

Tuning 5G for UL Throughput, RTT Latency and Network Resources utilization, at the 5G EVE project: The influence of 3GPP Architecture options and Edge Computing choices

Marc Molla, Isaac Quintana E (Ericsson Spain, 5G EVE)

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5G PPP

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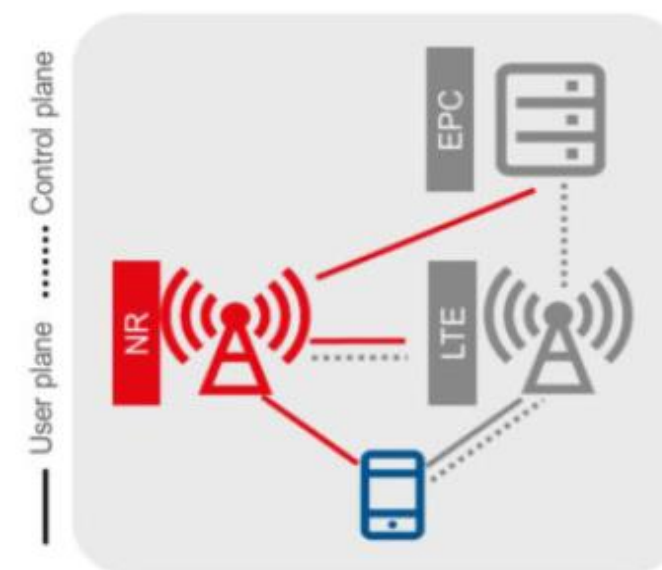
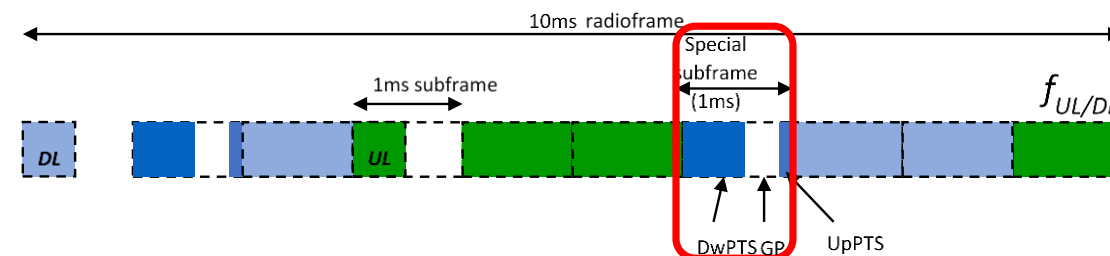


Contents

- **Uplink vs Downlink intensive patterns**
- **Core deployment Edge vs central**

