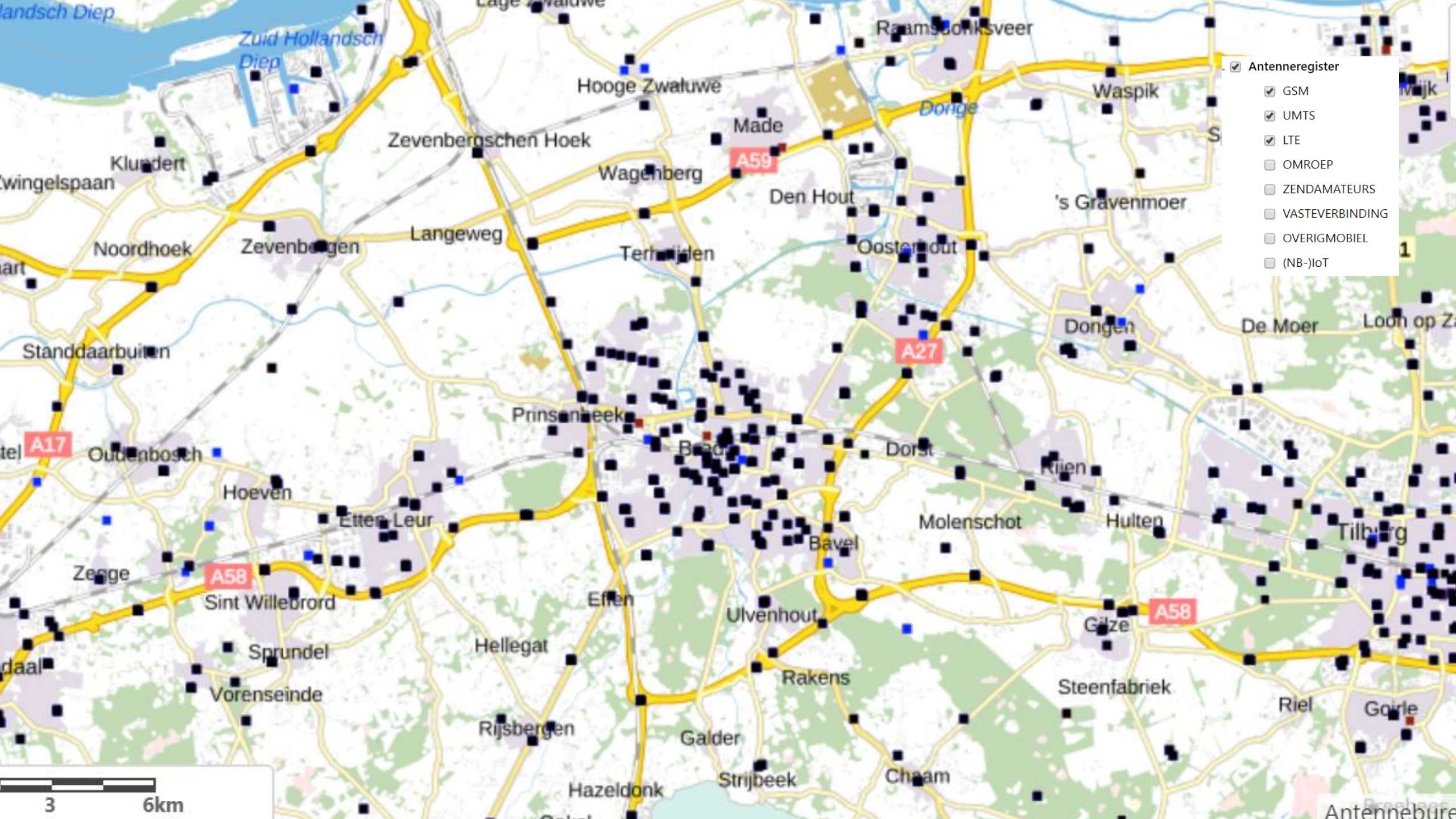
Radio Access Network  
(RAN)

Backhaul Transport Network  
(Transport)

Core Network  
(CORE)

Internet/Applications





- Antenneregister
- GSM
  - UMTS
  - LTE
  - OMROEP
  - ZENDAMATEURS
  - VASTEVERBINDING
  - OVERIGMOBIEL
  - (NB-)IoT
















Antennebuur

# Technical specifications of 5G

## Building Capacity



	Peak Data Rate	1 - 20 Gbps		Connection Density	10k - 1m devices / km <sup>2</sup>		Reliability	99.999% (of packets)
	User Experienced Data Rate	10 - 100 Mbps		Network Energy Efficiency	x1 - x100		Position accuracy	10m - <1m
	Spectral Efficiency	x1 - x3		Area Traffic Capacity	0.1 - 10 Mbps / m <sup>2</sup>		Security	Strong subscriber authentication, user privacy and network security
	Mobility	350 - 500 km/h		Availability	99.999% (of time)			
	Latency	1 - 10 ms		Battery life	10 years*			

