Samsung & 6G

5G technologies

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

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1. Samsung in telecomunication

1980

Entry in telecomunications with the buyout of Hanguk Jeonja Tongsin

1998 to 2002

Samsung invests in WCDMA for upcoming 3G
Launch of the first 3G mobile phone (Samsung SGH-Z105)

2013 to 2019

Develops mmWave technology and advanced antenna systems for 5G
Leader in 5G by supplying equipment to major operators in the world (Samsung galaxy S10 5G)

1991

Development of the first GSM systems (SGH-100)

2006 to 2009

Samsung start to work on 4G (LTE)
Launch of LTE network equipment for telecom operators (Samsung galaxy S aviator)

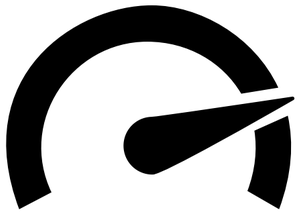
2021 to 2028

Begins testing THz bands for ultra high speed communication
Targets a leading role in defining global 6G standards

2. What is 6G

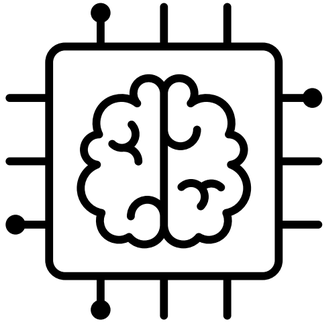
Extreme Speed and Low Latency

- Data rates : 1Tbps
- Ultra-low latency



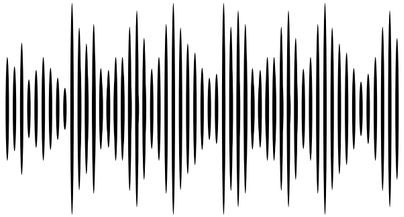
Use of AI

- AI integrated into the network core to optimize bandwidth, QoS and security
- Automated network operation that anticipate user needs



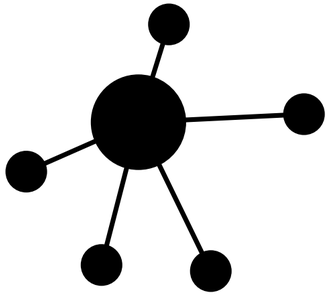
Huge Bandwidth

- Use of THz waves : More capacity and speed
- Problem with range and penetration



Massive connectivity

- Ability to handle millions of devices per square kilometer



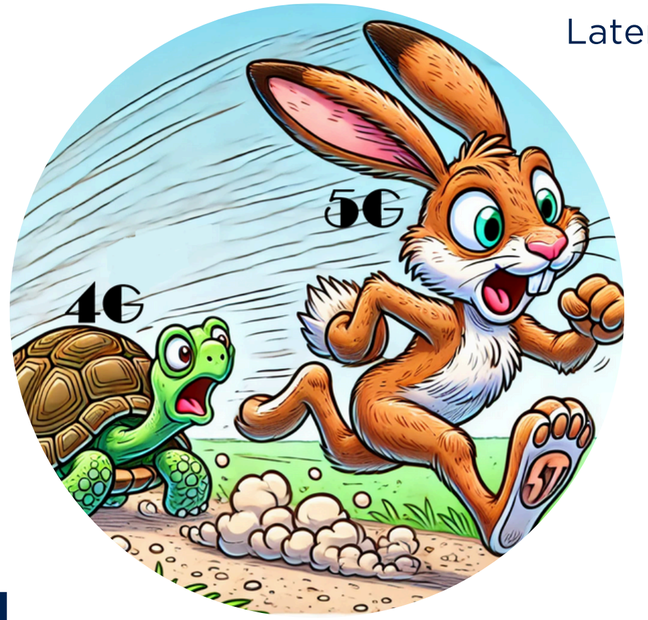
3. Difference with 5G

1

Bandwidth

5G
Under 100 GHz and shared with 4G, 3G, ...

