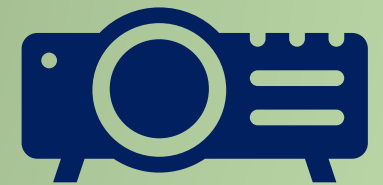



Presentation Slides

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A solid orange horizontal bar.

“The mobile wireless industry requires low, mid and high band spectrum for 5G to reach its full potential. MmWave technology is important to the progress of 5G networks, granting faster data speeds and much higher capacity compared to 4G LTE.”

Chris Pearson
President, 5G Americas

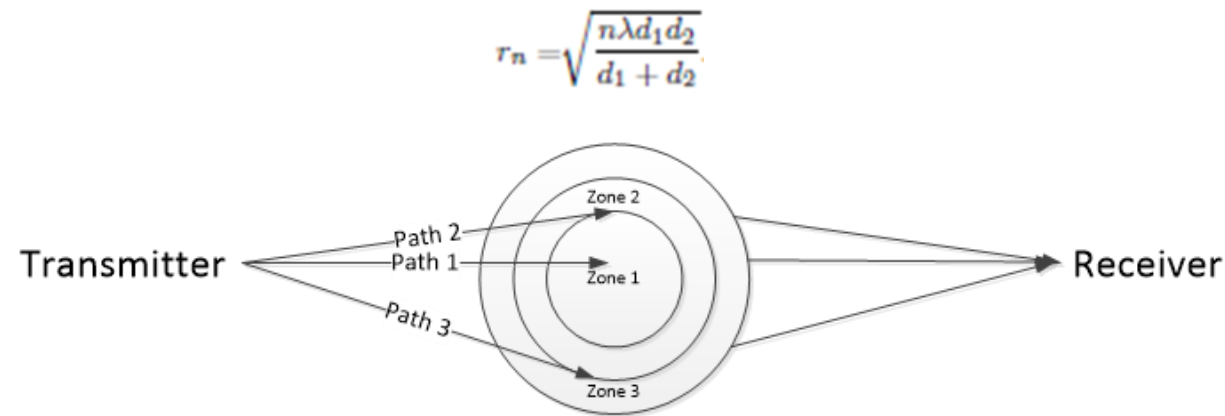


A solid orange horizontal bar.

“Once considered impossible to use for mobile wireless communications, mmWave now is an opportunity to utilize massive amounts of spectrum for extreme capacity, high throughput and ultra low latency for services on devices beyond just smartphones and laptops.”

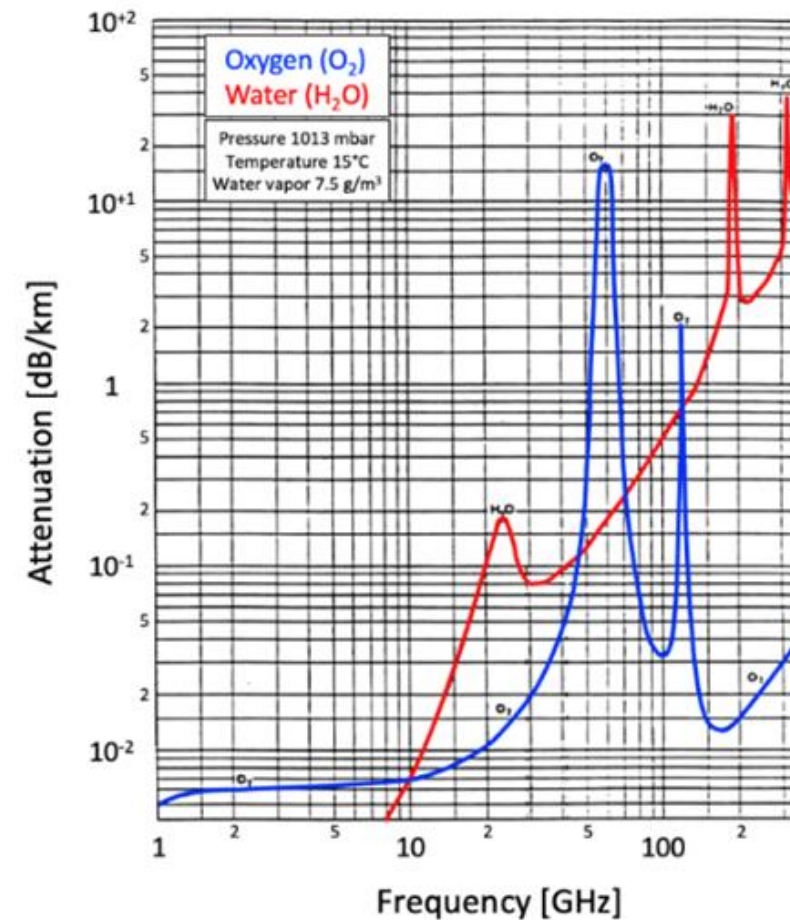
Lola Awoniyi-Oteri, engineer, principal, of Qualcomm Technologies, Inc.