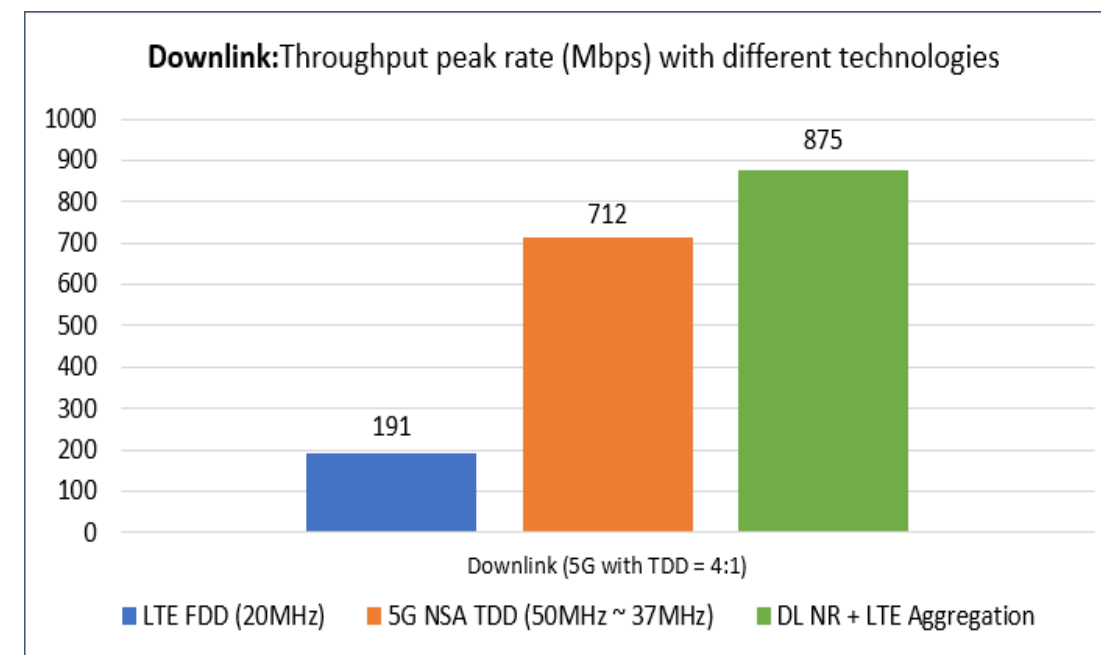
5G Key influencing aspects

- 5G NR uses different multiple access and modulation techniques.
- Massive MIMO is used to offset the propagation loss.
- TDD uplink measurements can be reused for downlink measurements.
- 5G NSA uses EN-DC (Option 3x).



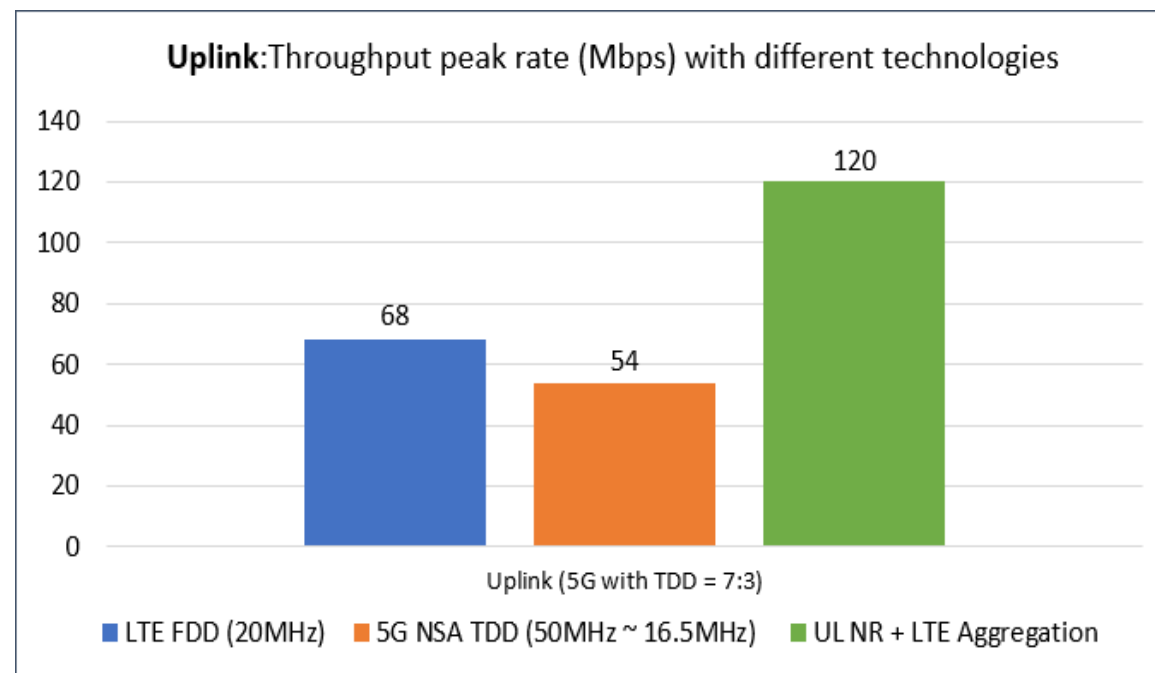
Downlink Peak Data Rate

- TDD Pattern (4:1) is adapted to improve the Downlink throughput vs Uplink throughput. This is the common configuration for customer Network.
- Furthermore NSA could provide the advantage of using feature: DL NR+LTE aggregation.
- Downlink peak data rate has never been a limiting factor for use cases covered by 5G EVC



Uplink Peak Data Rate

- Uplink data rate is a critical KPI in industry applications validated at 5G EVE.
- LTE uplink is higher than NR NSA uplink due to the TDD technique vs FDD.
- NR+LTE traffic aggregation has a big impact in the peak data rate.