6G
From 100GHz to 1THz



2

Speed Difference

Data rate : 6G = 100 x 5G

3

Latency Difference

Latency : 6G = 1000 x 5G

4

Security

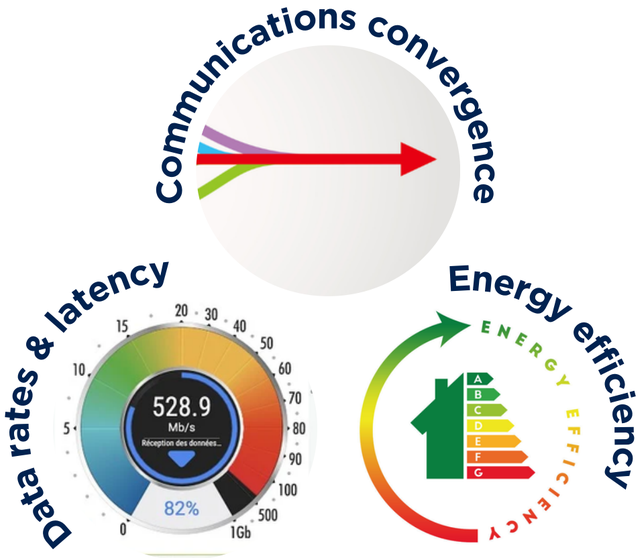
5G
Avanced security but not optimised for critic communication

6G
More secure with crypted data and real-time anomalie detection using AI which is good for critic systems

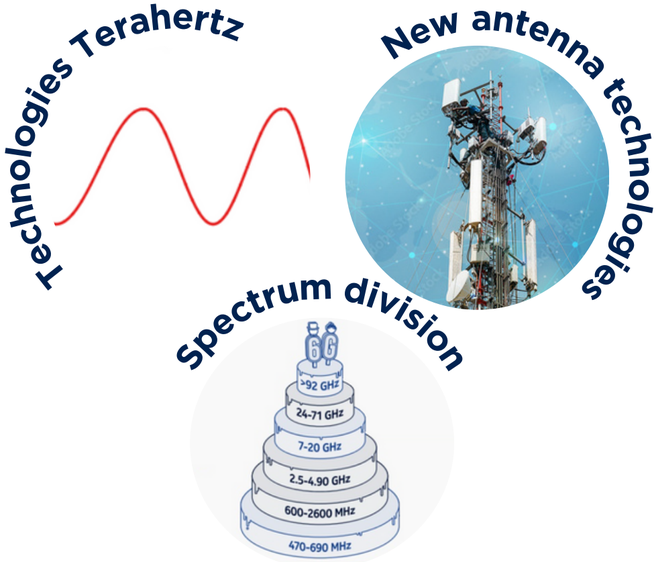
4. Samsung's 6G vision

"Deliver a hyper-connected experience for all, aiming for initial deployments by 2028 and mass commercialization around 2030."