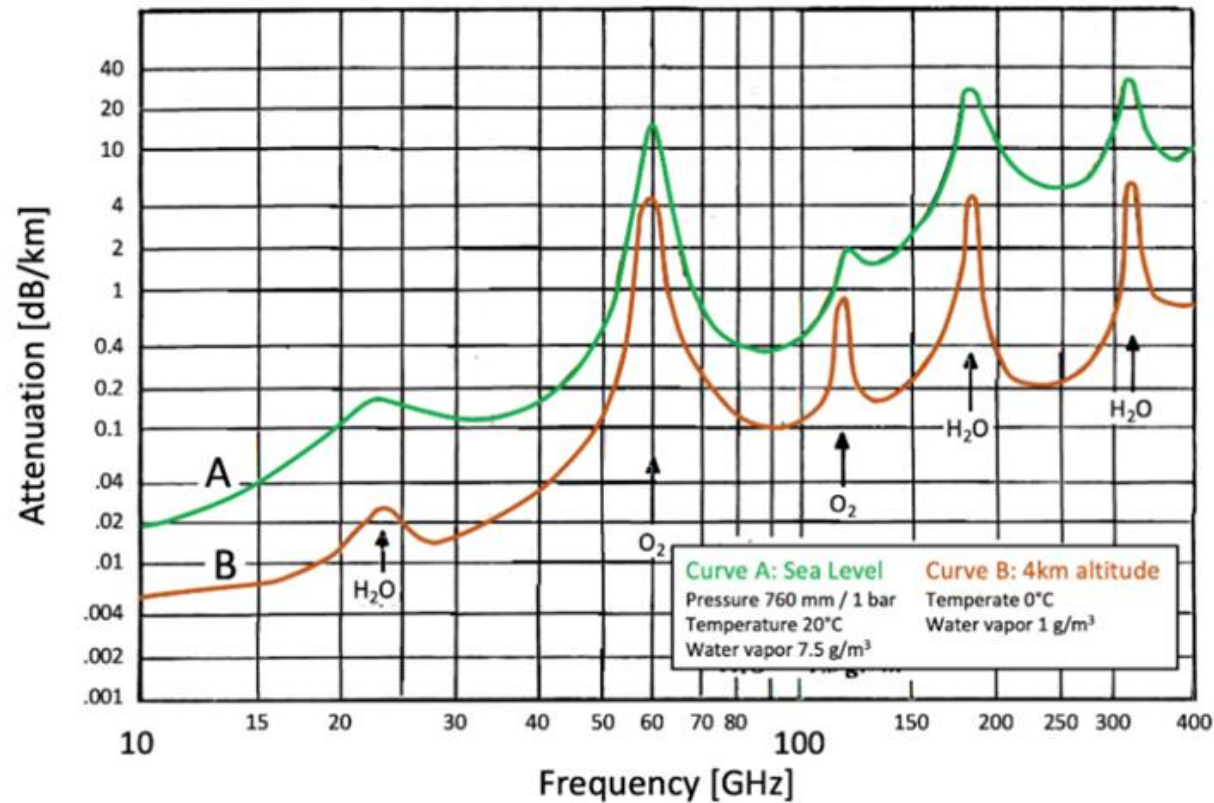
Qualcomm



Example of a
diffraction
object
blocking LOS
path between
transmitter
and receiver

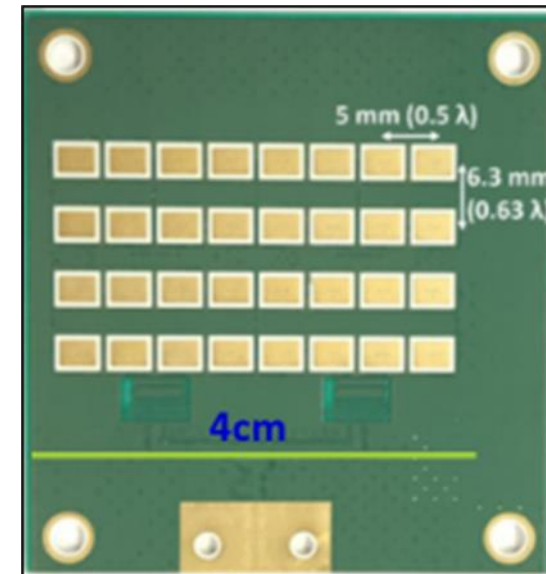
Contributions to the RF attenuation (loss measured in dB/km) due to molecular oxygen (blue) and water vapor (red) as a function of radio frequency (shown from 1 to 350 GHz)