\*For low power IoT devices

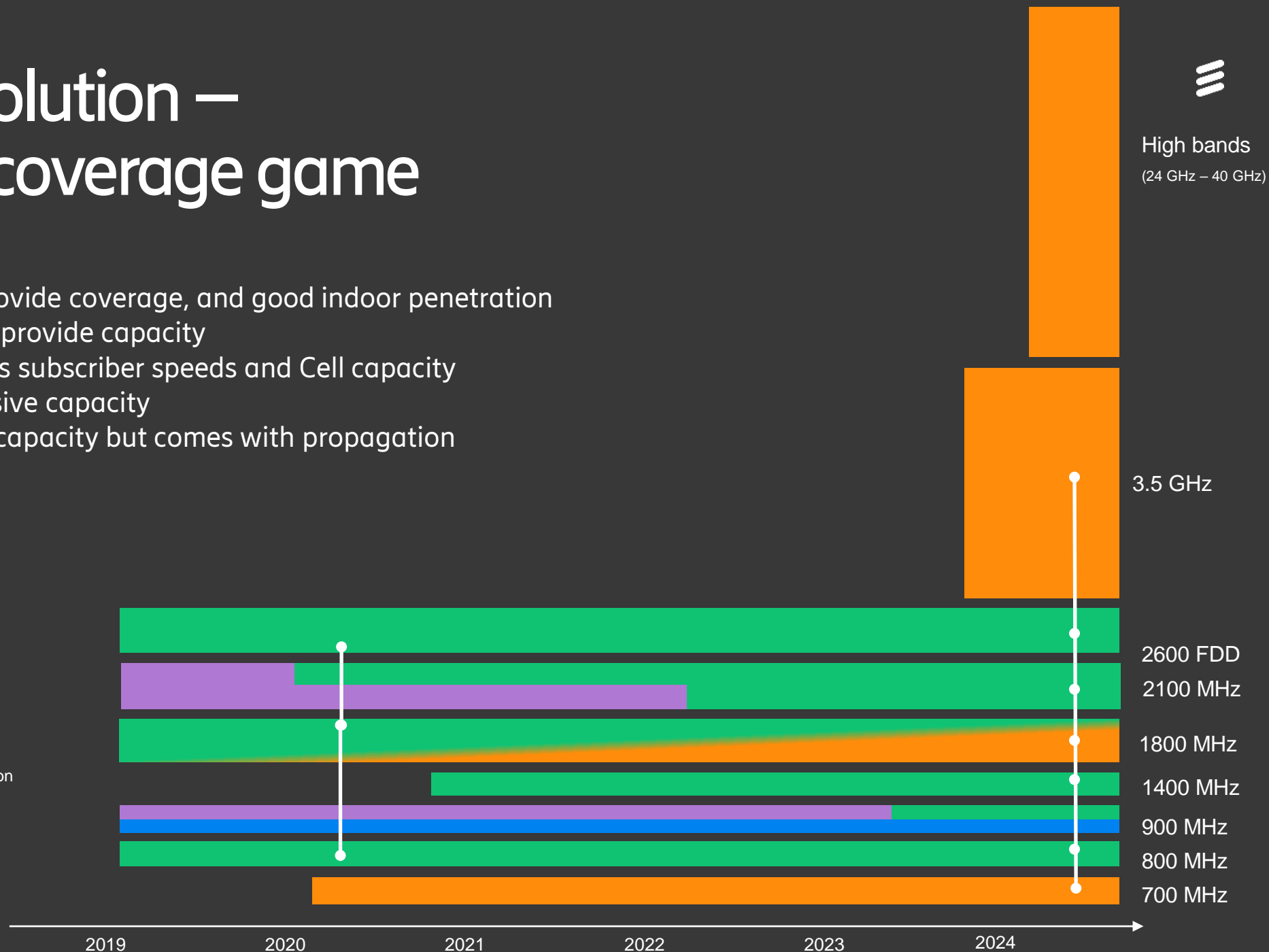
Source: ITU-R, NGMN, 3GPP

# Spectrum Evolution – a capacity & coverage game

- Low bands 700-900 MHz provide coverage, and good indoor penetration
- Low bands 1800-2600 MHz provide capacity
- Carrier aggregation increases subscriber speeds and Cell capacity
- Midband TDD provides massive capacity
- mmWave provides massive capacity but comes with propagation challenges