Services



Technical requirement



Exigences techniques

5. Demarcation of competitors

Extensive use of sub-THz frequencies

Focus on the convergence of communications and computing

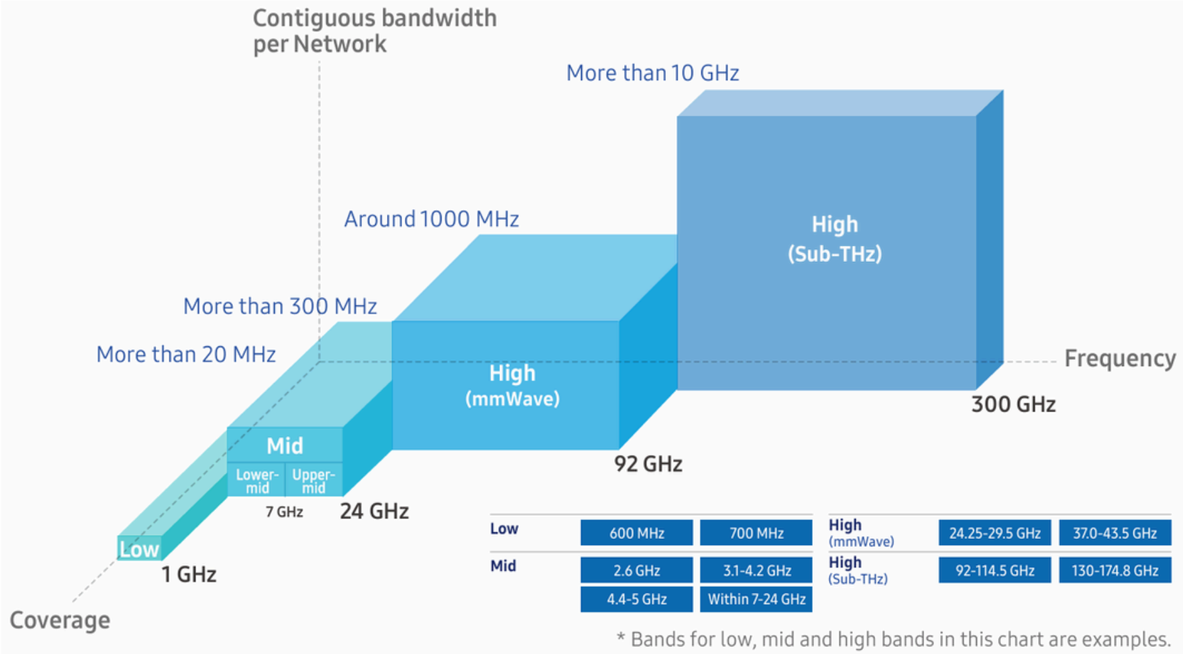
Hyperconnectivity and next generation services

New antennas

Spectrum sharing and usage strategies

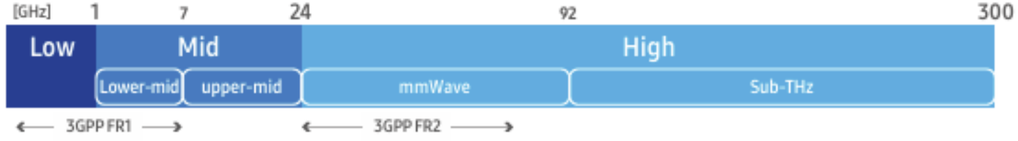
Societal objectives and contribution to the SDGs

5.1 Extensive use of sub-THz frequencies



Specifications

- Sub-THz (92-300 GHz)
- Ultra-massive MIMO.
- Up to 1Tbps datarate
- Digital twins (Digital Replica)