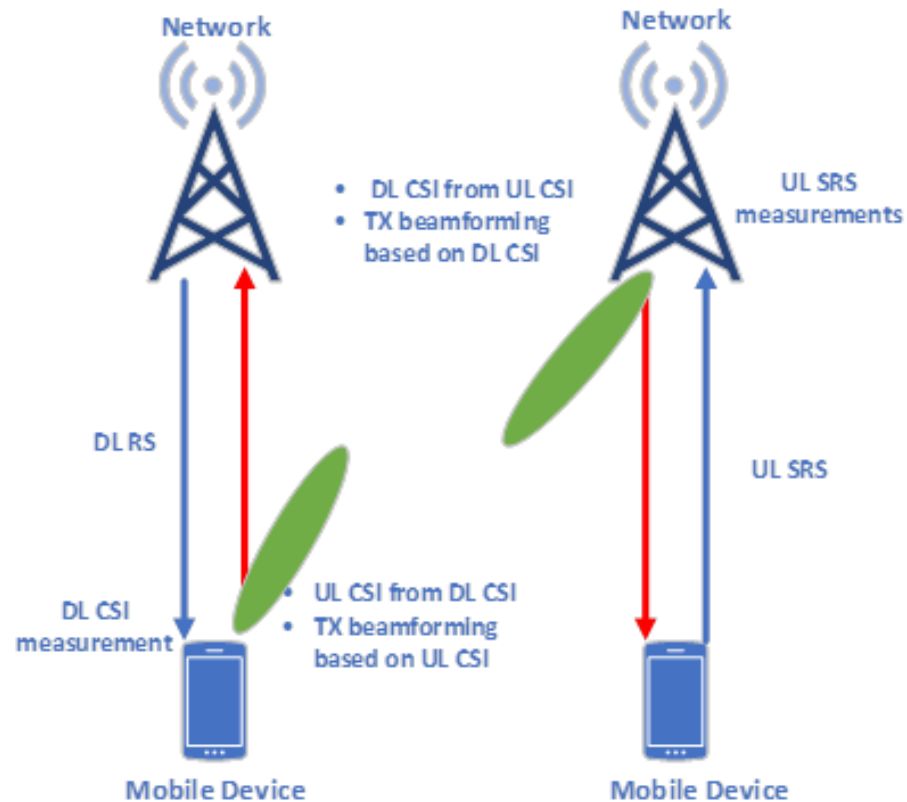
Atmospheric attenuation (units = dB/km) for air as a function of radio frequency (shown from 10 to 400 GHz) for two different conditions - one at sea level (green) and another at an altitude of 4km (brown)

A 28 GHz antenna array side of a printed circuit board spanning only 4 cm in length with eight elements