2G 3G  
4G 5G

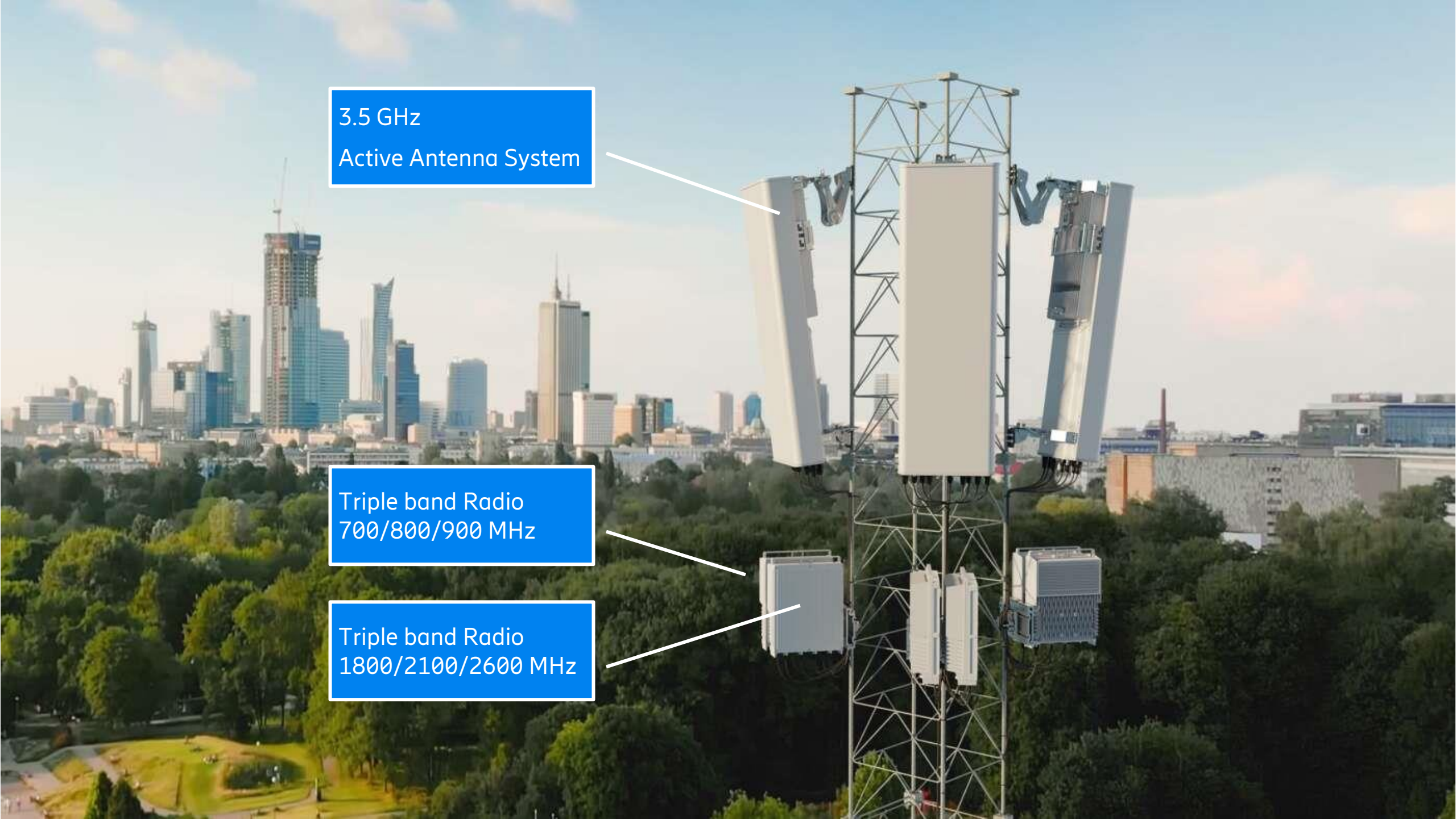
Spectrum  
combination  
examples



3.5 GHz  
Active Antenna System

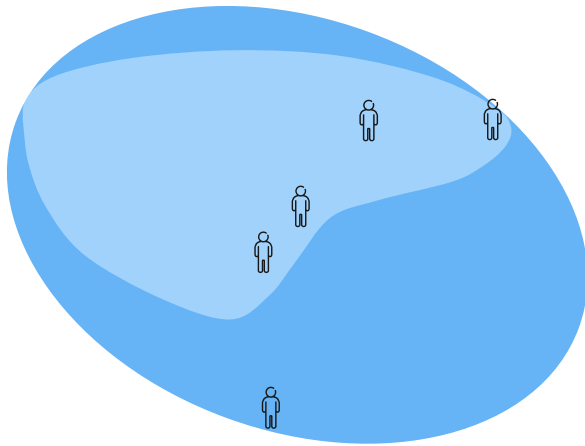
Triple band Radio  
700/800/900 MHz

Triple band Radio  
1800/2100/2600 MHz

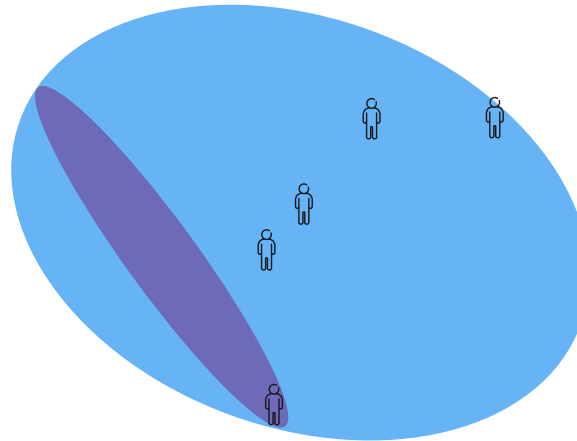




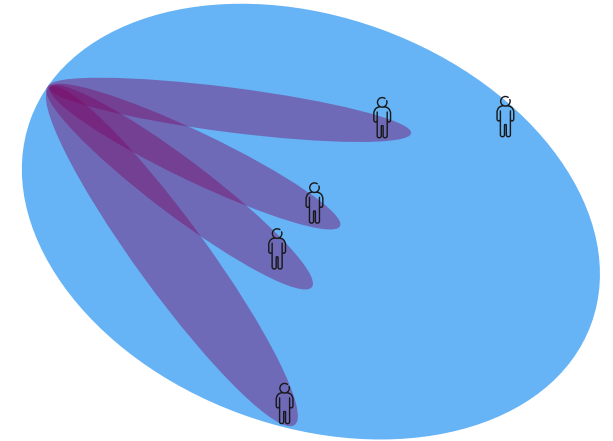
# Massive MIMO: Functionality



- Cell Shaping
  - Define cell shape to fit UE distribution
  - Decreases the inter cell interference