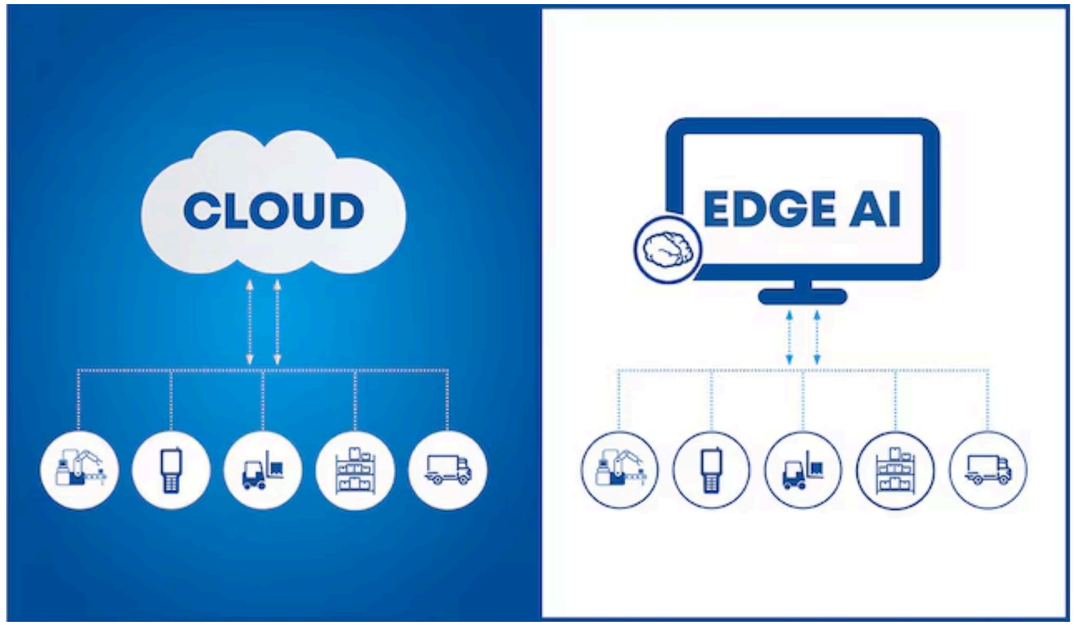


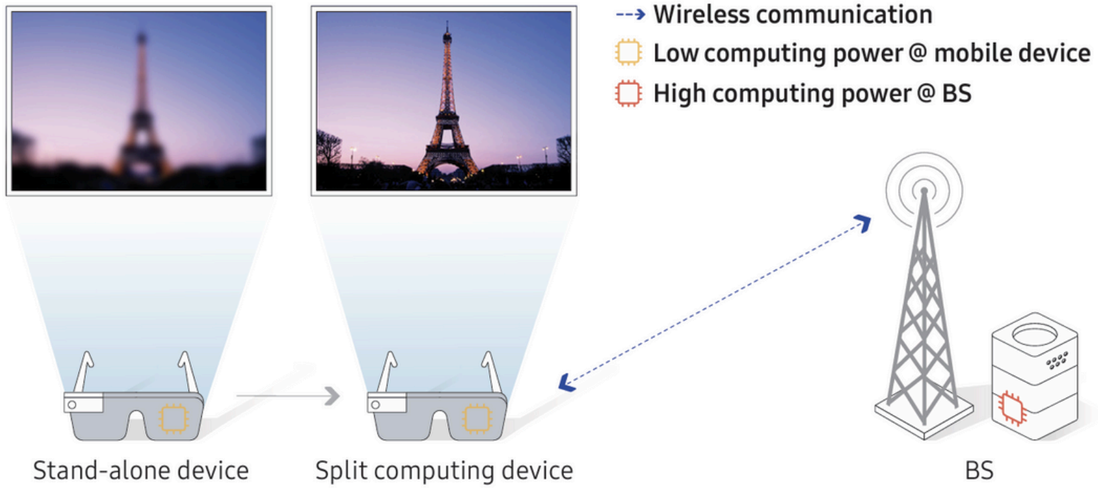
Competitors

- Expansion of existing bands*
- Moderate exploration of bands above 100 GHz*

*for Nokia and Ericsson

5.2 Focus on the “convergence of communications and computing”





5.3 Hyperconnectivity and next generation services

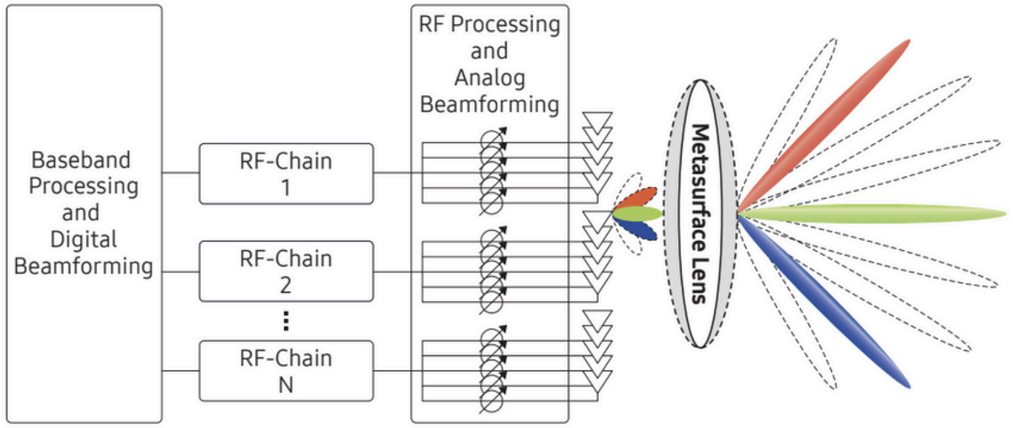
New Services

- Immersive experience (XR)
- High-fidelity mobile holograms
- Digital twins

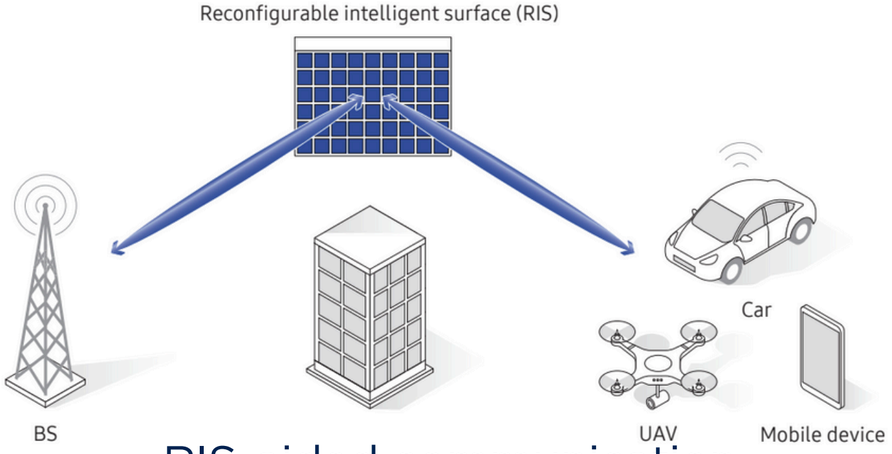
With specific features

- Latencies of the order of 100 µs
- Massive throughput for holograms

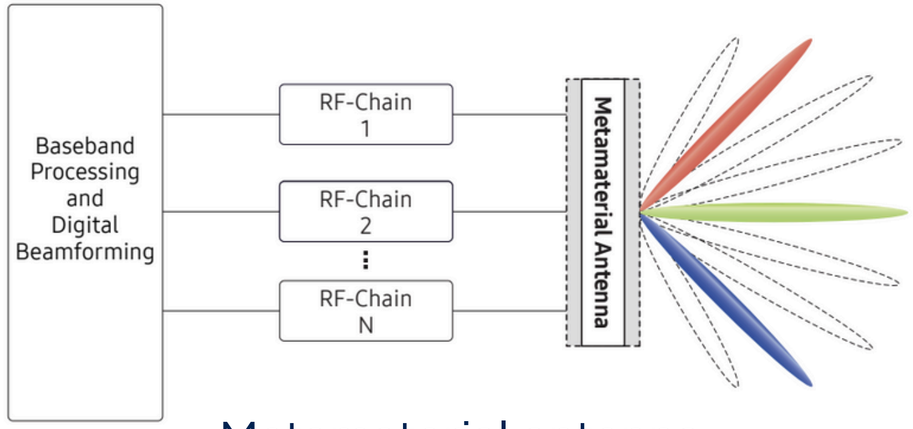
5.4 New antennas



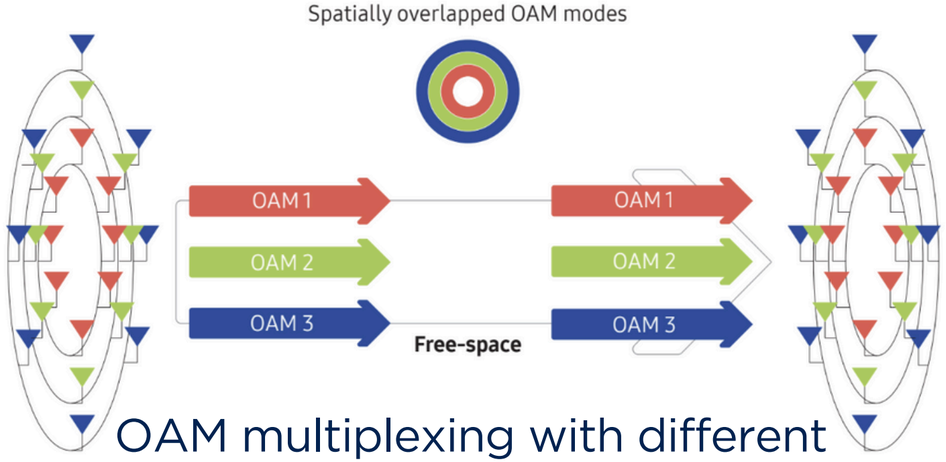
Metasurface lens