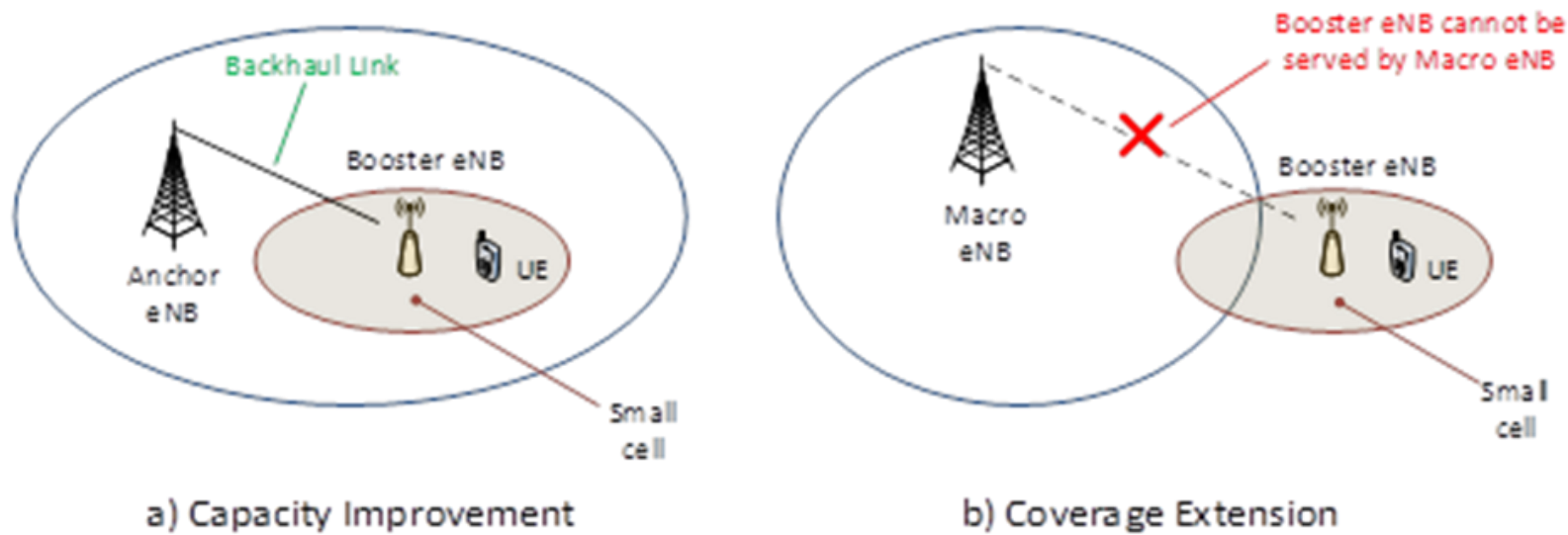




Basic uplink scheduling mechanism

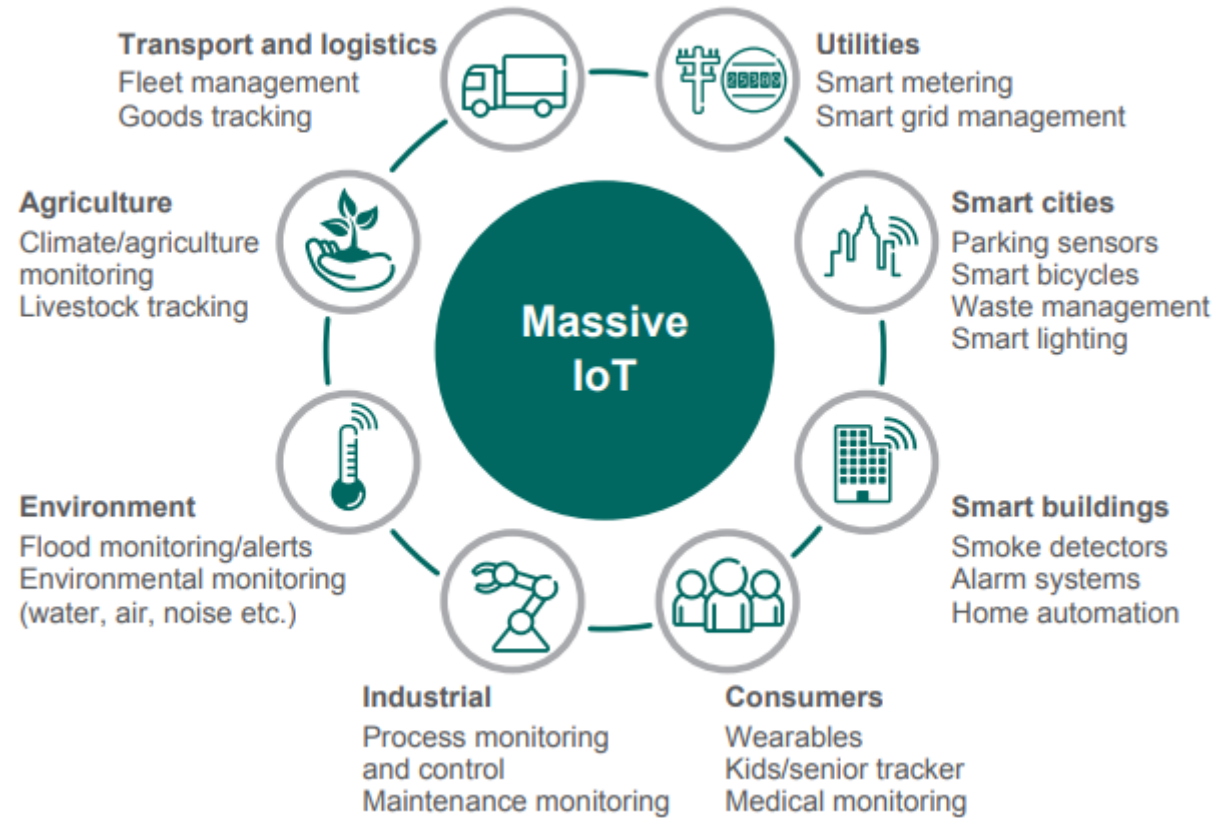


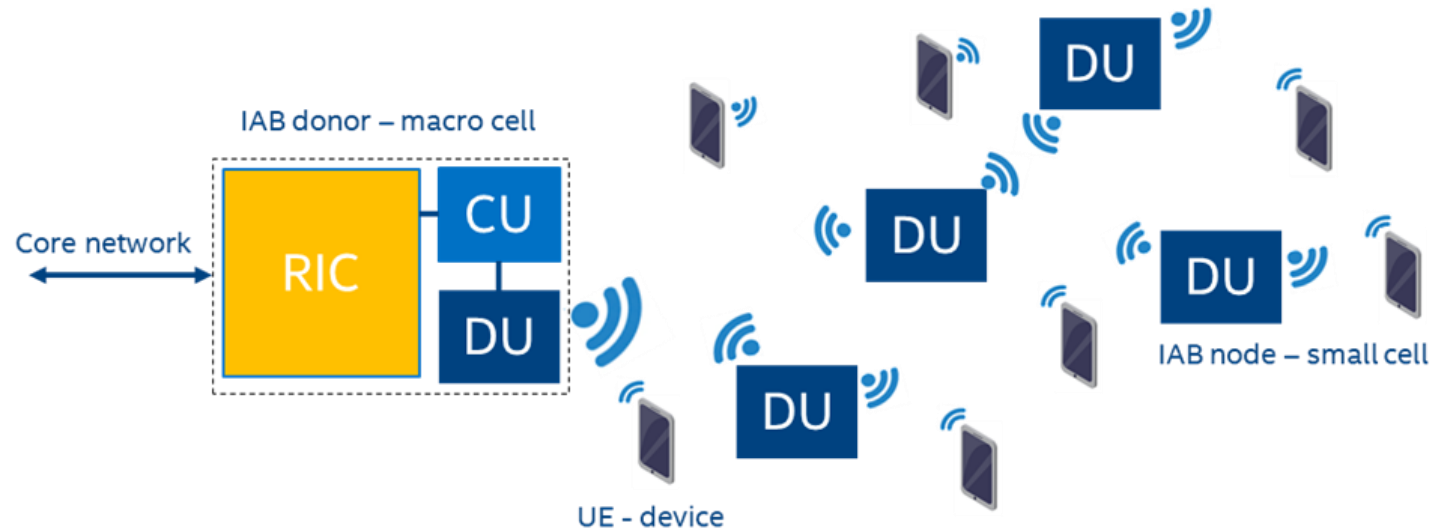
