

ÅLCOM – Network Measurements and Future Network Development

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Agenda

Ålcom Radio Network Status

Network Measurements on Sea Area

- ✓ Coverage – 4G/5G
- ✓ Data QoS – DL/UL
- ✓ Latency

Future Network Development

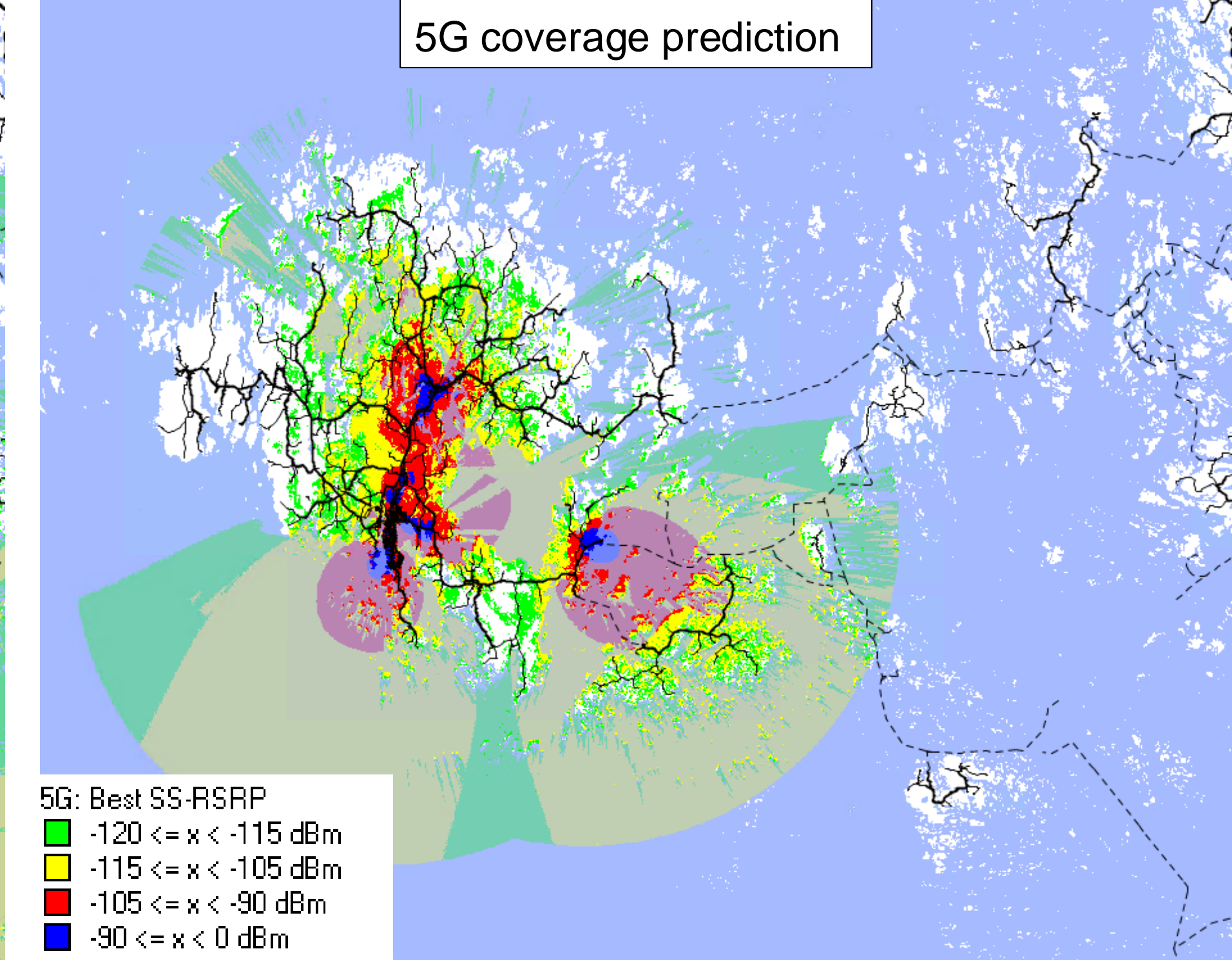
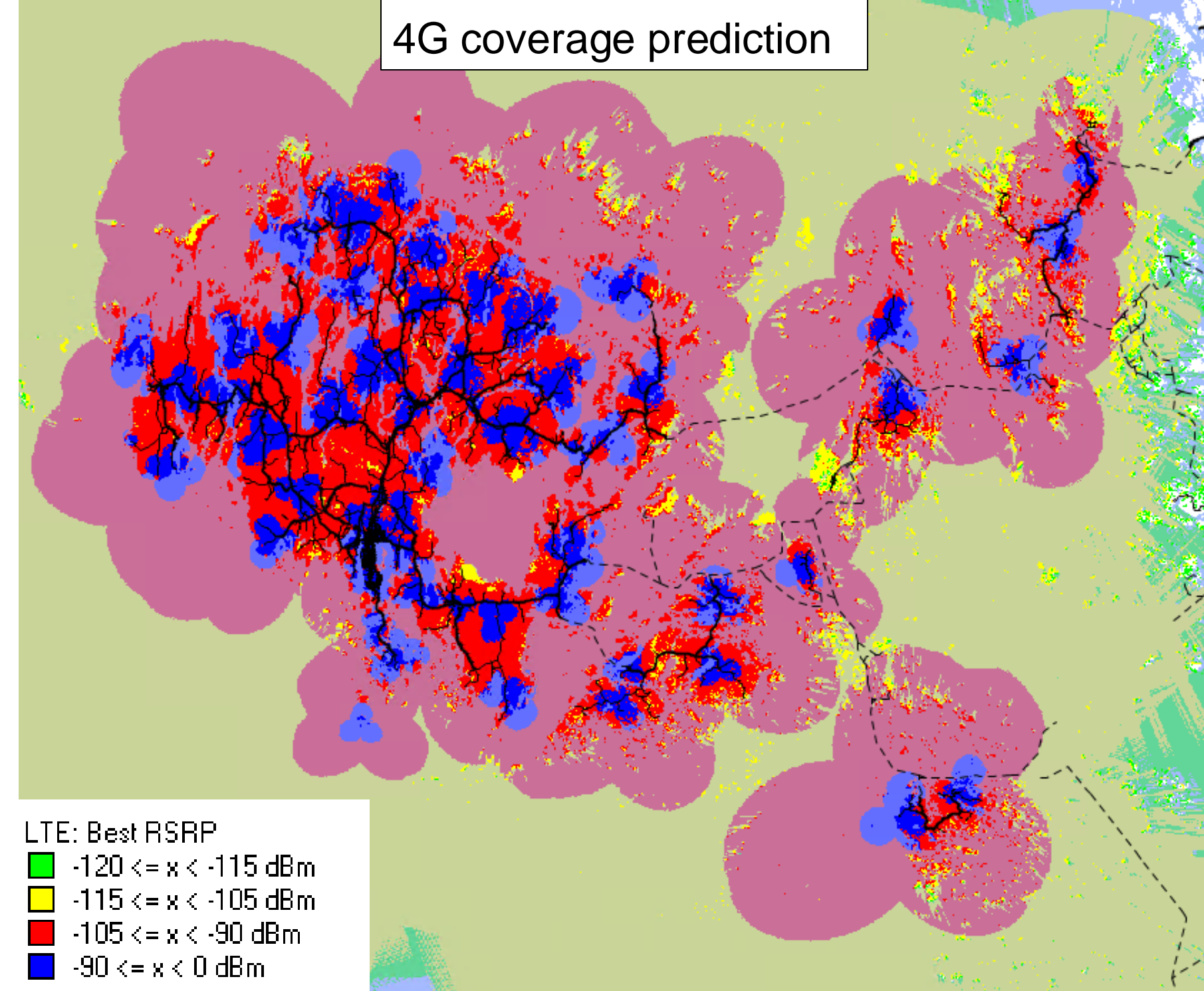
- ✓ Technology Plans

