

5G is a giant leap

Realize a scalable and latency aware network



NOKIA

	Today	2020-25
Users	10M people	+100M 'things'
Speed	100 Mbps	100x faster
Latency	>>10 ms	10x less
NW service level	Best effort for all	Committed SLAs
Logical networks	1	Many (slices)

Smart home

Mobile gaming

Industry 4.0

Connected cars

Drones

IoT wearables

Examples from 5G-trials

Rakuten Smart stadium experience

remote unmanned delivery robot operation

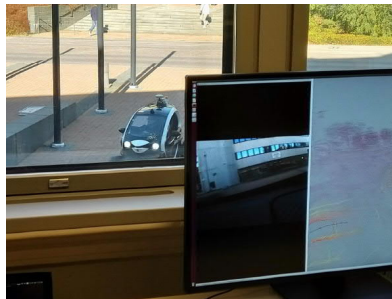
drone-based identity verification

8K VR video streaming through the utilization of a 5G network



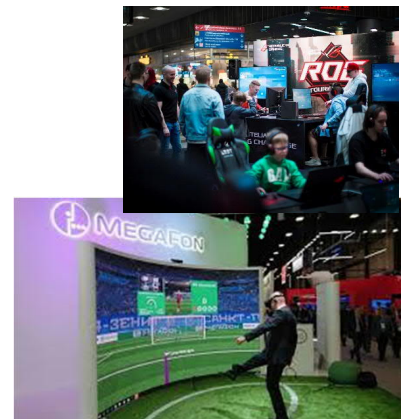
Telia Self-driving cars

Autonomous driving in Nokia Espoo Campus



eSports

- Gaming over 5G in shopping center
- Innovation lab
- Virtual football – Du
- Virtual reality penalty - Megafon



Industry 4.0

- Monitoring factory assembly line – Telefonica
- Nokia Oulu Conscious Factory with Telia
- Nokia, ABB and Kalmar conduct industry's first trial with ultra-reliable, low-latency 5G technology for electricity grid and harbor automation



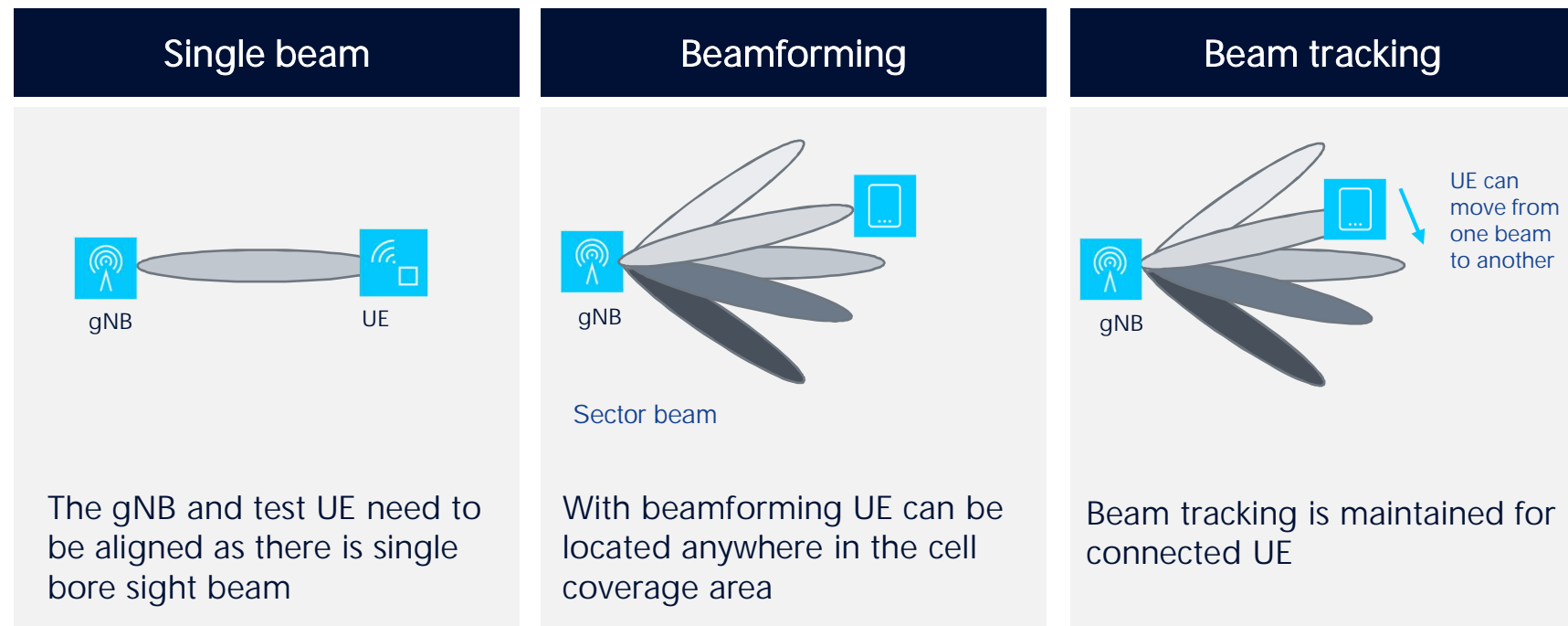
Densification for cost efficient capacity and coverage, indoors and outdoors portfolio for any deployment scenario