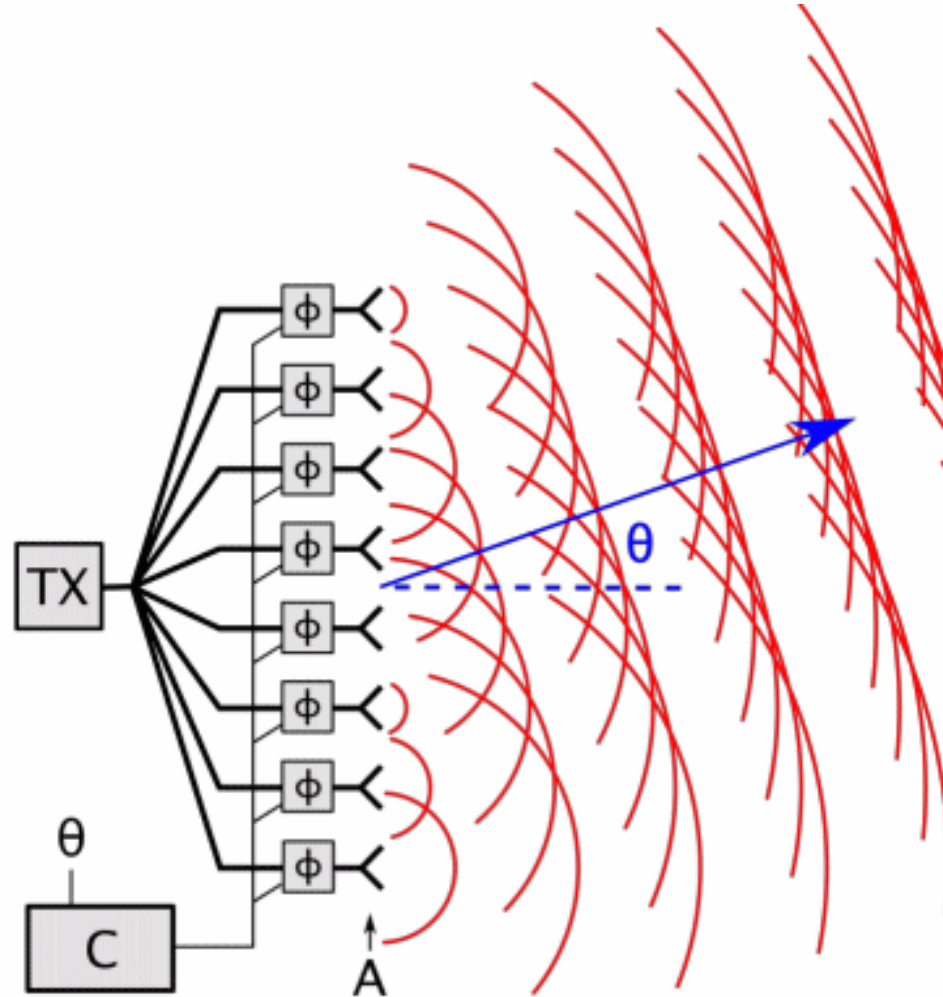


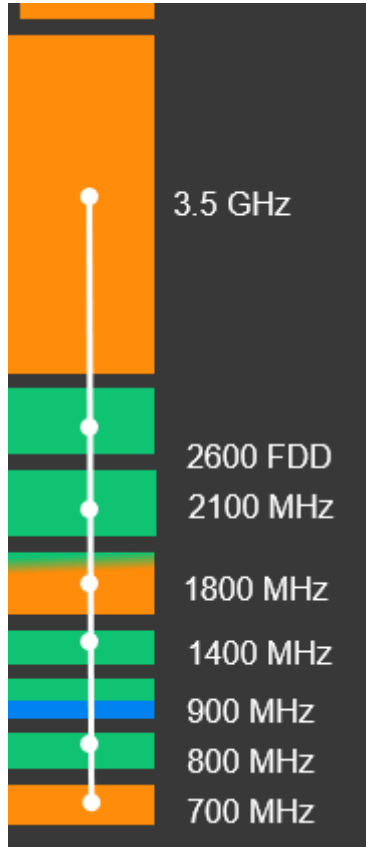
- Single-User MIMO
  - Sharp beam follows UE
  - Higher SINR increases data rate
  - Benefit irrespective of load



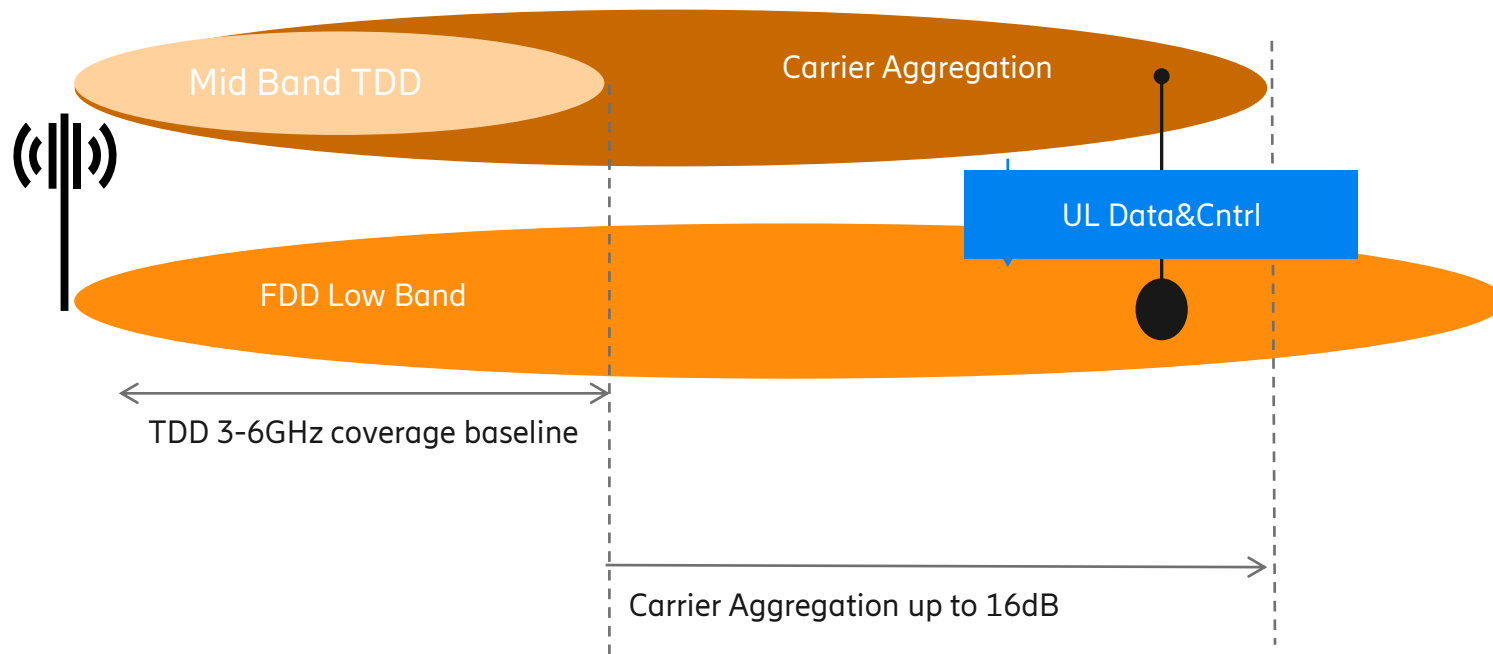
- Multi-User MIMO
  - Multiple UEs reuse same frequency-time resources
  - Capacity gain in high load and when channel is suitable