Ålcom Radio Network Status

Deployed technologies: 2G, 3G, 4G, 5G

Spectrum bands:

- 2G: 900 MHz
- 3G: 900, 2100 MHz
- 4G: 800, 1800, 2600 MHz
- 5G: 700, 3500 MHz



Network Measurements on Sea Area

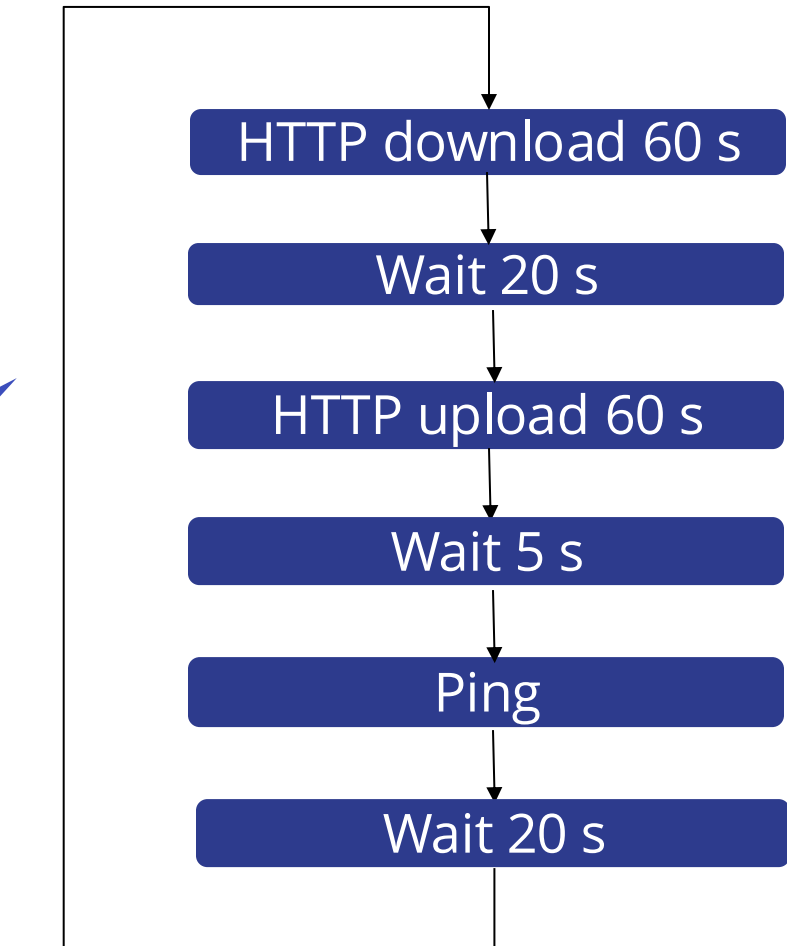
Measurements were carried out in the following locations during November:

