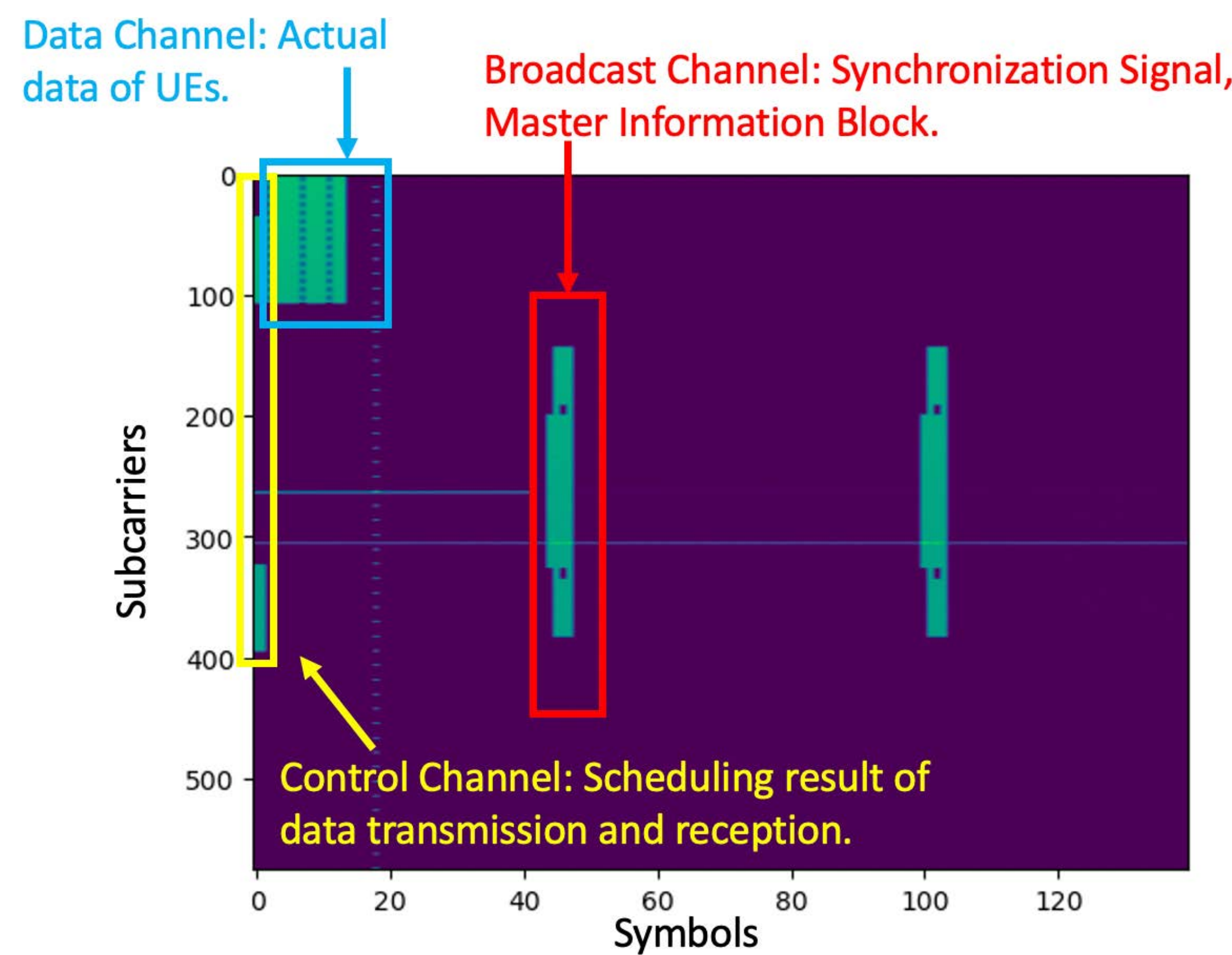
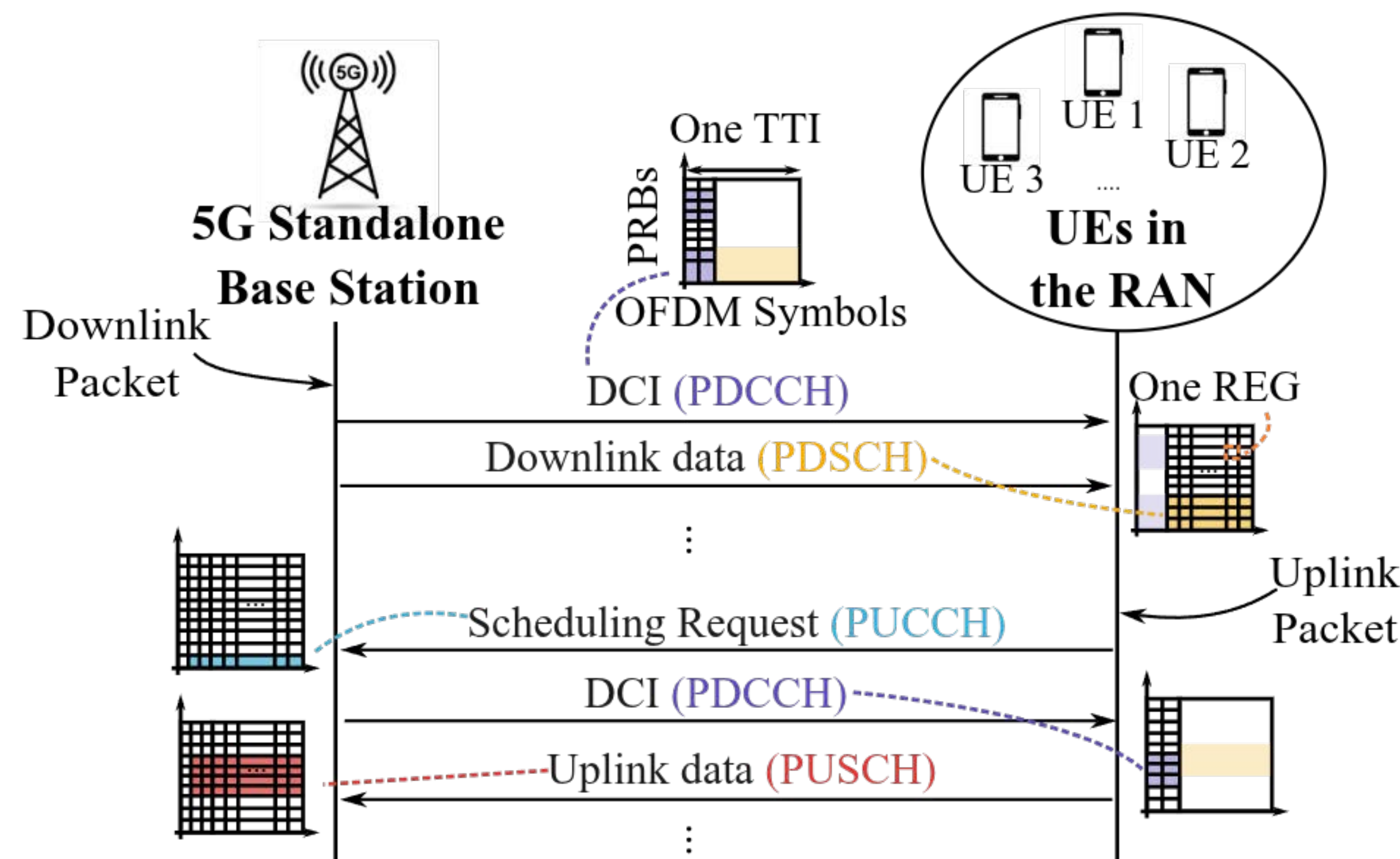


5G Physical Layer Background



