5G mmWave New Radio

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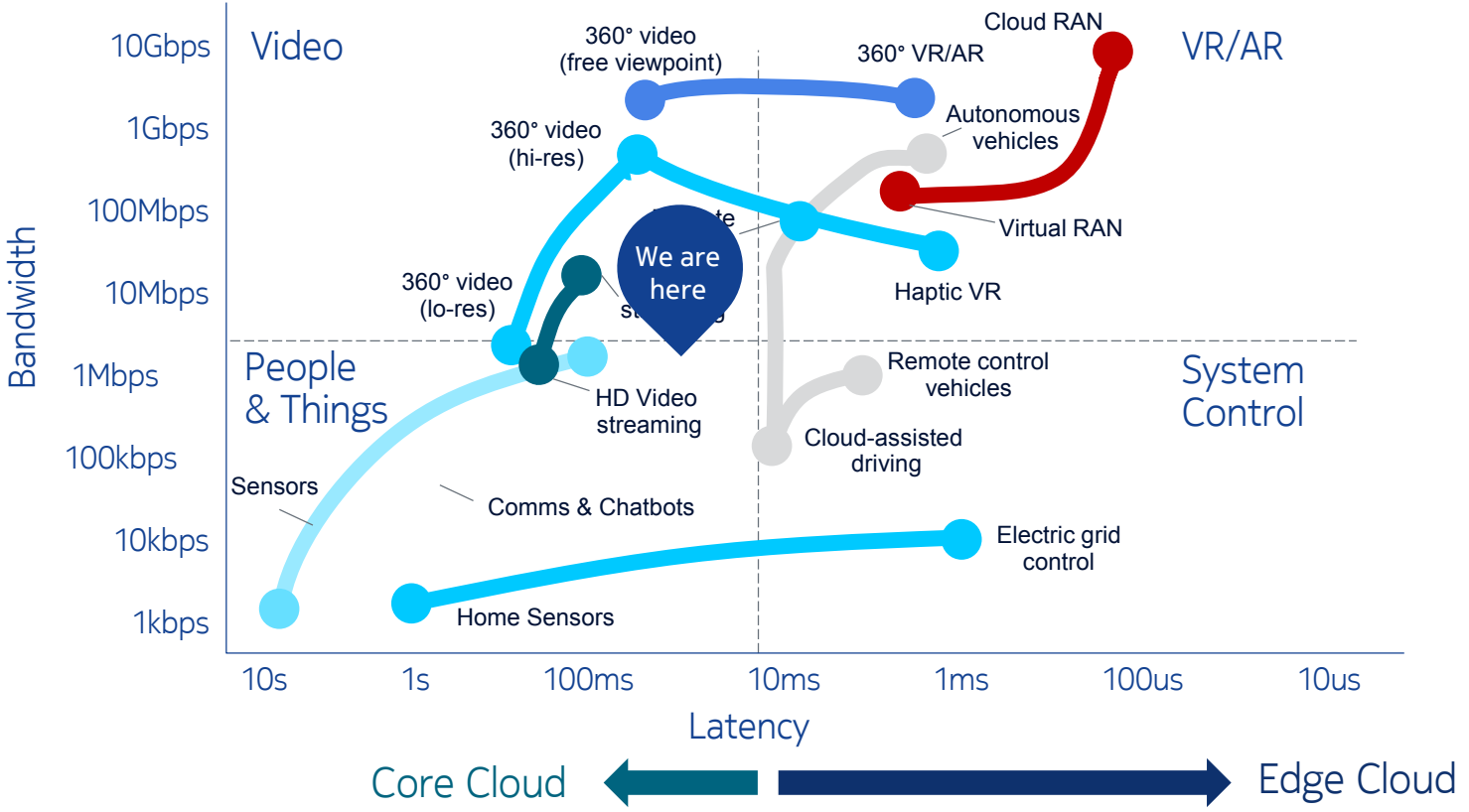
Latency & bandwidth matter … for new digital experiences that save time



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Thinking time….

We have created tools to increase discovery to save time (and waste time?)

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Star Trek thinking time....