1. Västerhamn
2. Korrvik
3. Järsö
4. Herrö
5. Svinö
6. Långnäs hamn

Around 10 min of testing in each location

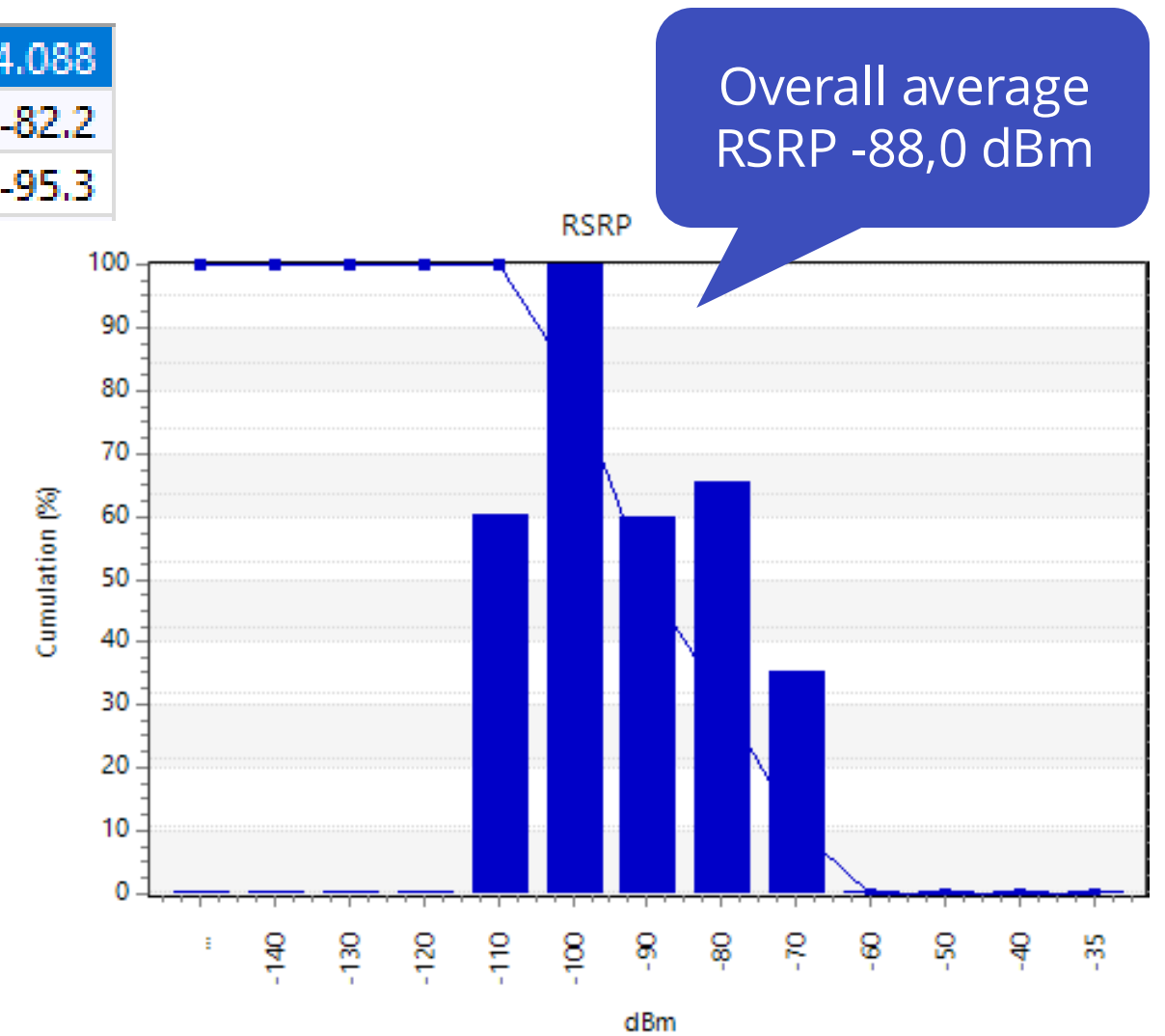
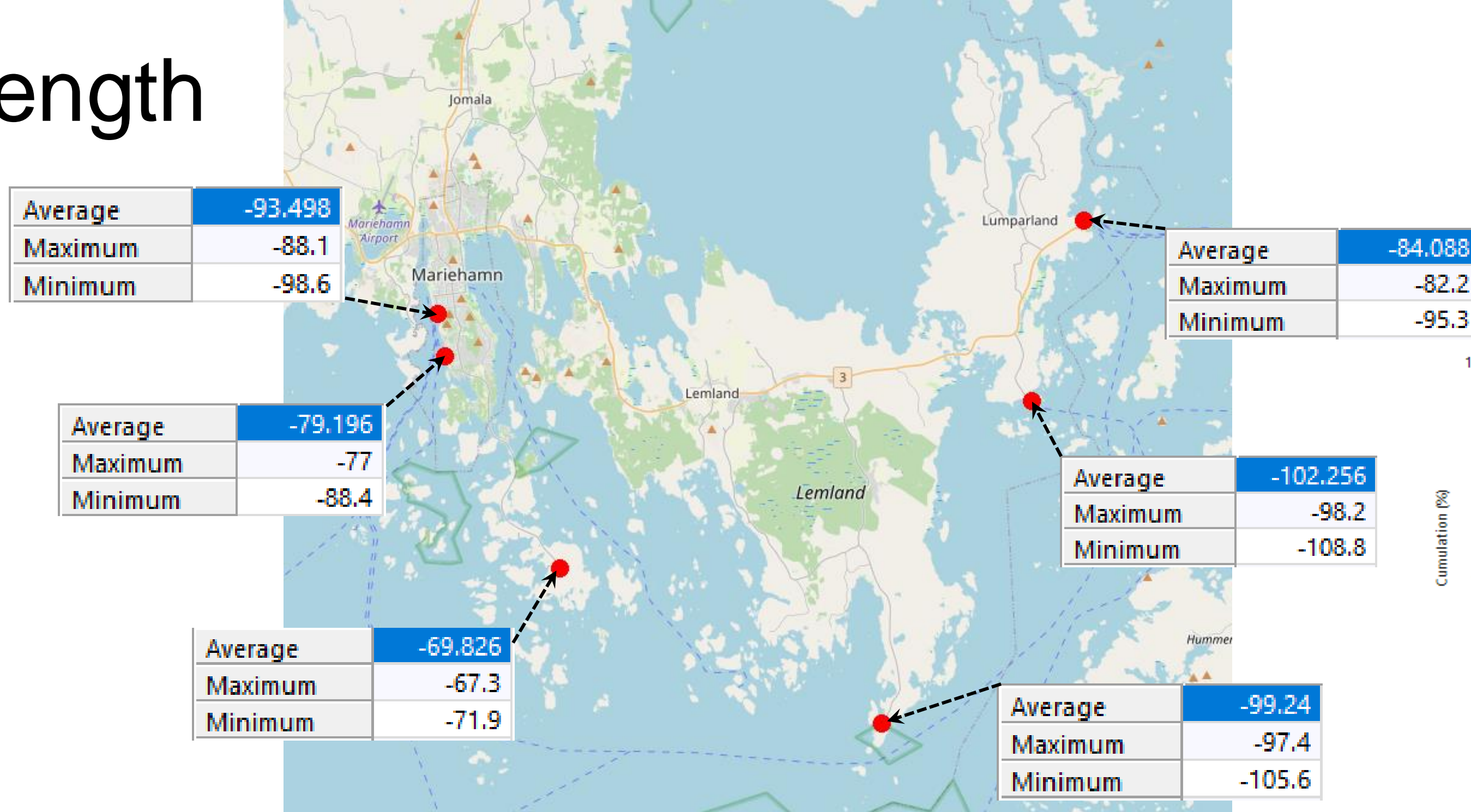