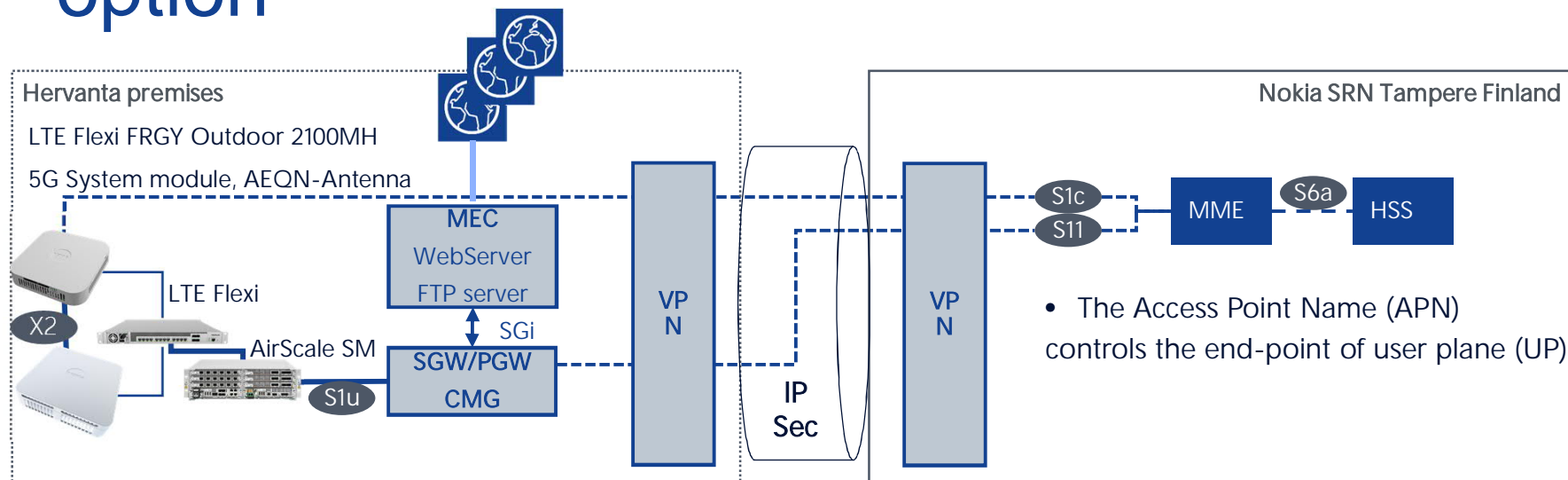
Residential Femto	3G + 4G
Enterprise Femto	3G + 4G
AirScale Wi-Fi	Indoor and Outdoor and integrated module 802.11ac
Flexi Zone Pico	3G or 4G + Wi-Fi or LAA
AirScale Indoor	2G+3G+4G+5G
Flexi Zone Micro	3G or 4G
AirScale Micro RRH	3G or 4G or 5G
MiniMacro	3G or 4G
MEC	Wi-Fi, LTE and 5G