Communicator

Holodeck

Replicator

Smartphone

Virtual Reality

3D Printer

Decreasing distance to reduce waste/energy and save time

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Star Trek thinking time….

Transporter

Tricorder

Should decrease distance and increase knowledge to save time…but this remains to be done

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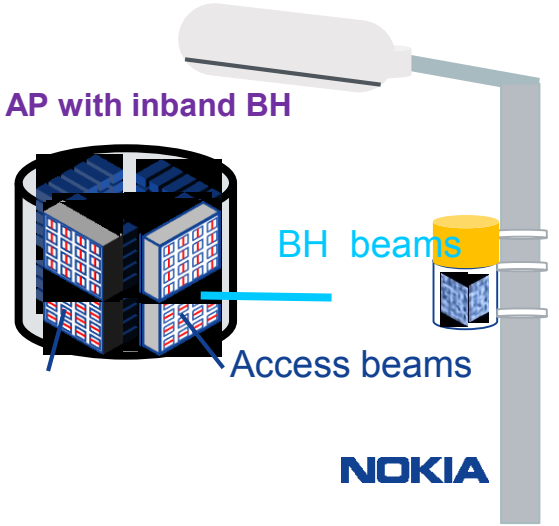
mmWave : 70 GHz – 300 GHz

- Wide bandwidths available at frequencies 70-300 GHz offer opportunity for dramatic increase in capacity and peak rates together with low latency.
  - Large-scale applications of VR, AR, and highly interactive 360 video and personalized UHD entertainment.
  - Hyper-dense commercial, city or campus infrastructure deployments
- Integrated access and backhaul with 360deg coverage solution
  - Peak Rate > 100 Gbps, Cell Edge Rate > 10 Gbps
  - Aggregate throughput per cell in excess of 100Gbps
  - All-in-one AP with small form factor
- **Key Innovation @ BW > 100 GHz**:
  - RFIC array innovations at ultra-wide bandwidth
  - ADC/DAC technology development
  - Self backhauling with self-organizing deployment
  - Unique thermal management solutions for pole-mounted AIO “Canister” unit



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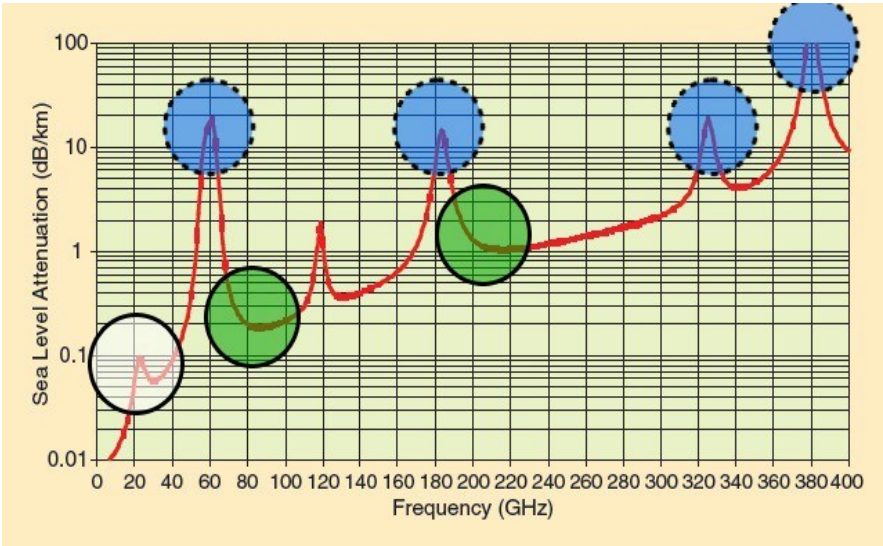
Evolution towards achieving 100 Gbps Peak Rate and Cell Throughput

Bandwidth
10-20 GHz available in 130-300 GHz band

MIMO
Can we do 4x4 SU-MIMO @ mmWave?

Modulation & Coding
Little Flexibility



Freq Range	Available
130-150 GHz	141-148.5 GHz (7.5 GHz)
209-226 GHz	17 GHz
252-275 GHz	23 GHz

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