- Terminal in freely floating mode 5G/4G
- Tele2 public Speedtest server used (in Sweden)
- Ping test site 1.1.1.1 (Cloudflare)



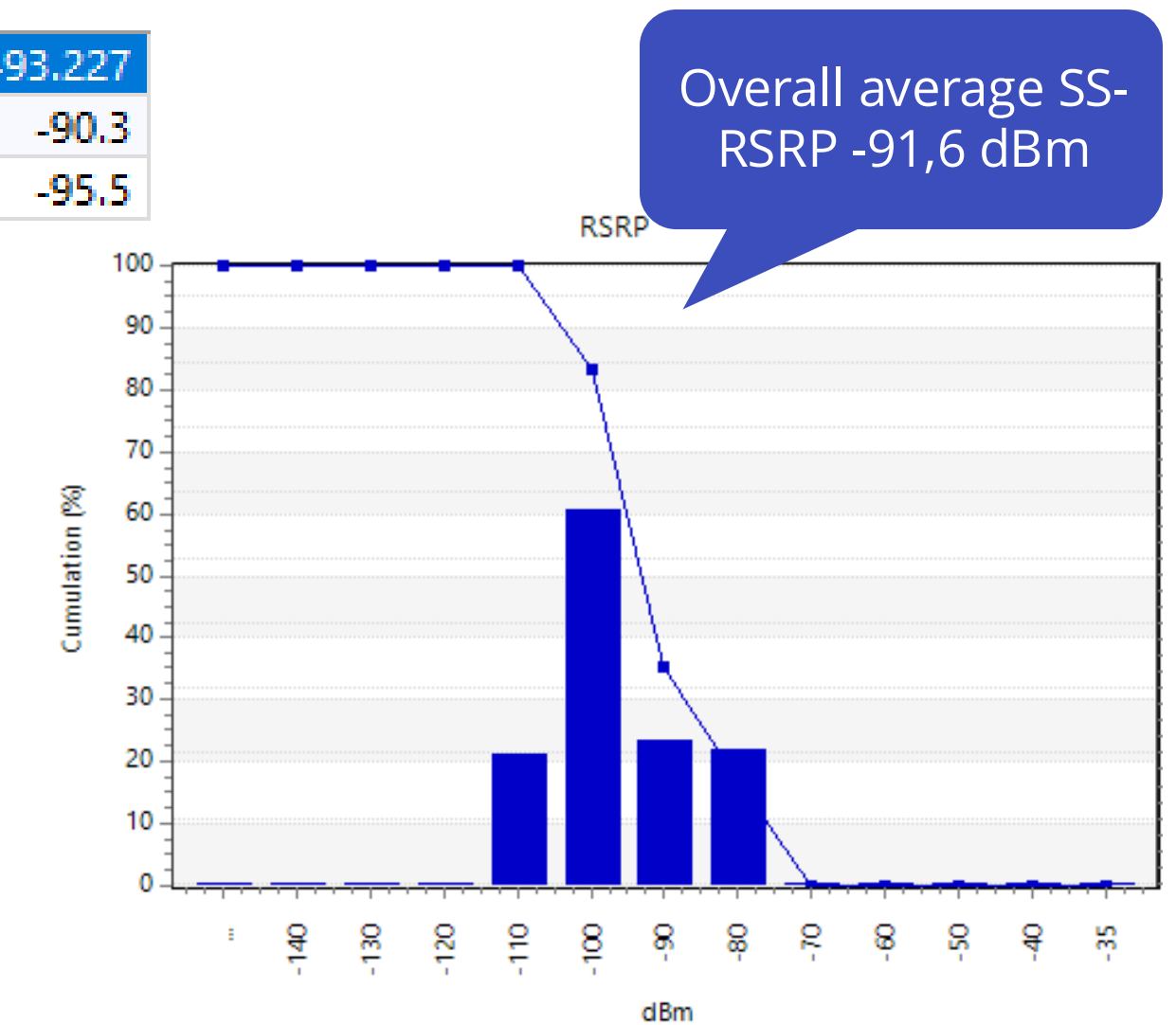
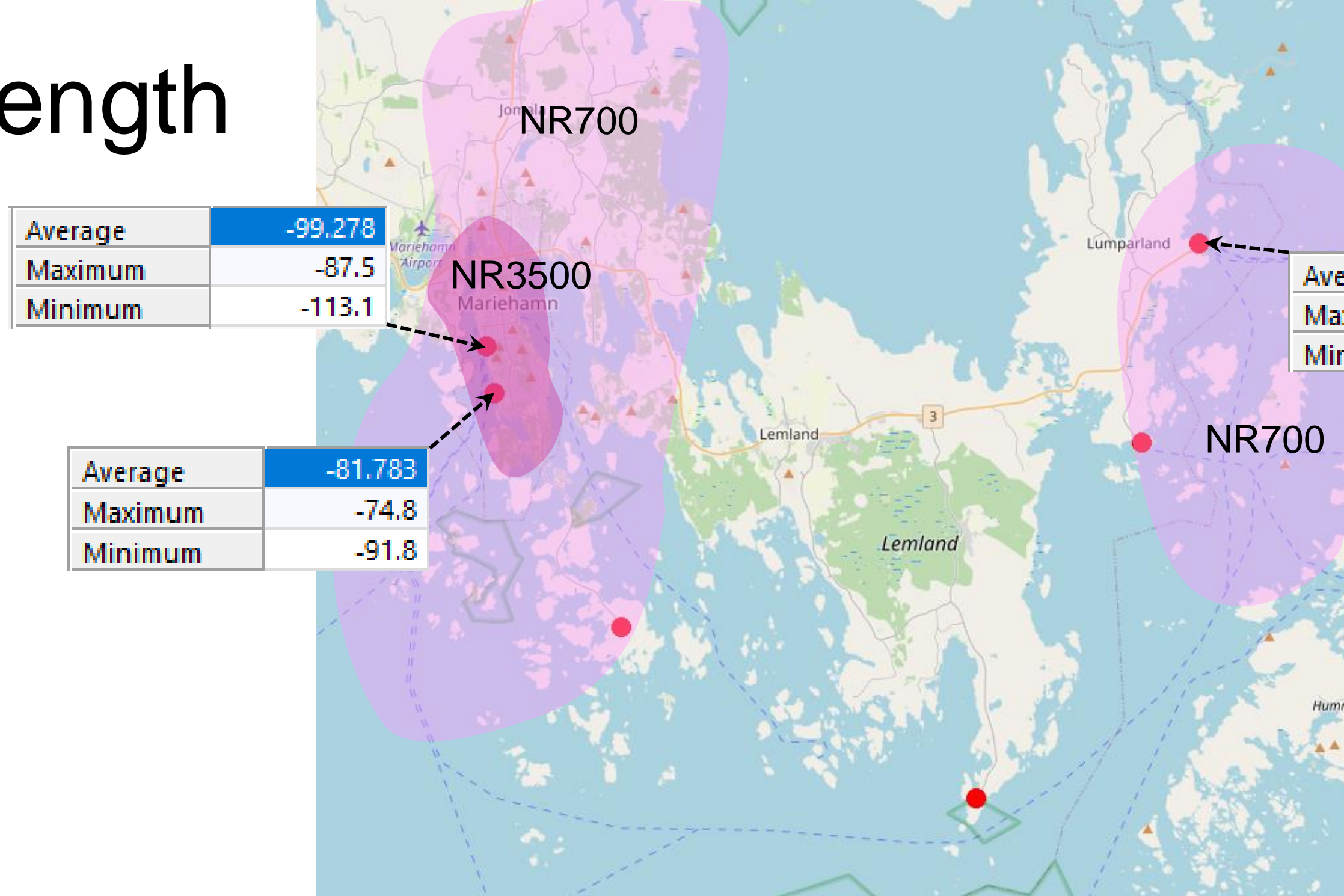
Coverage – 4G Signal Strength