RIS-aided communication between a BS and a mobile user



Metamaterial antenna

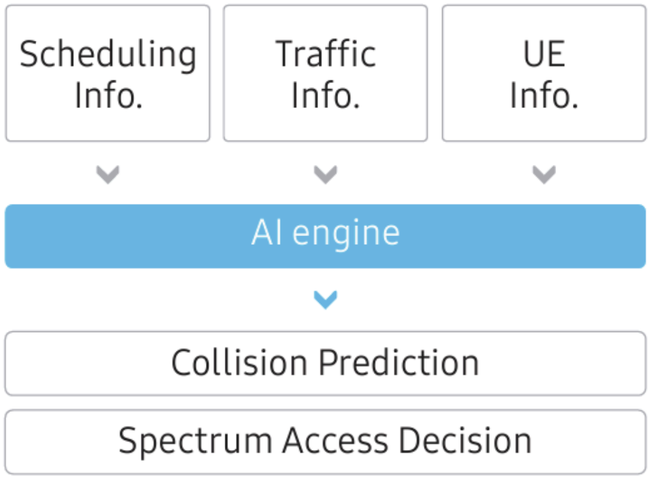


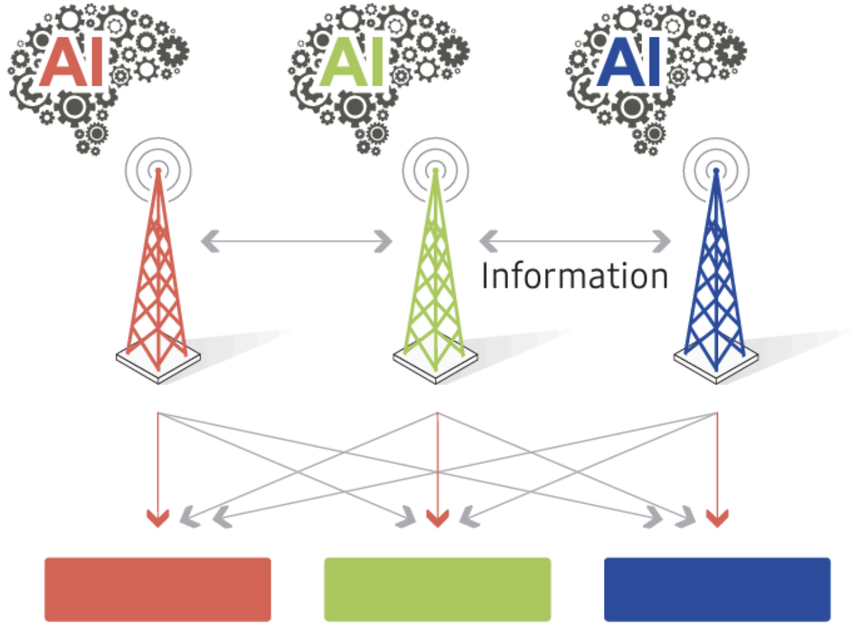
OAM multiplexing with different OAM modes

5.5 Spectrum sharing and usage strategies

Sharing technology

- Use of the underutilized spectrum
- No more “Exclusive licensees”





5.6 Societal objectives and contribution to the SDGs

United States SDGs

- Reducing regional and social disparities
- Improving access to essential services

6. 6G risk

1

Technological

- Needs THz waves, AI integration and massively interconnected networks = Complexity of development, deployment and maintenance
- Require significant energy to handle massive data volumes

2

Social

- Use of THz waves in 6G could fears about potential health impacts

3

Security

- Millions of devices interconnecte = Great target for cyber attacks

7. An ambitious future

2013 to 2019

Develops mmWave technology and advanced antenna systems for 5G
Leader in 5G by supplying equipment to major operators in the world (Samsung galaxy S10 5G)

2021 to 2028

Begins testing THz bands for ultra high speed communication
Targets a leading role in defining global 6G standards

2028 to 2030

The first field tests will take place in 2028, and the first antennas will be deployed and switched on for the general public in 2030.

Thanks for your attention

Sources

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- Samsung_6G_Vision