CSIT Acquisition
at UE (left) and
Network (right)



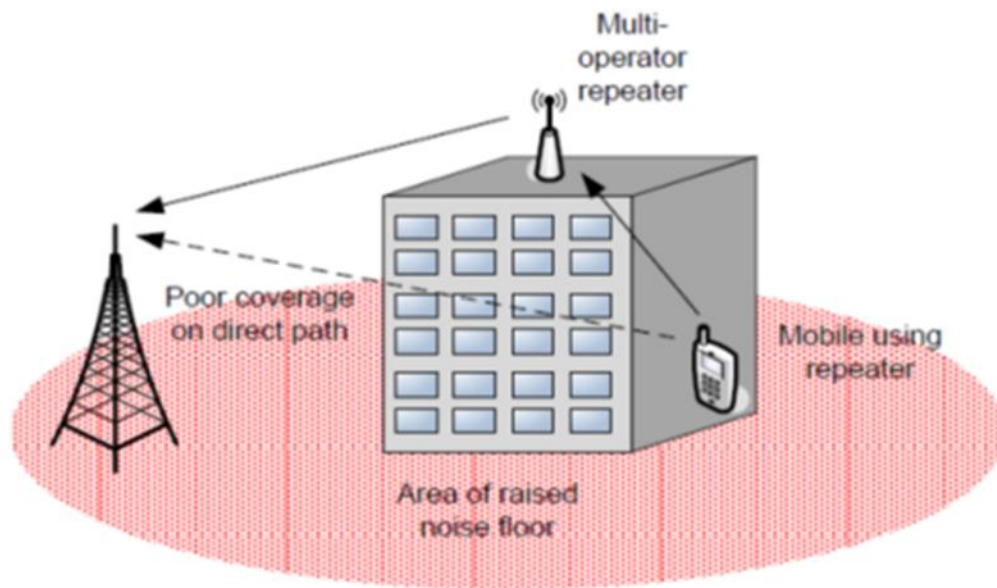
5G mmWave small cell underlay for capacity and coverage enhancements