# Beamforming explained



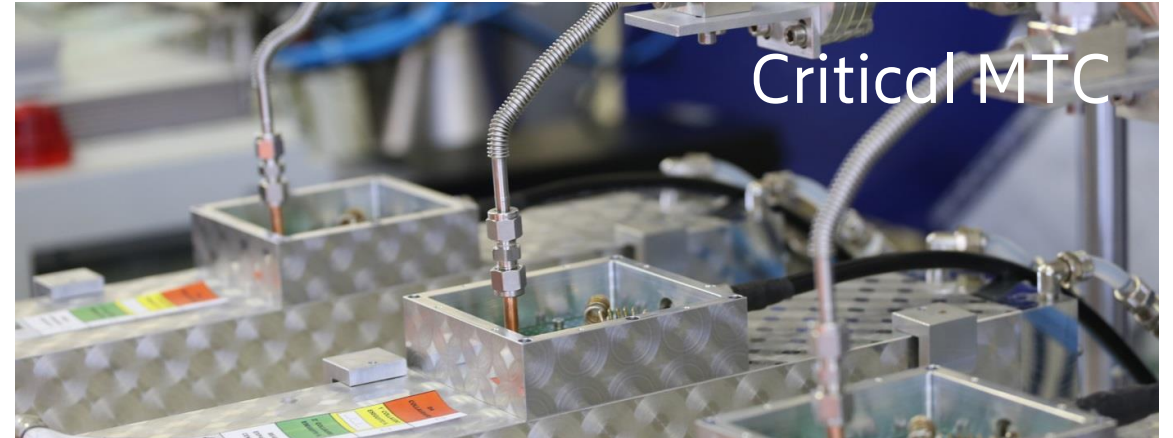


# The importance of Low-Band Uplink (back-channel) is limiting factor



- Low bands serve as an anchor band of the radio connection
- Mid & High bands serve provide huge capacity but have limited range
- By putting Uplink predominantly on the Low band , the effective reach of the Mid & Highband increases
- Low bands are also important to provide much needed capacity on Cell Edge (and indoor)
- Hence interest in new low-bands:
  - B71 (617-698MHz)
  - B31 (452.5-467.5 MHz)

# 5G is use case driven



# Agenda

- 5G Overview
- Fixed Wireless Access
- Media Distribution in Cellular networks



# Fixed Wireless Access

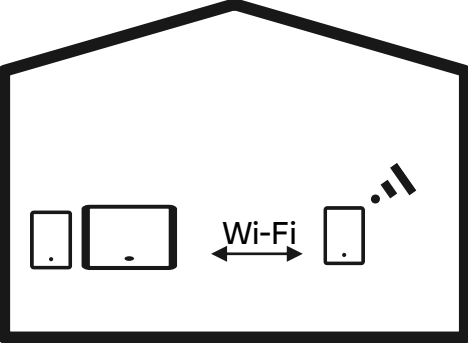


# Definition of Fixed Wireless Access



Focus

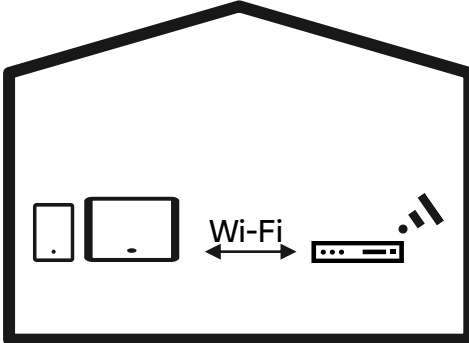
## Mobile broadband



Standard MBB pricing, device logistics and management.  
Includes tethering to Wi-Fi only devices.

## Fixed Wireless Access

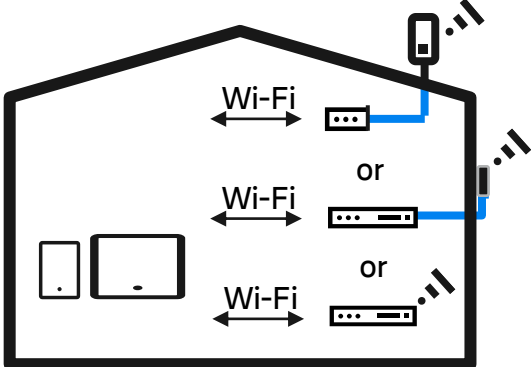
Early offerings – best-effort



Nomadic indoor device (CPE) with MBB-like device handling.  
May involve special price plan.