Conclusions

- Small variation in Uplink throughput is more significant than in Downlink:
 - ❑ Improvement DL from 712 Mbps to 875 Mbps = 163 Mbps (23 % increase)
 - ❑ Improvement UL from 54 Mbps to 120 Mbps = 66 Mbps (122 % increase)
- This significant improvement in Uplink Throughput has a very relevant influence in industry use cases, from not being feasible with LTE to be fully enabled by 5G

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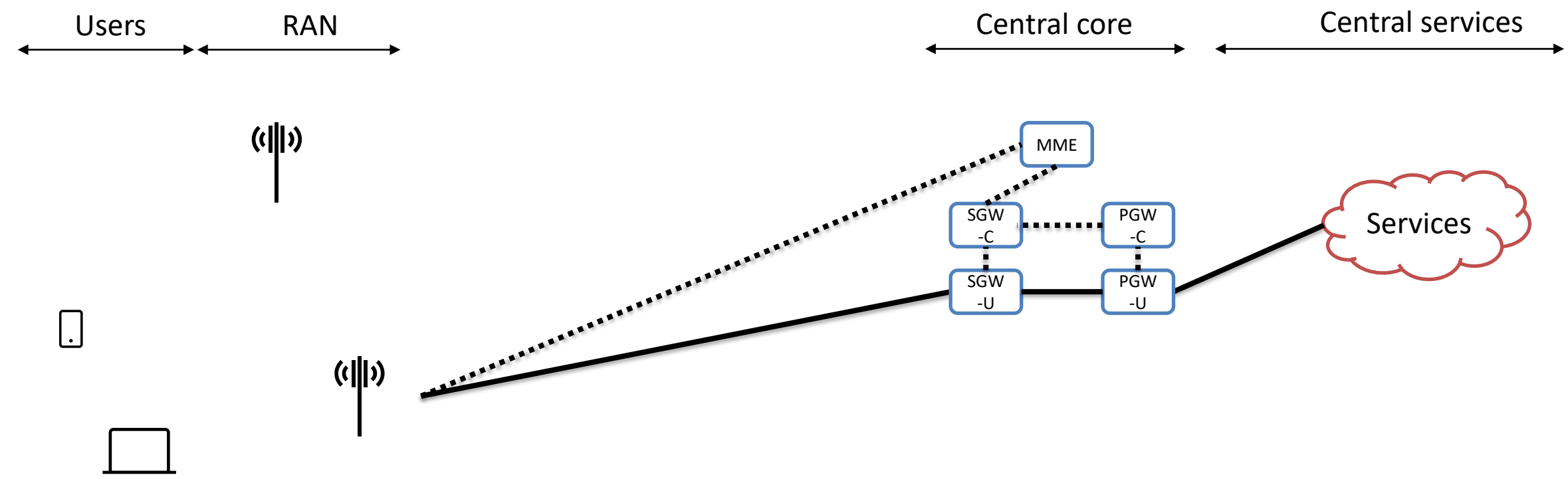
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3GPP core evolution: 4G with CUPS

