Norwegian Centre for Research-based Innovation

NORCICS

SFI Norwegian Centre for Cybersecurity in Critical Sectors

Cross-Vendor 5G gNB Comparison

Sebastian G. Grøsvik, Stanislav Lange, Thomas Zinner
Department of Information Security and Communication Technology, NTNU Trondheim

1 Motivation

- 5G NR is designed to support an emerging diversity in services, shifting away from the smartphone-centric 4G.
- Private 5G networks can offer a custom and optimized network architecture and performance for new use cases.

2 Research Goals

- Develop a method for automated, comparable measurements across systems.
- Compare deployment options and performance of open-source and commercial gNB base stations.

3 Private 5G Network Testbeds

- Physical private 5G testbeds consisting of both commercial and open-source 5G system implementations.
- We have developed a method for conducting comparable nanosecond-precision measurements across deployments.

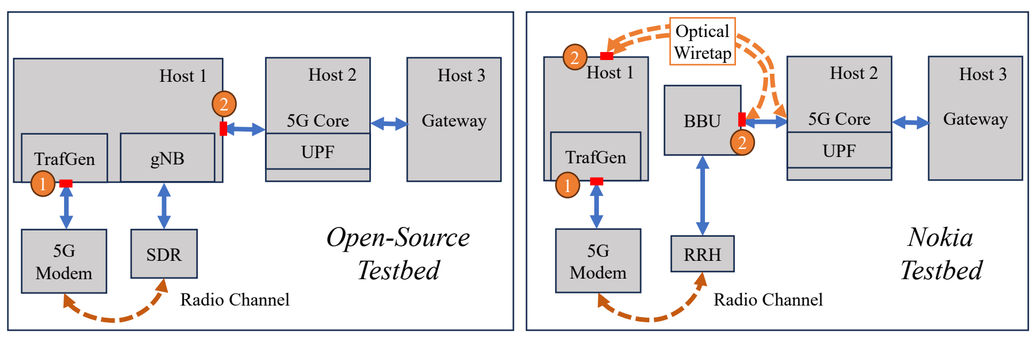

Fig. 1. Standardized performance measurement setup for comparable results across 5G deployments.

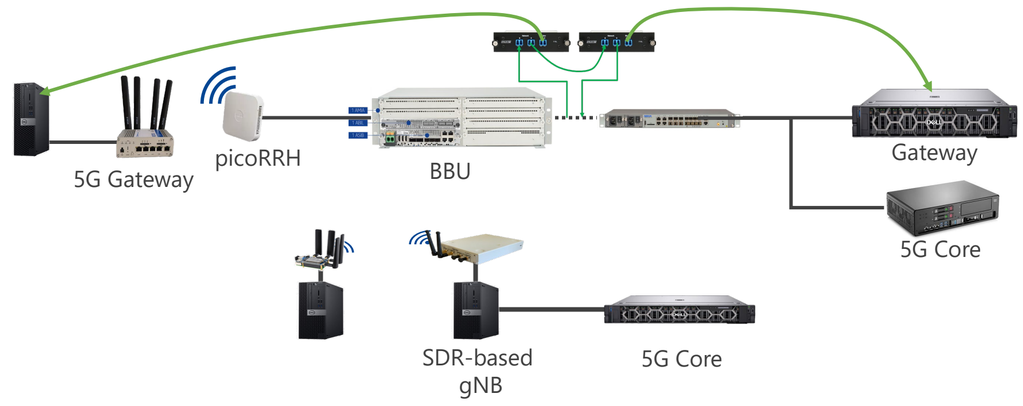

Fig. 2. Commercial Nokia 5G system and open-source 5G system available at the NTNU B5G lab.

4 Throughput Performance Measurements

- We successfully automated repeatable performance testing of 5G gNB measurements across four 5G deployments.

gNB	Ratio	MIMO layers	DL (Mbps)	UL (Mbps)	UE SNR
Askey	8:2	2DL 2UL	585.52±1.82 (79%)	128.98±5.04 (65%)	37.13
	8:2	1DL 1UL	299.61±1.97 (81%)	76.98±0.01 (78%)	34.29
Nokia	8:2	4DL 2UL	1031.21±4.22 (69%)	168.54±0.03 (85%)	35.81
	8:2	1DL 1UL	319.88±0.12 (86%)	45.93±0.31 (46%)	30.21
SRS	8:2	1DL 1UL	276.96±5.49 (75%)	76.72±1.15 (77%)	30.42
OAI	8:2	1DL 1UL	104.96±5.10 (28%)	12.16±6.05 (12%)	31.91

Tab. 1 & Fig. 3.
Comparison of throughput using UDP at 80 MHz bandwidth.

Fig. 4.
Comparison of throughput and one-way delay using TCP at 80 MHz bandwidth.