## Fixed Wireless Access

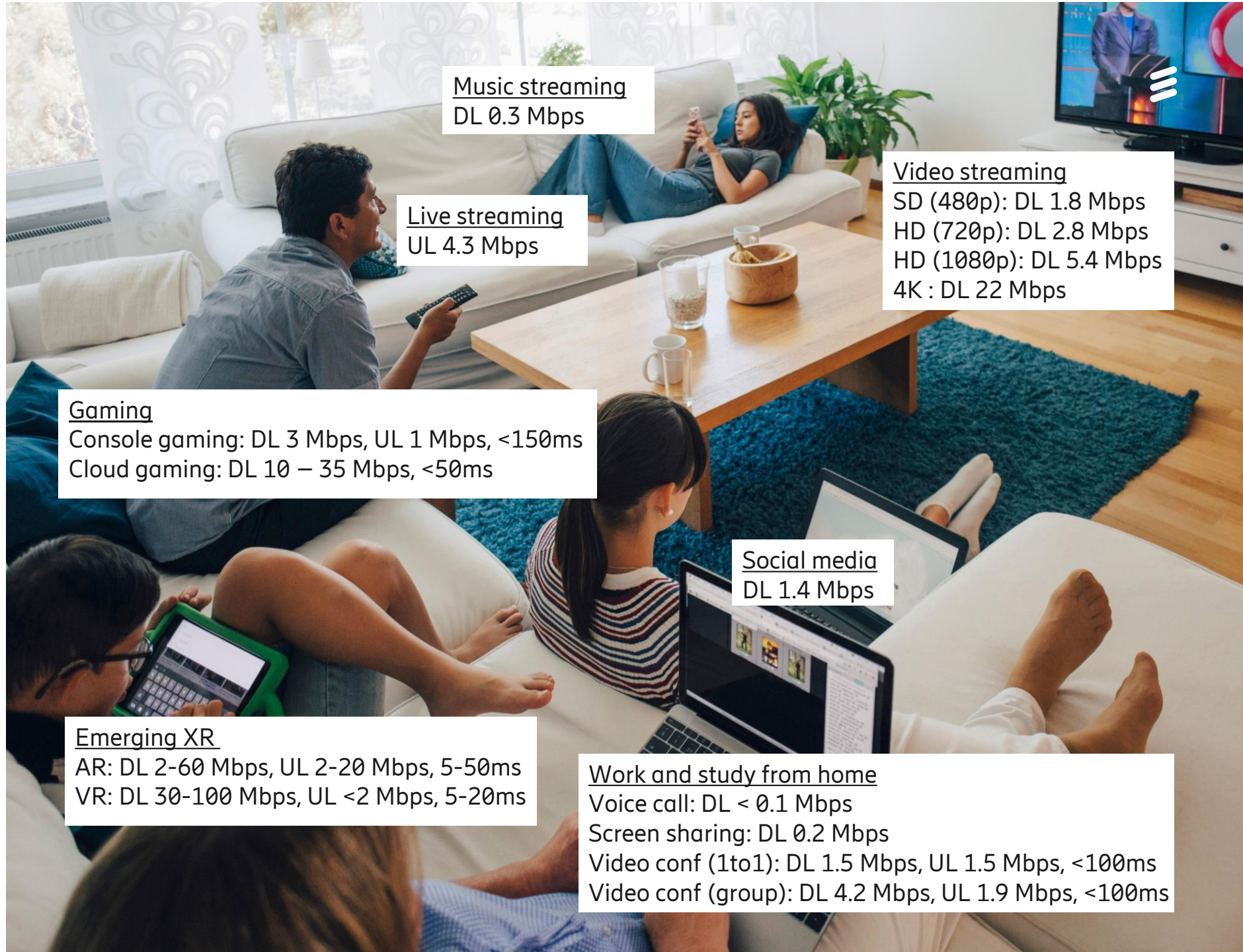
Focused large-scale offering



1. Managed device (CPE), indoor or outdoor.
2. Special fixed-inspired price plan.
3. Subscription tied to known location.



# FWA drives capacity build-out of the networks, leading to further densification of the networks



Music streaming  
DL 0.3 Mbps

Live streaming  
UL 4.3 Mbps

Video streaming  
SD (480p): DL 1.8 Mbps  
HD (720p): DL 2.8 Mbps  
HD (1080p): DL 5.4 Mbps  
4K : DL 22 Mbps

Gaming  
Console gaming: DL 3 Mbps, UL 1 Mbps, <150ms  
Cloud gaming: DL 10 – 35 Mbps, <50ms

Social media  
DL 1.4 Mbps

Emerging XR  
AR: DL 2-60 Mbps, UL 2-20 Mbps, 5-50ms  
VR: DL 30-100 Mbps, UL <2 Mbps, 5-20ms