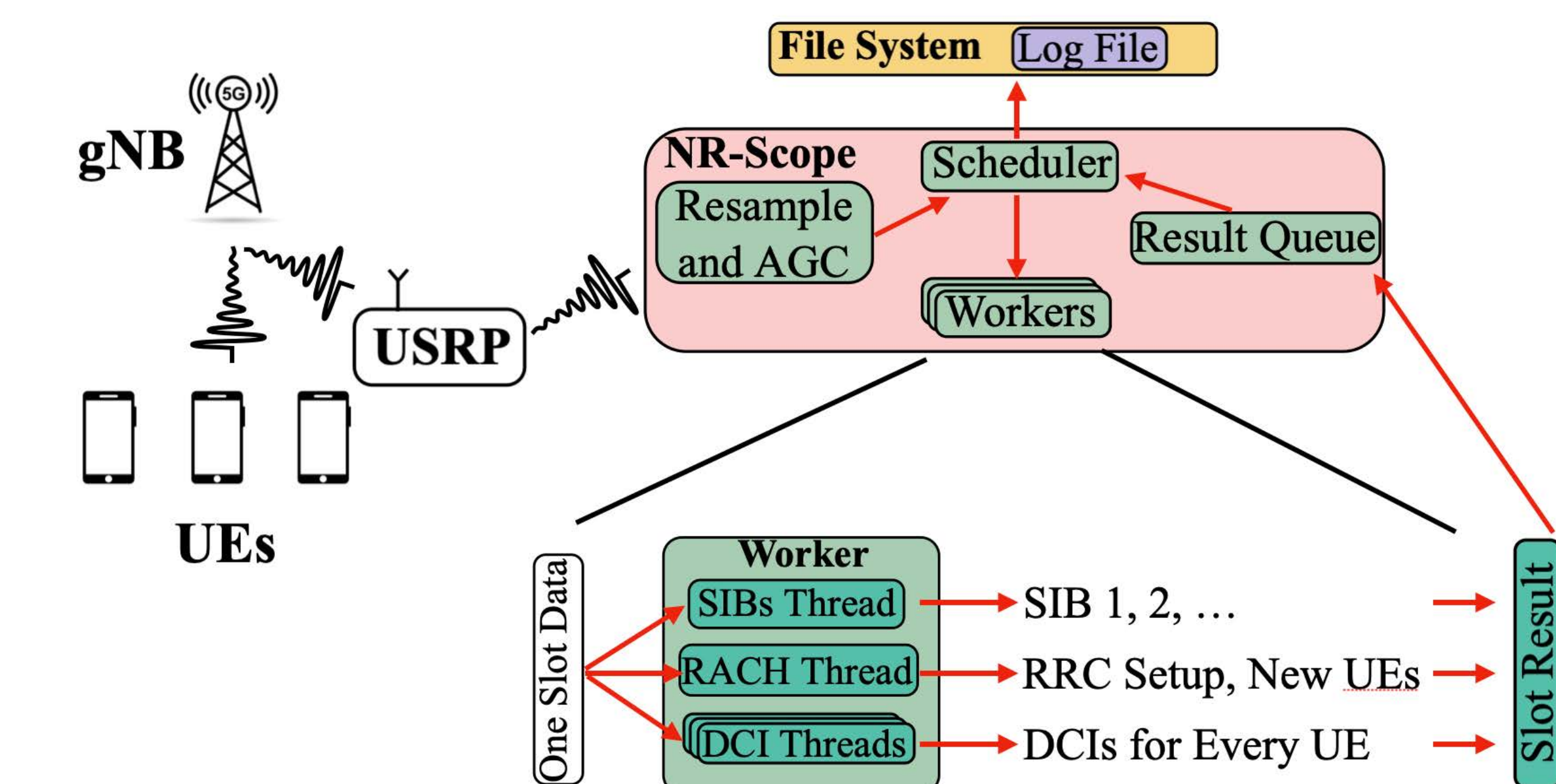
5G base stations broadcast interleaved **control** and **data** channels.

The control channels carry system information and DCIs (downlink control information) messages, which schedule data packets.