Massive IoT Use Cases Enabled by 5G Technologies





An IAB network with macrocell (IAB donor) and several wireless backhauled small cells (IAB nodes)

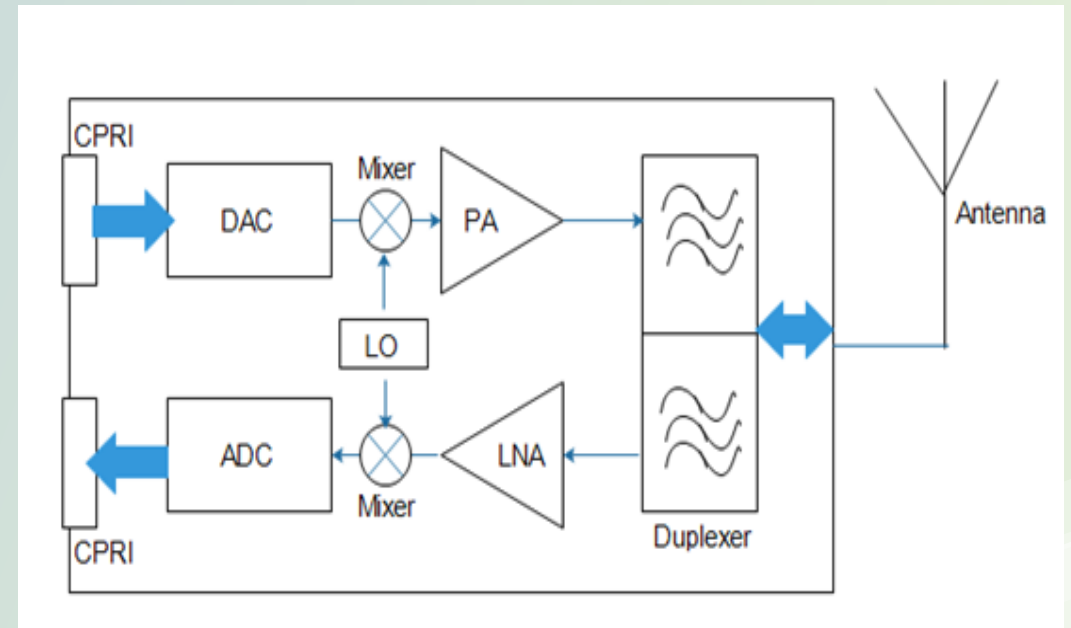
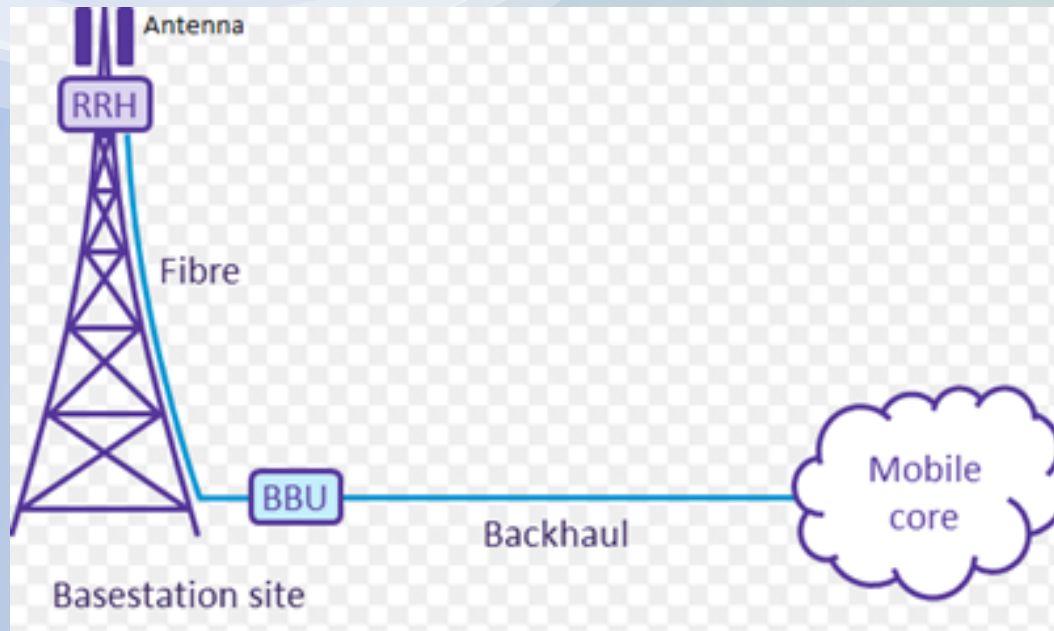