- 800 MHz provides the baseline coverage, 1800 and 2600 MHz layers built for required capacity.
- Average 4G signal strength (RSRP) in the measured locations was varying between $\sim -70 \dots -102$ dBm.
- Over 99,7 % of the samples were above -105 dBm, which is typically sufficient threshold for adequate indoor coverage.



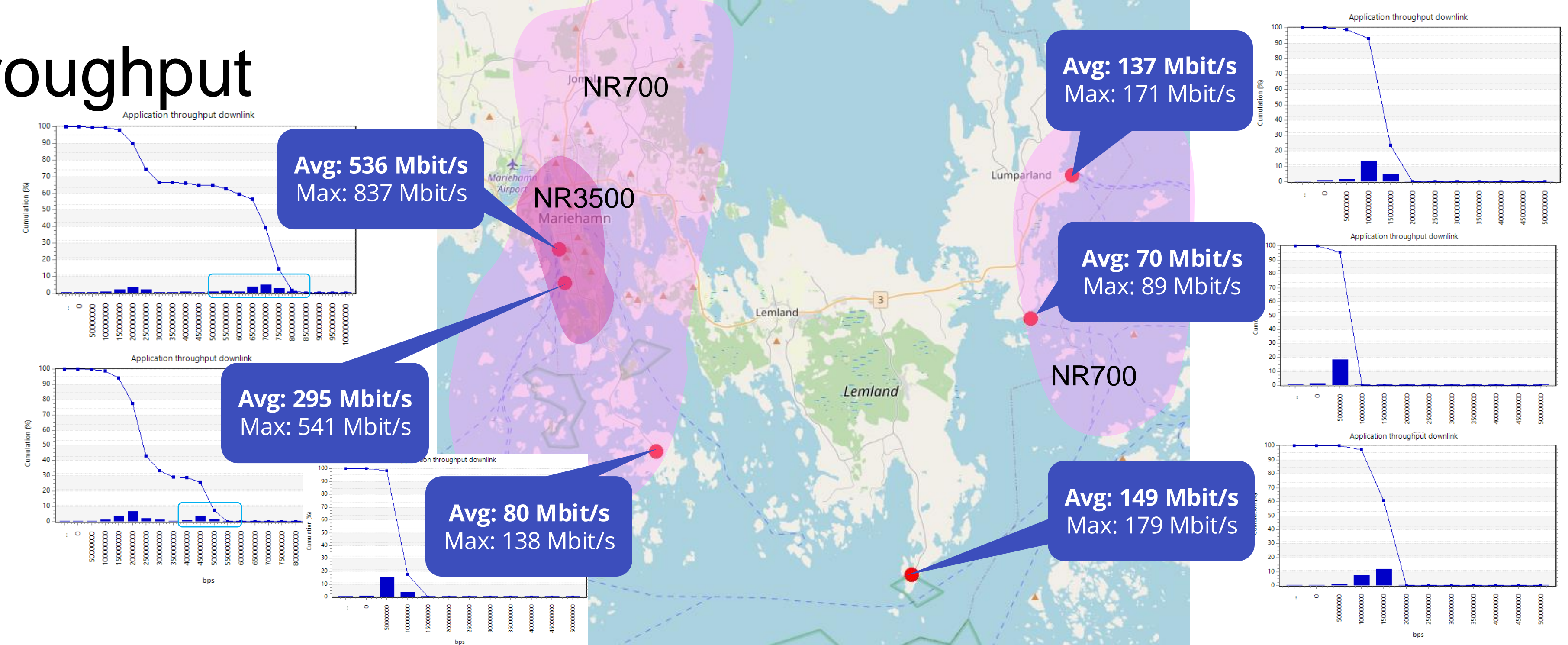
Coverage – 5G Signal Strength

- 700 MHz provides the baseline coverage, whereas 3,5 GHz brings the required capacity (NR3500 currently available only in Mariehamn city centrum area).
- Average 5G network SS-RSRP in the measured locations (where available) was varying between ~-82...-99 dBm.