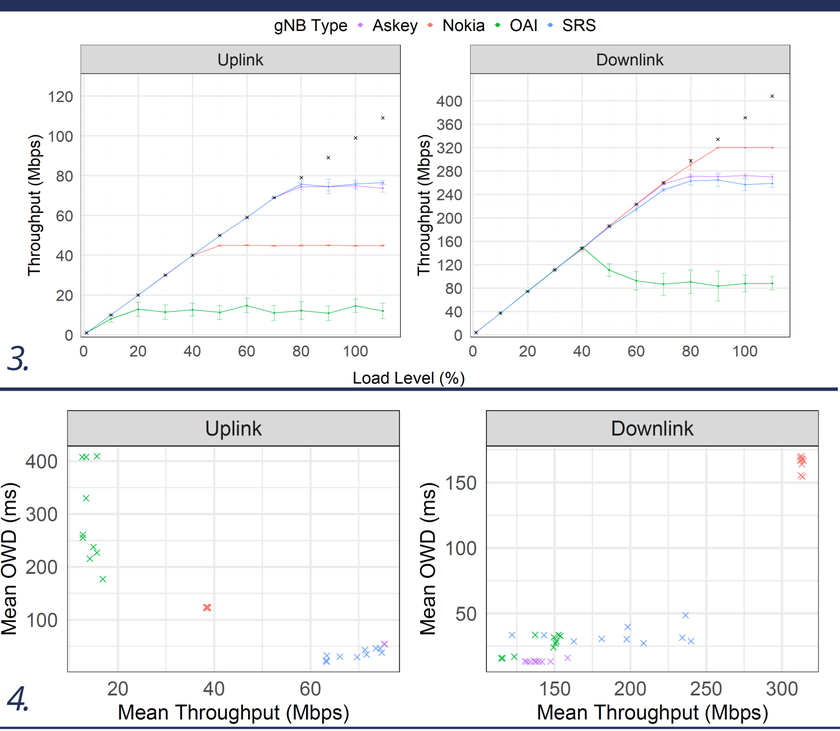

Fig. 3.

Fig. 4.

5 Latency Performance Measurements

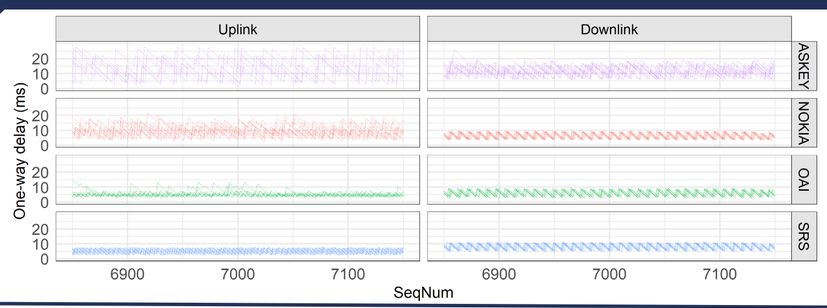

Fig. 5.

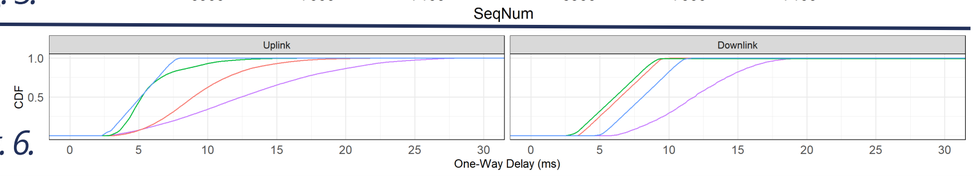

Fig. 6.

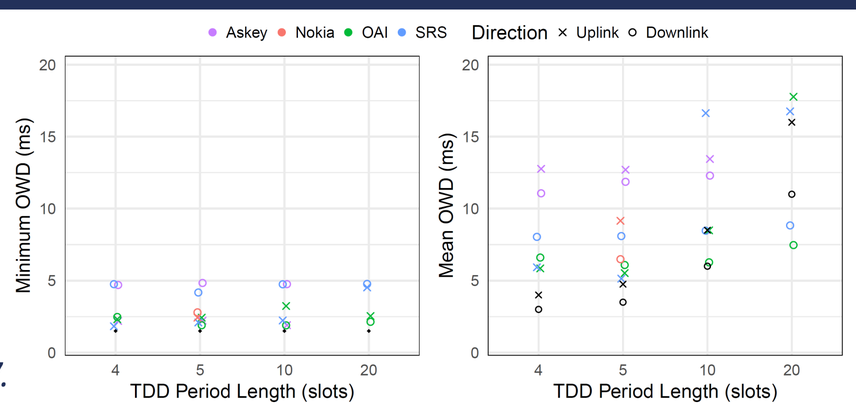

Fig. 7.

Fig. 5, 6, & 7. Comparison of latency across different 5G NR gNB implementations.