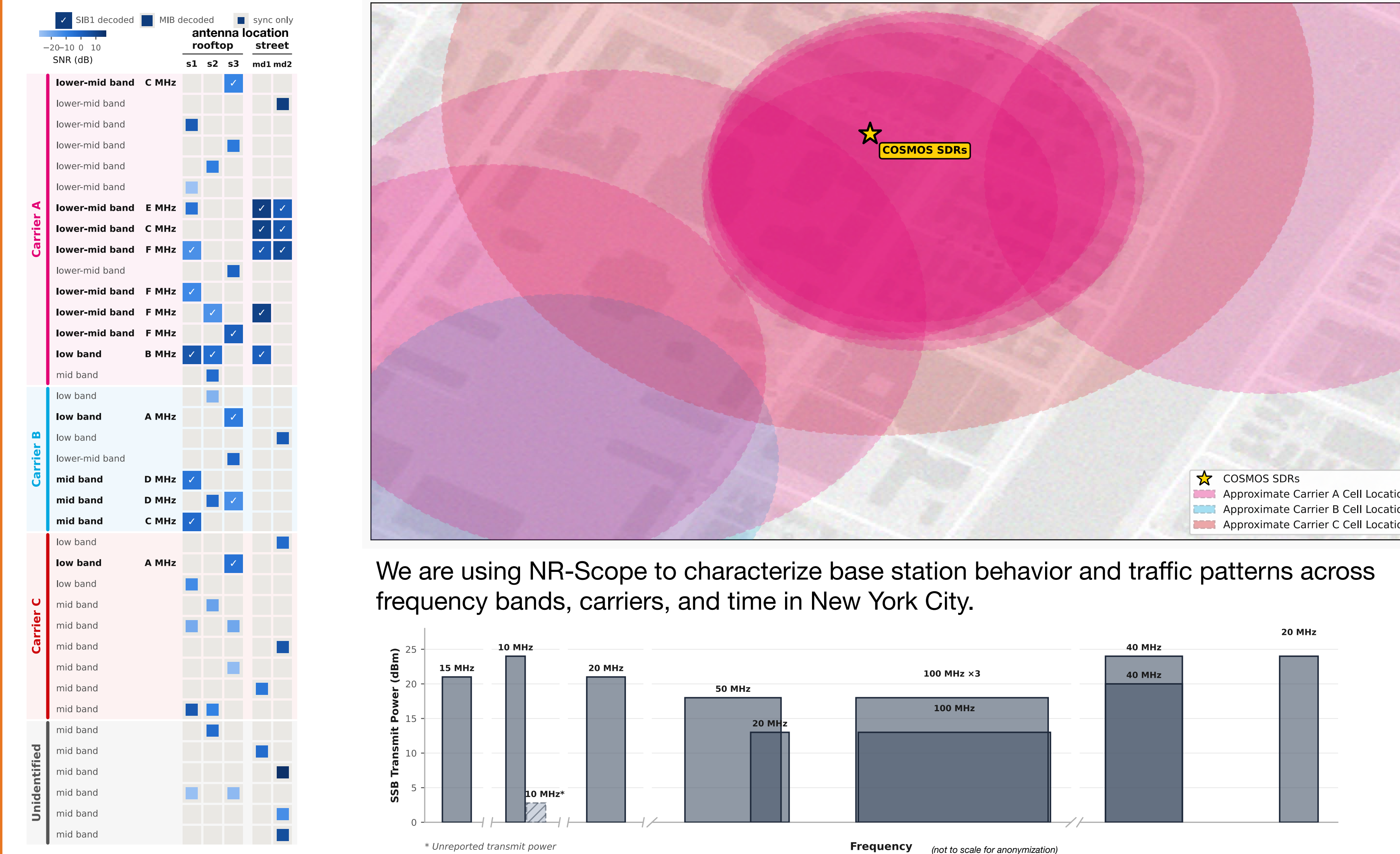


NR-Scope Architecture

NR-Scope synchronizes with 5G base stations and decodes, in real time, **system information (MIBs, SIBs)**, **session establishment (RACHs)**, and **scheduling (DCIs)** messages.