Data QoS – DL Throughput

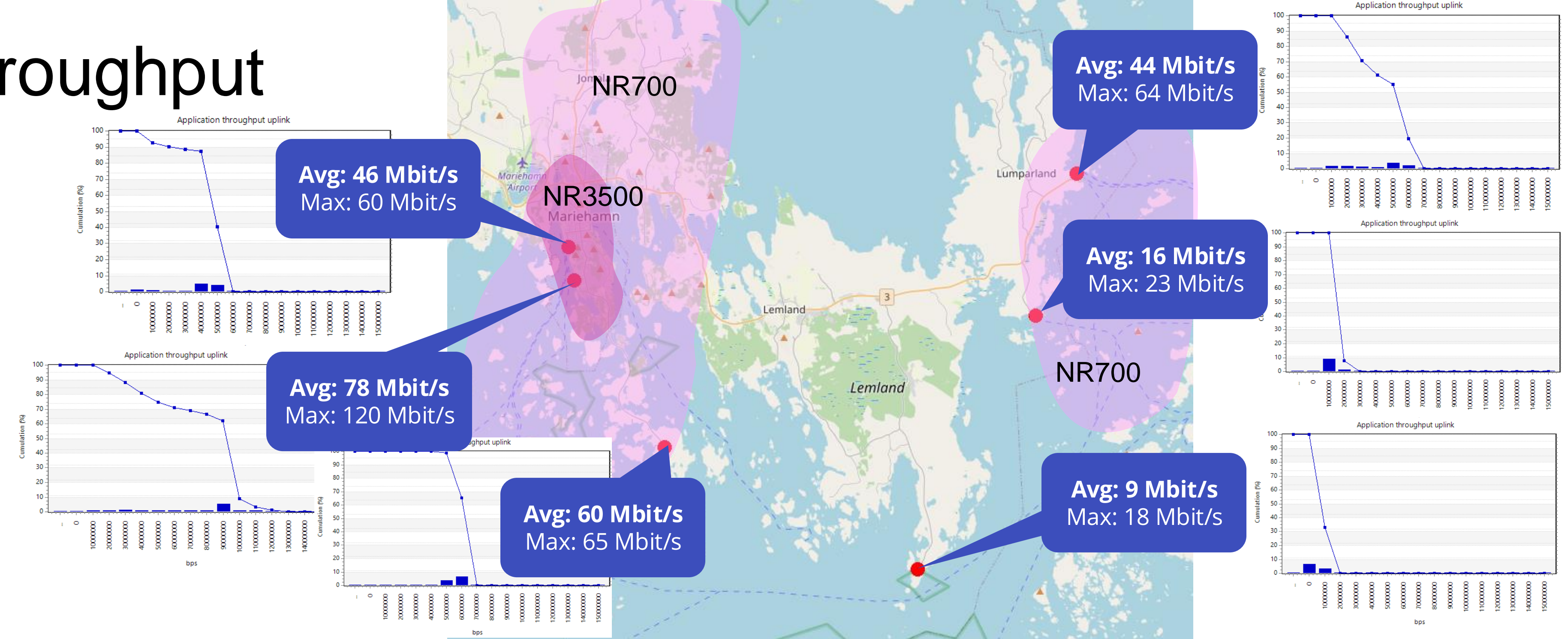
- Average downlink application throughput measured between **~70...536 Mbit/s**.
- NR3500 clearly boosts data rates and provides “real” 5G data QoE.
- The share of low DL throughputs (below 50 Mbit/s) mainly around **~0...2 %**.



| Location | Share of <50 Mbit/s (%) |
|--------------|-------------------------|
| Västerhamn | 0.6 |
| Korrvik | 0.6 |
| Järsö | 1.7 |
| Herrö | 0.0 |
| Svinö | 4.5 |
| Långnäs hamn | 1.2 |