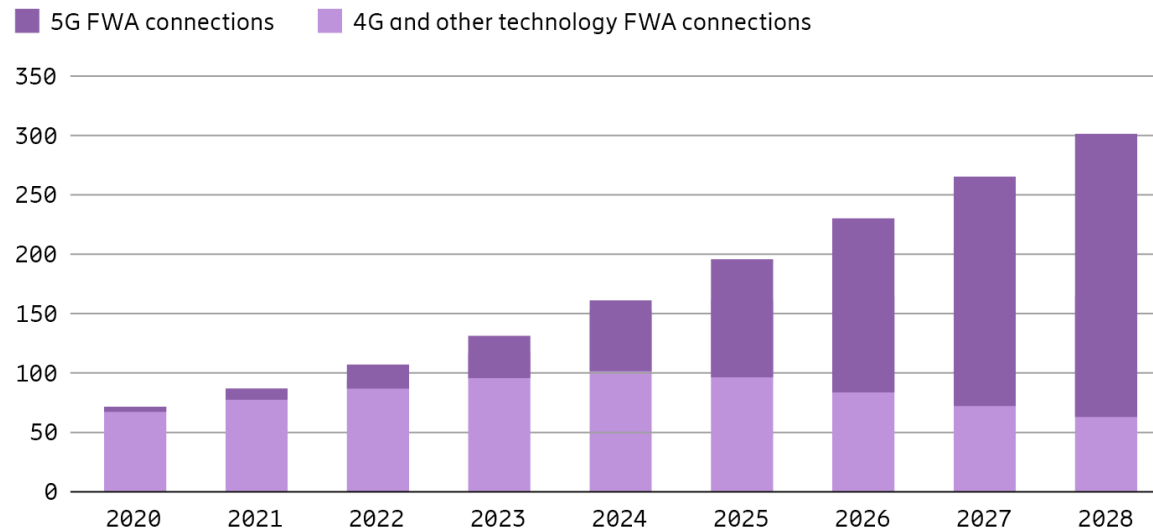
Work and study from home  
Voice call: DL < 0.1 Mbps  
Screen sharing: DL 0.2 Mbps  
Video conf (1to1): DL 1.5 Mbps, UL 1.5 Mbps, <100ms  
Video conf (group): DL 4.2 Mbps, UL 1.9 Mbps, <100ms

# FWA connections to threefold and reach over 300 million by end of 2028



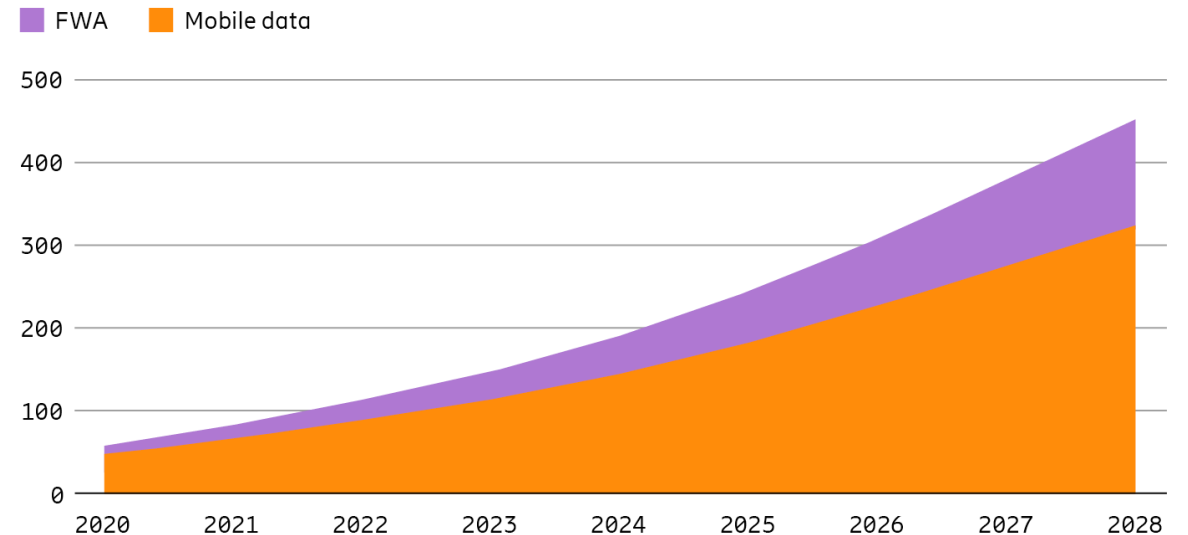
## FWA connections

FWA connections (millions)



## Mobile Network Traffic

Global mobile network data traffic (EB per month)





# Telenor modernizing home broadband with 5G FWA

5G FWA focusing on DSL/copper network decommissioning, with almost half of net adds have been FWA (other half fiber). Received government incentive (5G spectrum auction discount) to deploy FWA 100/10Mbps in underserved areas.

**FWA offers for homes and for secondary homes. TV services can be added.**

## Several 5G unlimited\* offerings available:

- 500 Mbps: USD 127/month
- 300 Mbps: USD 102/month
- 200 Mbps: USD 87/month
- 100 Mbps: USD 76/month

## Several 4G unlimited\* offerings available:

- 60 Mbps: USD 76/month
- 30 Mbps: USD 71/month
- 10 Mbps: USD 61/month

5G-ready outdoor CPE including installation for USD 203 with 12-month contract USD 509 without an agreement period

FWA connections reaching total 120,000 connections by 3Q2022.

\*Unlimited amount of data. The speed is maintained up to a consumption of 2 TB per month, then the speed is reduced to 5 Mbps rest of month



## Network

Ericsson Radio System  
5G NR and LTE

Total 110 MHz available in:

- FDD Band <2.6 GHz
- TDD Mid Band 2-6 GHz

Utilize existing macro sites and spare load on existing carriers

Started with 4G FWA with network prepared to smooth 5G migration

Ericsson Cloud Core



# FastWeb 5G home offering, including mmWave

## FastWeb NeXXt Casa

- Fixed broadband provider
- +1000 municipalities already has coverage
- 5G "Fastweb Casa FWA Light"
  - Up to 1 Gbps for EUR 20/month, outdoor CPE and Wi-Fi modem included
  - Unlimited offering based on mmWave
  - Euro 2 activation Fee (monthly installment x 20 months)
  - Technician installation for free and no minimum contract period
  - Subscription paus of 10 days included for one year
  - EUR 250 cancellation fee if CPE and router is not returned in 45 days.