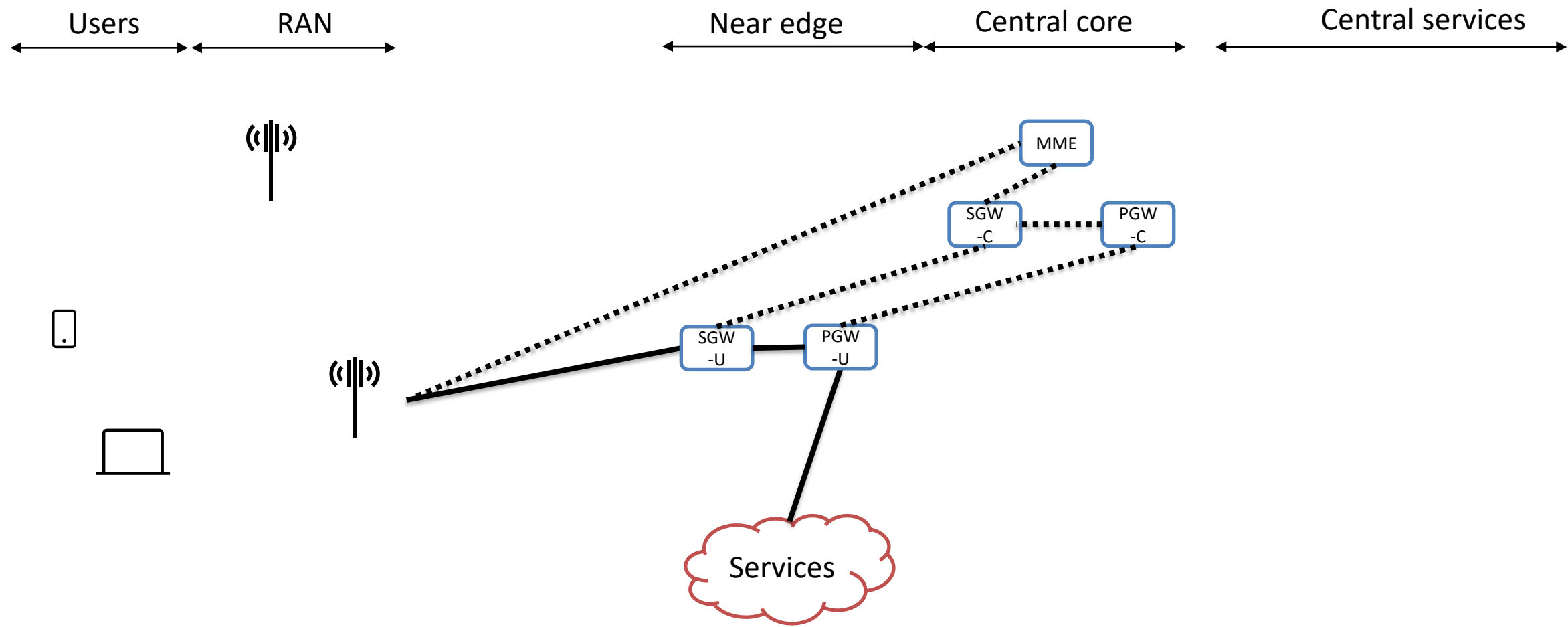


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3GPP core evolution: 4G with CUPS