Data QoS – UL Throughput

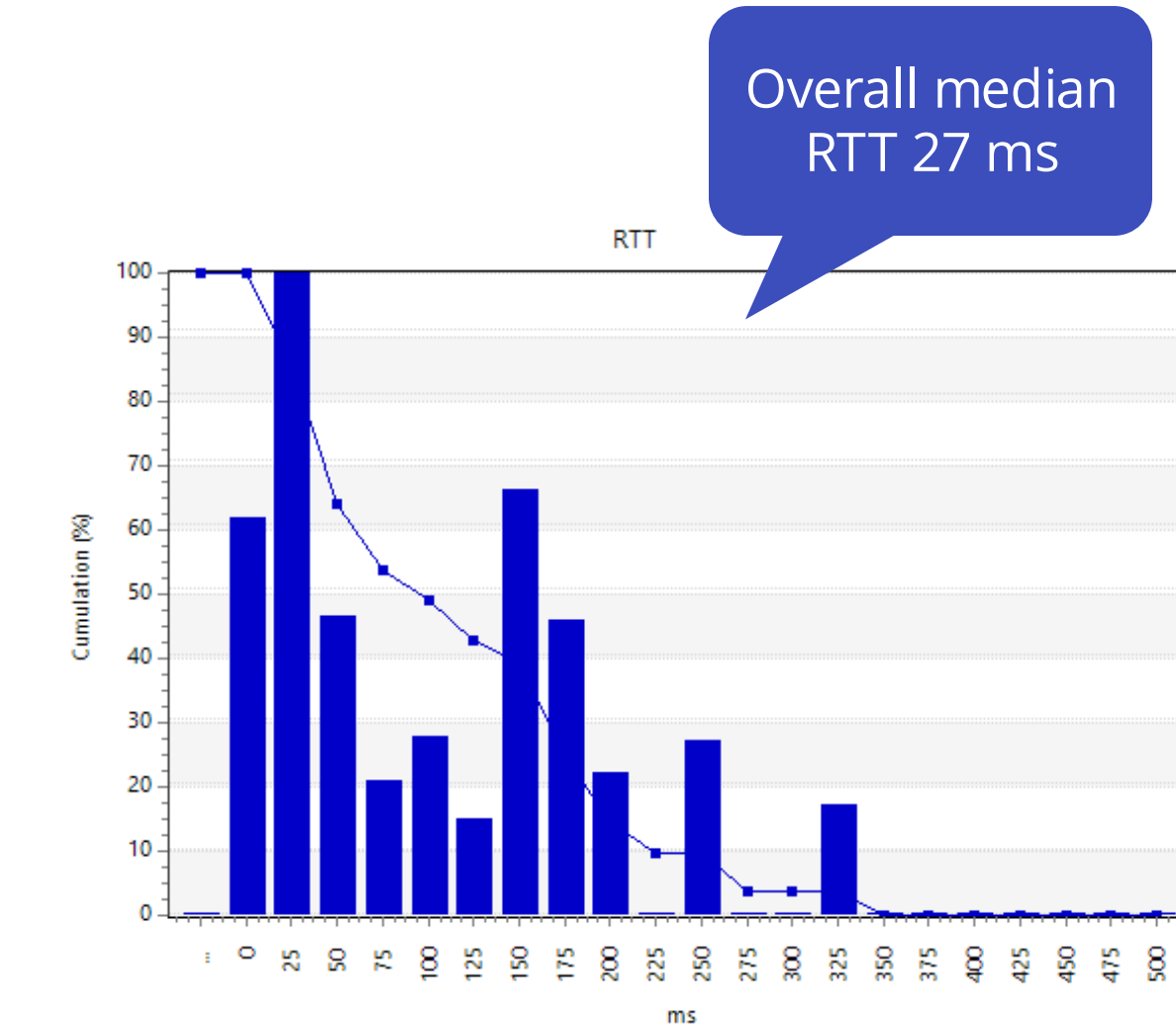
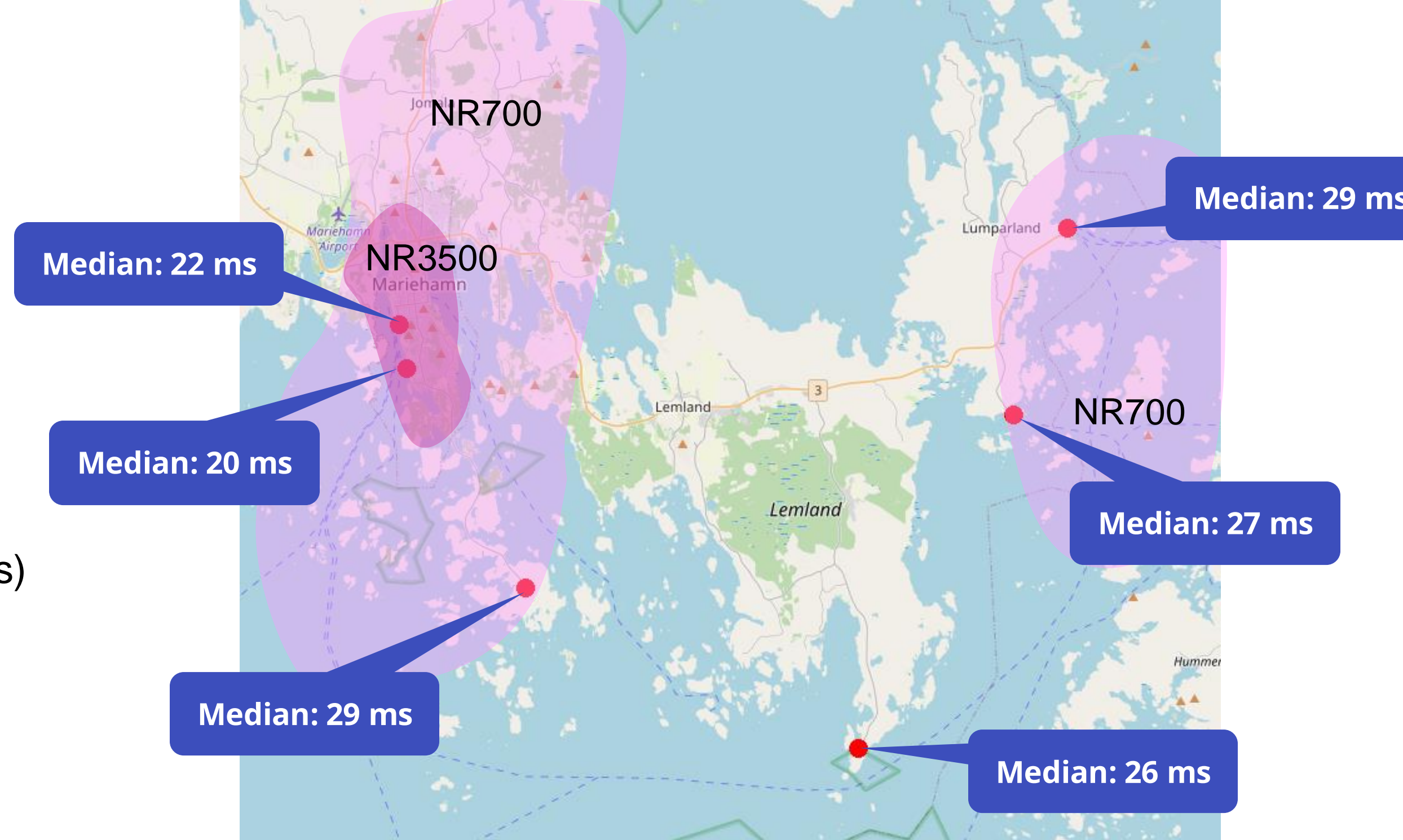
- Average uplink application throughput measured between **~9...78 Mbit/s**.
- EN-DC has significant impact.
- The share of low throughputs (below 10 Mbit/s) was 0 % in most of the locations. In Herrö LTE800 as single serving band caused lower user experience.



| Location | Share of <10 Mbit/s (%) |
|--------------|-------------------------|
| Västerhamn | 7.2 |
| Korrvik | 0.0 |
| Järsö | 0.0 |
| Herrö | 67.1 |
| Svinö | 0.0 |
| Långnäs hamn | 0.0 |

Latency – Ping RTT

- Median latency (ICMP ping Round-Trip-Time) was between **20...29 ms** in the measured locations.
- The lowest latency was obtained in NR3500 network area, but 4G leg always exists (signaling).
- With 5G NSA network deployment Ultra-Low Latency (<5 ms) can not be reached yet (requires SA solution with 5G core).