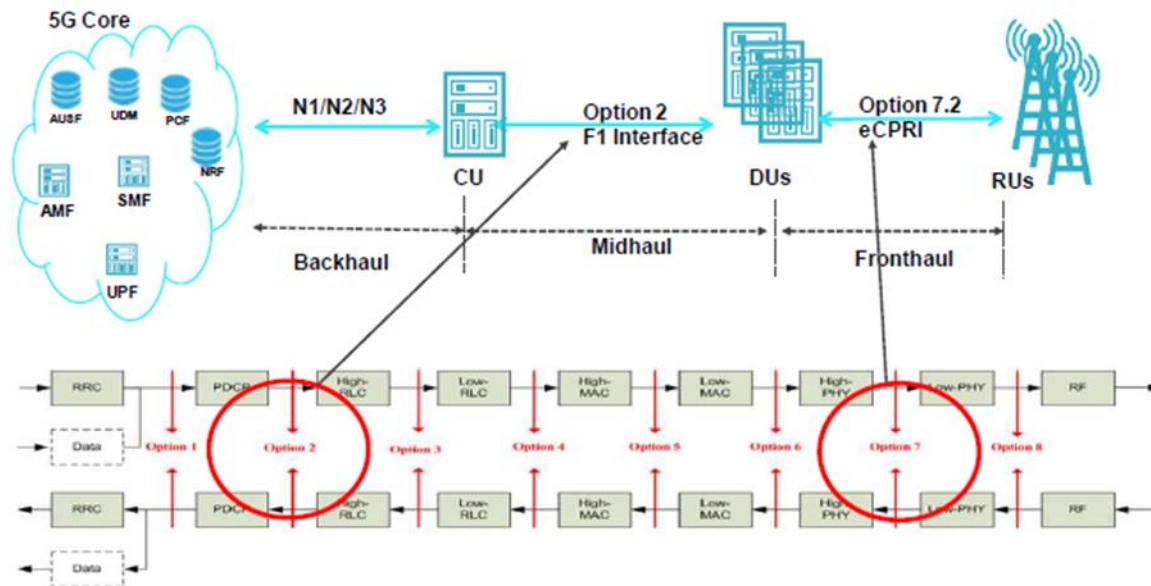
Repeater



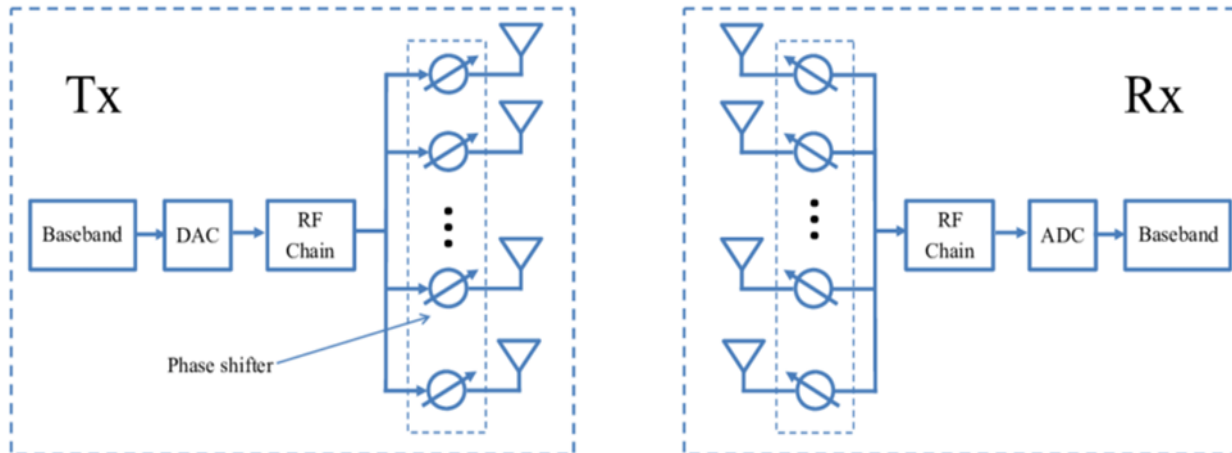
Examples of outdoor (left) and indoor (right)
mmWave repeaters