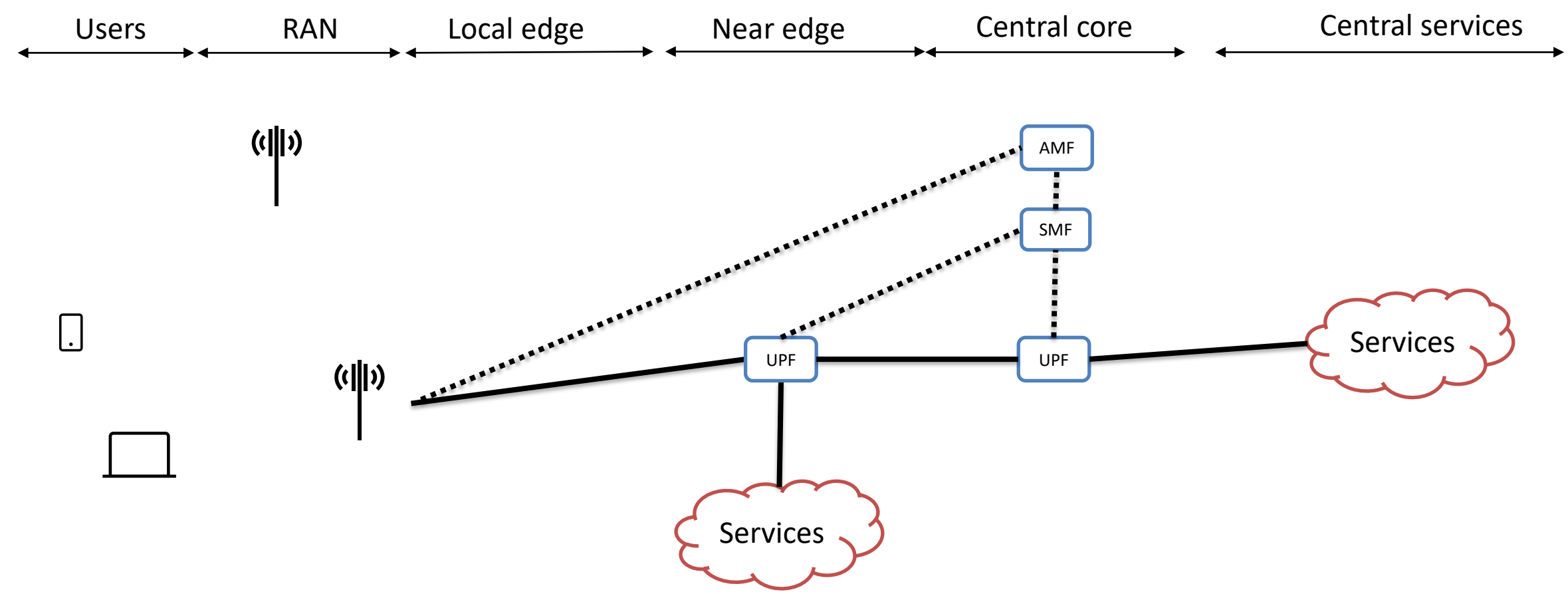


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3GPP core evolution: 5G

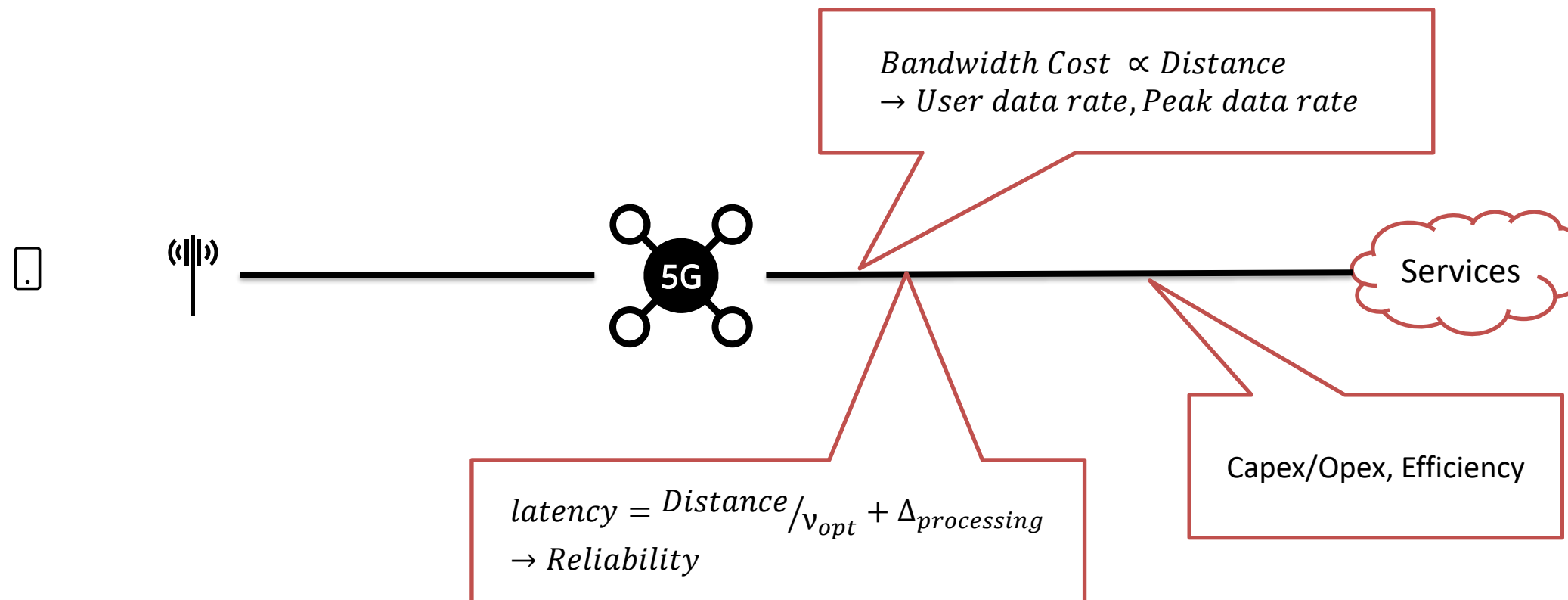


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KPIs involved



Conclusions

	Local edge (units of km)	Near edge (tens of km)	Central Offices (Hundreds of km)
URLLC	Performance: Optimal	Performance: Limited	-
	Investment: Very High	Investment: High	-
	Efficiency: High	Efficiency: Very High	-
eMBB	Performance: Optimal	Performance: Optimal	Performance: Limited
	Investment: Very High	Investment: High	Investment: Low
	Efficiency: Low	Efficiency: Very High	Efficiency: High



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Thank you!

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(Ericsson, 5G EVE)

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