<https://www.fastweb.it/adsl-fibra-ottica/?from=menu>



## Network

Ericsson Radio System  
5G NSA  
High Band >24 GHz with TDD  
TDD Mid Band  
2-6 GHz anchor



# Bouygues FWA offering, complement to fiber

Bouygues France launched in June 2022

5G Internet Box

Offering for selected areas under 5G coverage

- 5G offering with 1.1Gbps download and 58Mbps upload
  - EUR 39.99 For 12 months then EUR 42.99/month, no commitment
  - Indoor CPE with WiFi 6
- 4G offering with up to 220Mbps and 38Mbps upload
  - EUR 32.99/month no commitment
  - Indoor CPE
- TV via the B.tv app, + 70 channels on smartphone and tablet
- Self-installation

<https://www.bouyguetelecom.fr/offres-internet/5g-box>



## Network

Ericsson Radio System

Total 70 MHz available in:

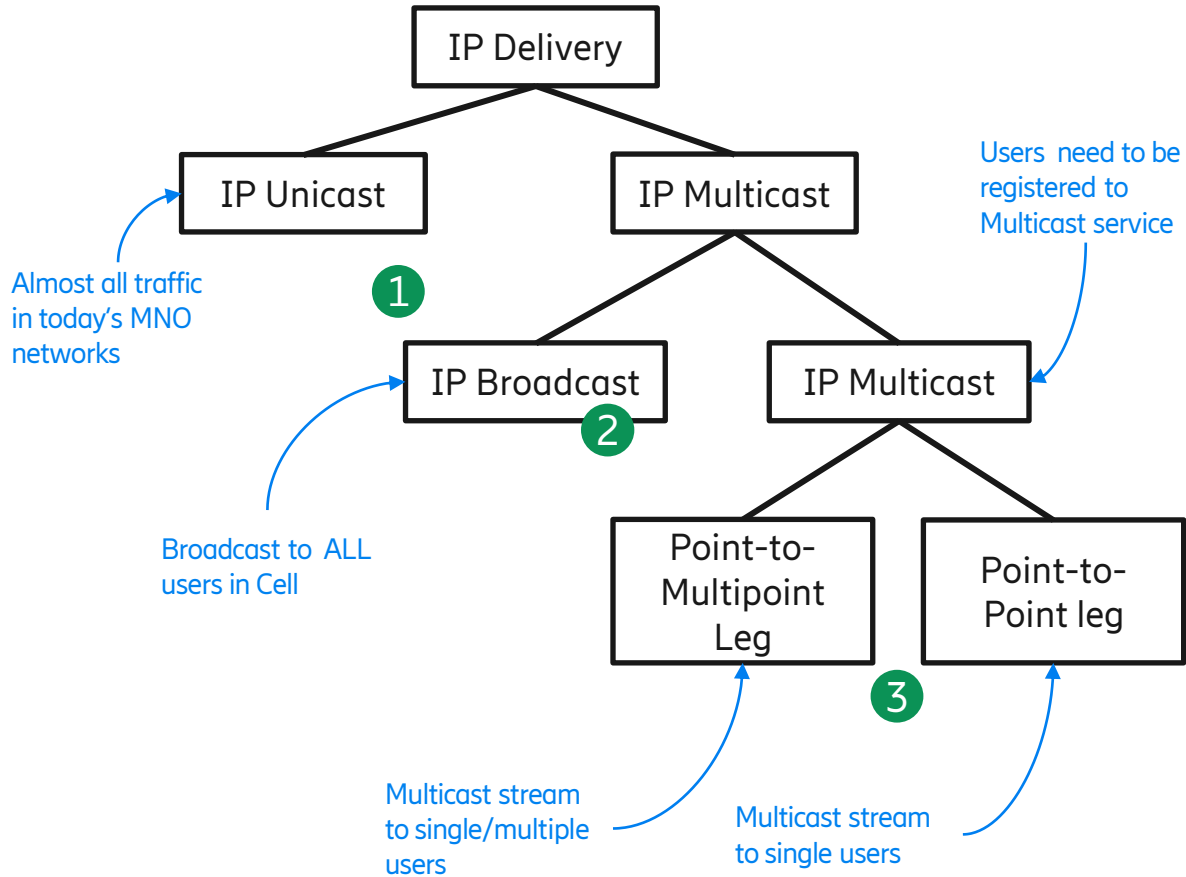
- TDD Mid Band 2-6 GHz

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# Broadcast en Multicast options in a Cellular network



**1**

Application Server sends IP Broadcast and IP Unicast to the Radio Access Network. The RAN then forwards IP Broadcast and IP Unicast to the destination.

- Typical MBMS configuration
- Exists since 4G, mostly used in trials and POC's

**2**

Application Server sends IP Broadcast to the Radio Access Network. The RAN then forwards IP Broadcast to the destination.

- Dedicated broadcast only networks
- Candidate for High-Tower High-Power

**3**

Application Server sends IP Multicast and IP Unicast to the Radio Access Network. The RAN then forwards IP Multicast to Single or Multiple UEs and IP Unicast to Single UE.

- Advanced dynamic decision in 5G Radio Network
- Implementations expected for e.g. Push-to-Talk

# Summary

- 5G networks provide high peak speeds, and massive capacity
- Vast majority of 5G use cases is built on Unicast transmission
- Low bands have limited capacity but are essential to build High performing networks
- Therefore they are valuable assets to MNO's
- Fixed Wireless Access momentum is increasing, offering opportunities for media distribution complementing fixed broadband connectivity
- 4G & 5G standards offer quite wide variety of Broadcast and Multicast options, but global adoption is still very limited







[www.ericsson.com](http://www.ericsson.com)