Mobility evolution

Static beamforming – digital/analog beamforming - beam tracking



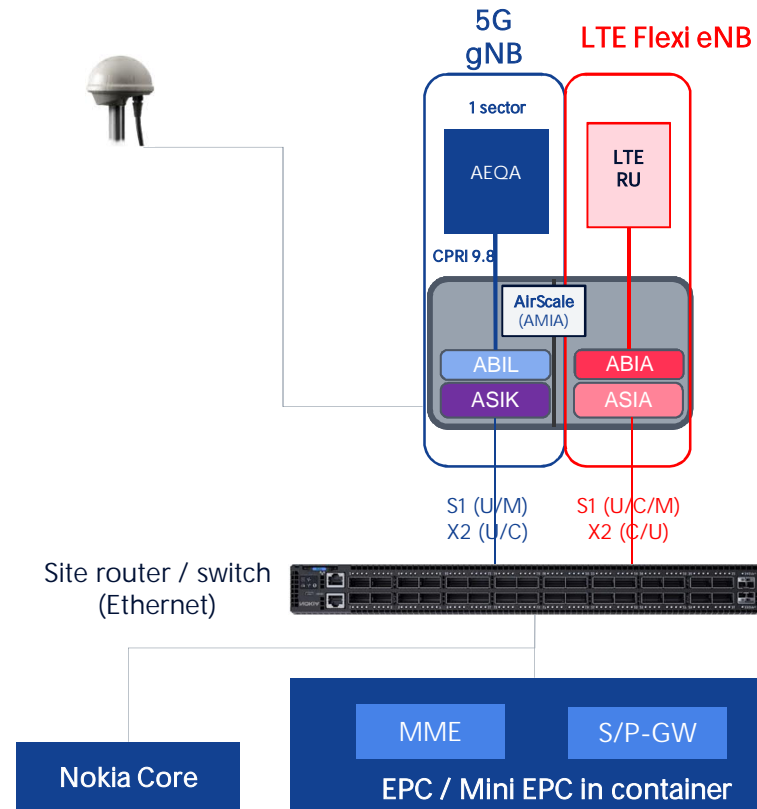
Tampere University 5G trial based on 3X option



- LTE capacity can be demonstrated with high quality video and large file download in MEC server
- Internet traffic and voice calls are managed in centralized core in SRN

Tampere University 5G trial based on 3X option

- One ASIK + one ABIL configuration for one sector with AEQD-antenna
- One ASIK + one ABIL = gNB
- Only connectivity between 5G and LTE is SYNC chaining
- CPRI front haul connection towards RU
- 1 / 10 GE interface towards backhaul
- GNSS synchronization and synch chaining



TTO B – Tampere, Hervanta

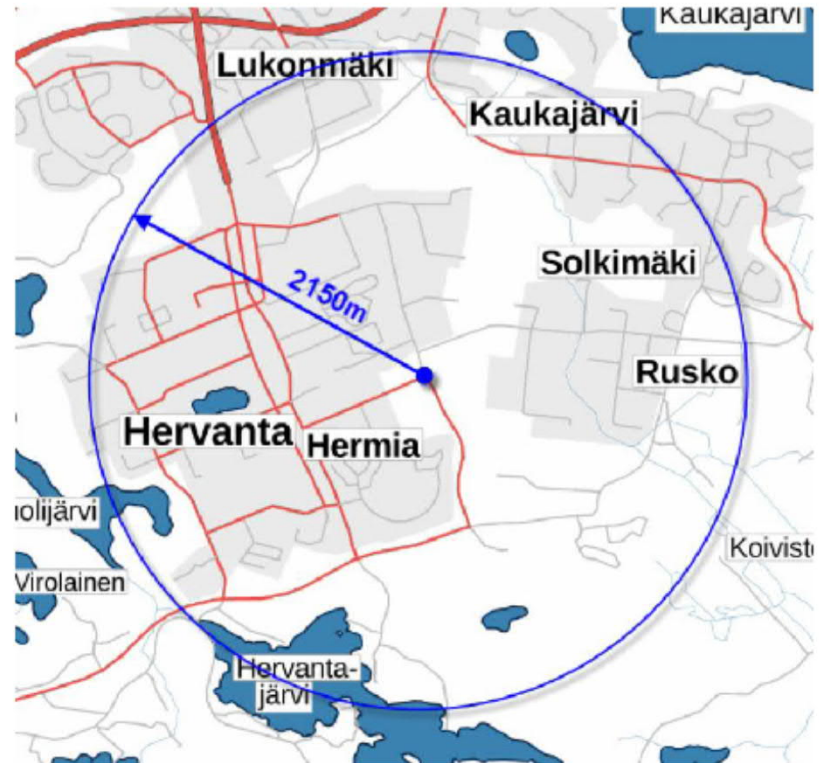
Government Decree

TTO B: 1800, 2100, 2600 MHz, 3,5 GHz 60MHz BW

Coordinates of the circle center:

- N: 6816930 E: 333180
- Radius: 2150m

Coordinates: ETRS-TM35FIN



Confidential



Overview of 5G Trial in the Hervanta campus

The place of 5G-antenna



TTY KAMPUSAREENA / PÄÄAUKIO

The coverage area of 5G-cell



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