Future Network Development

- 5G network coverage expansions in line with traffic growth and 5G SA migration for URLLC (latency <5 ms) in 2027.
 - NR3500 deployments on residential areas and hot-spots, taking into account summer season peaks.
 - NR700 deployments on rural areas and ferry routes between the key harbors (Mariehamn, Långnäs, Eckerö).
- 4G network capacity upgrades, including new spectrum bands, to tackle data traffic growth where needed.
- 3G spectrum (U2100) refarming for 4G usage.
- 2G network sunset tentatively in 2025.

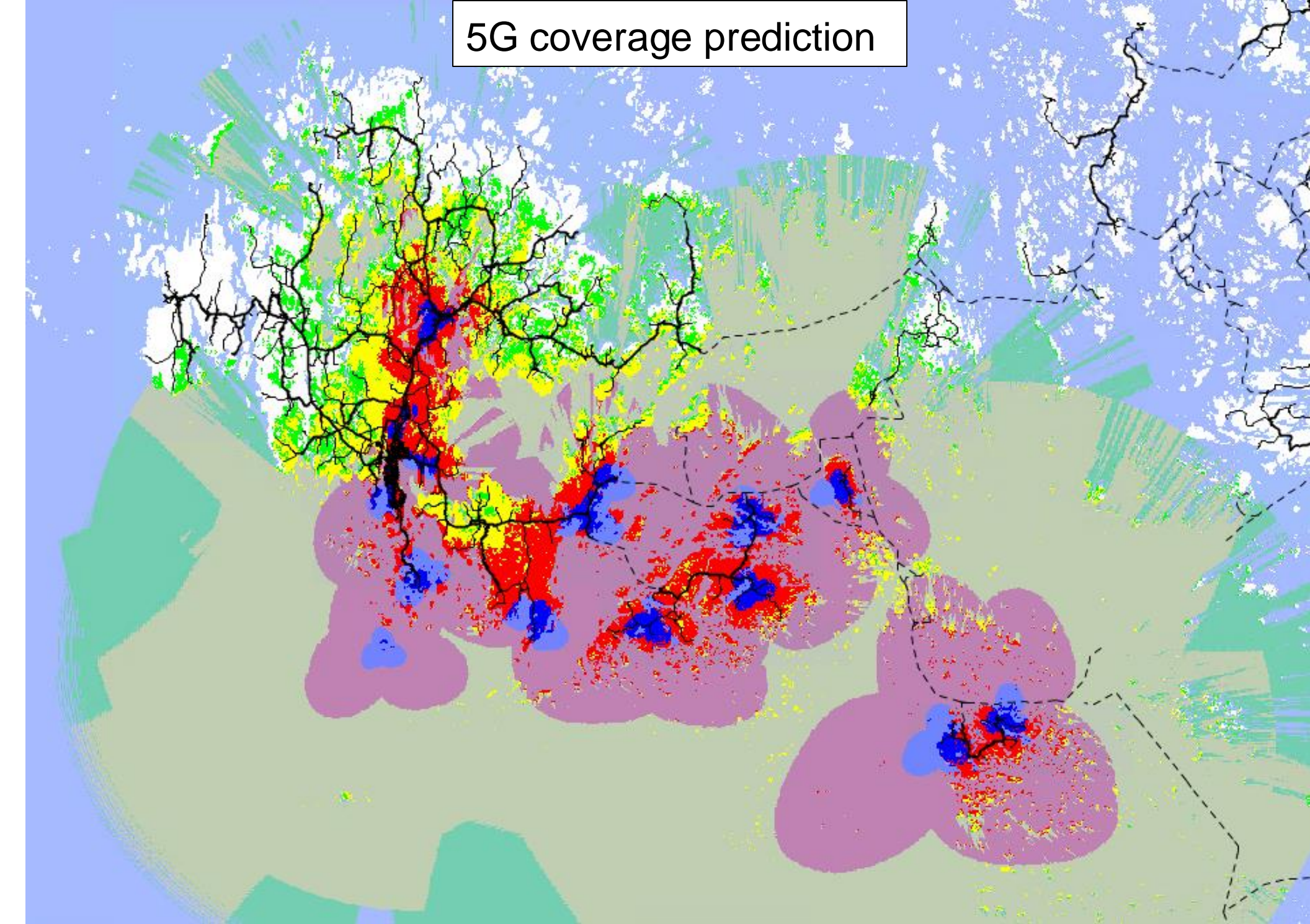


Future Network Development

Prediction for Ålcom 5G network sea coverage plan for 2026
 deployed with 700 MHz.

- Mariehamn – Kökar
- Långnäs – Kökar.

5G: Best SS-RSRP
 ■ $-120 \leq x < -115$ dBm
 ■ $-115 \leq x < -105$ dBm
 ■ $-105 \leq x < -90$ dBm
 ■ $-90 \leq x < 0$ dBm



Omnitele Services Portfolio

35+

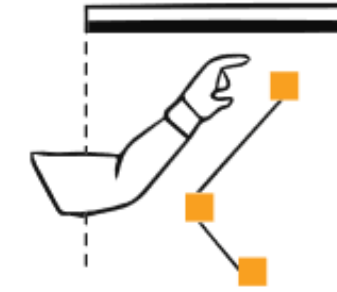
years of mobile network experience

100+

countries of project experience

2 000+

projects with satisfied customers



Consulting Services

- Technology & spectrum strategy
- Vendor selection & procurement
- Feasibility studies
- Technical due diligence
- Advisory for regulatory authorities & user organisations



Network Services

- RAN design & RF planning
- Network optimisation
- Benchmarks
- Network audits
- Network development & performance management



Automated Solutions

- PRIMEA RAN Diagnostics
- PRIMEA RAN Investment Optimisation
- Customised solutions