Sub 6 GHz RRH

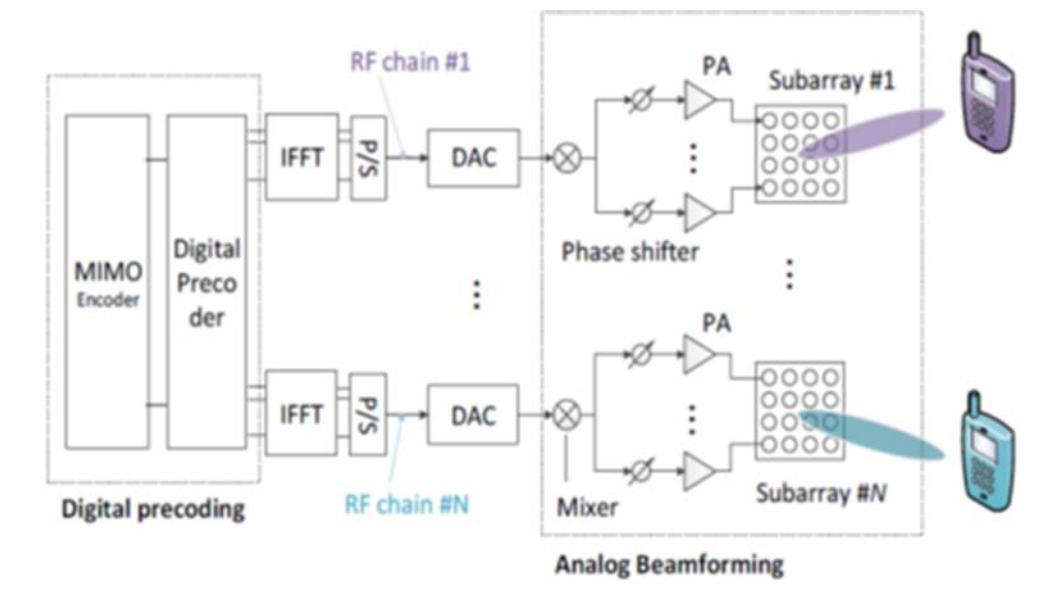




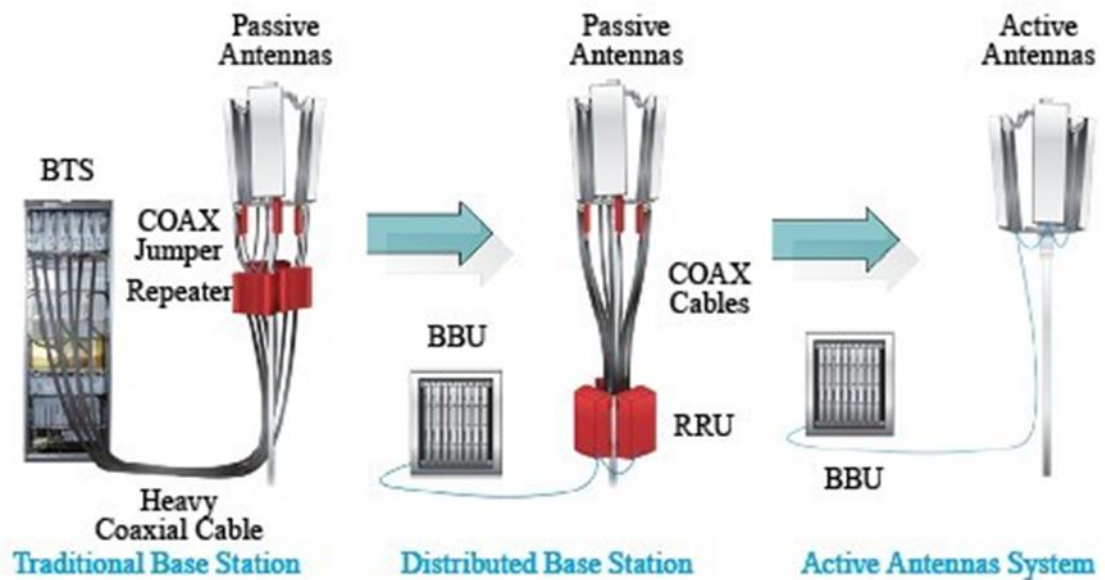
RAN split options
and RAN network
elements



Analog
beamformer
diagram



Hybrid beamforming structure



. Evolution of
base station
architecture