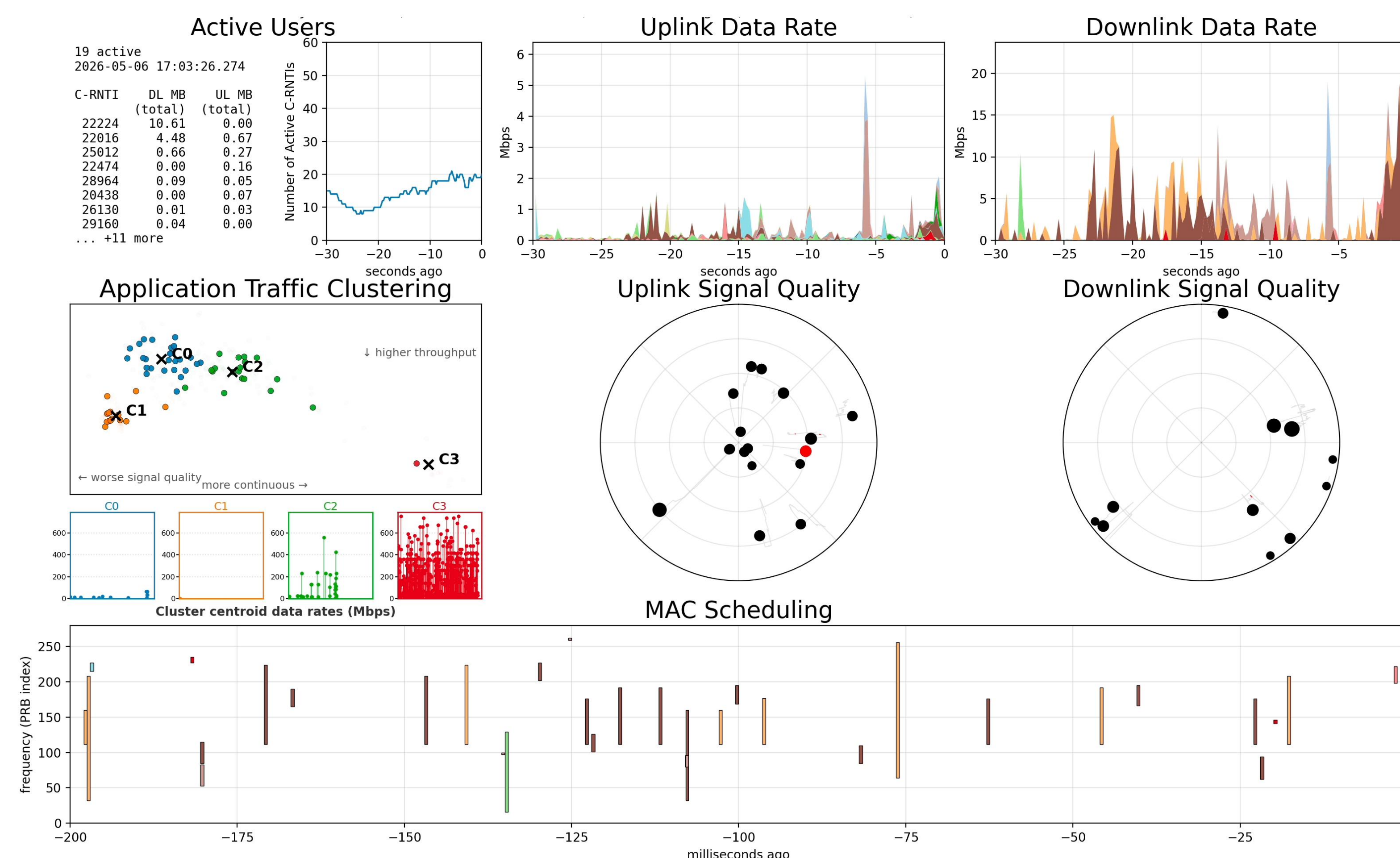


Longitudinal 5G Measurement in NYC (COSMOS)



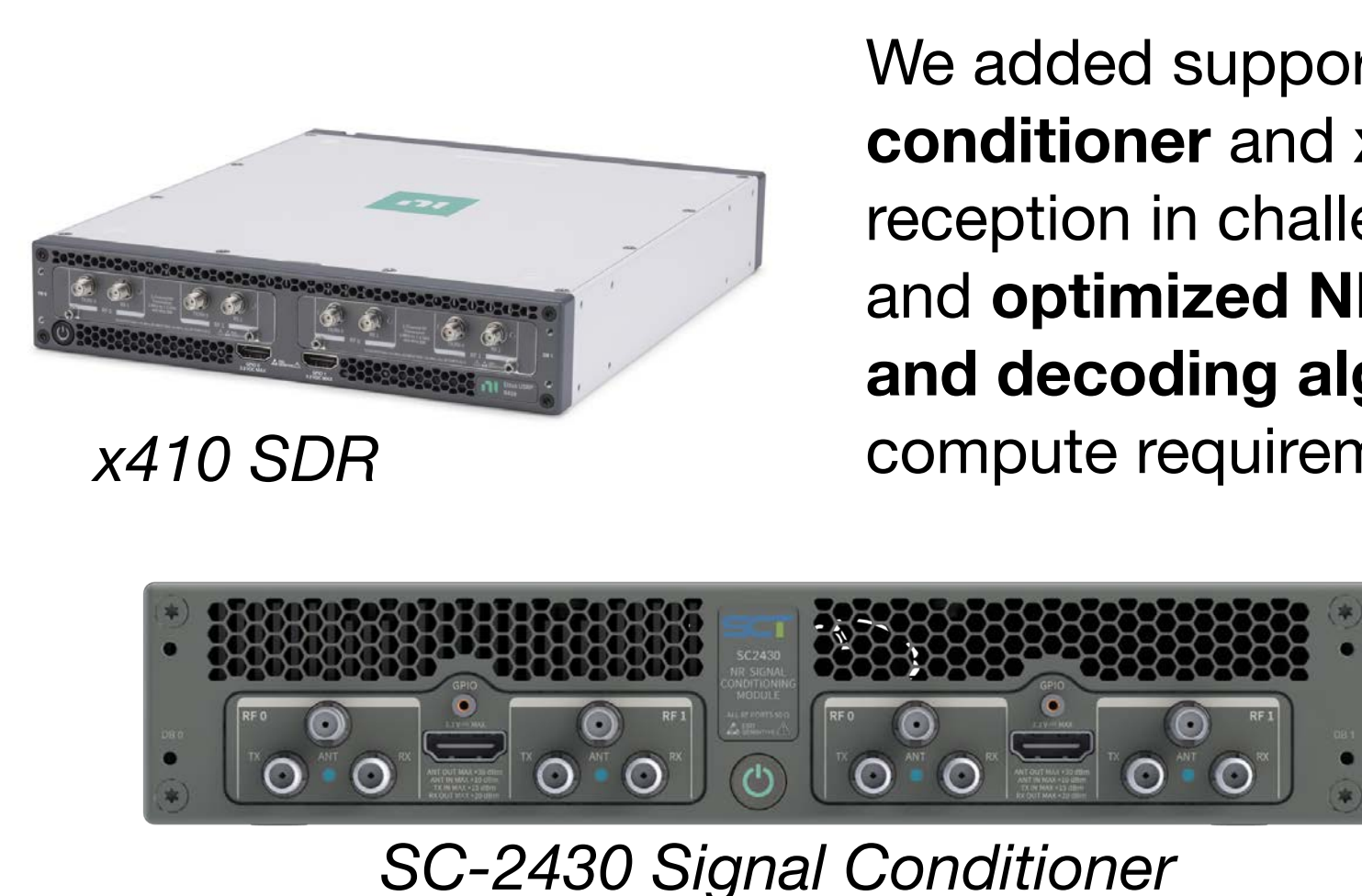
We are using NR-Scope to characterize base station behavior and traffic patterns across frequency bands, carriers, and time in New York City.

Fine-Grained Real-Time Telemetry

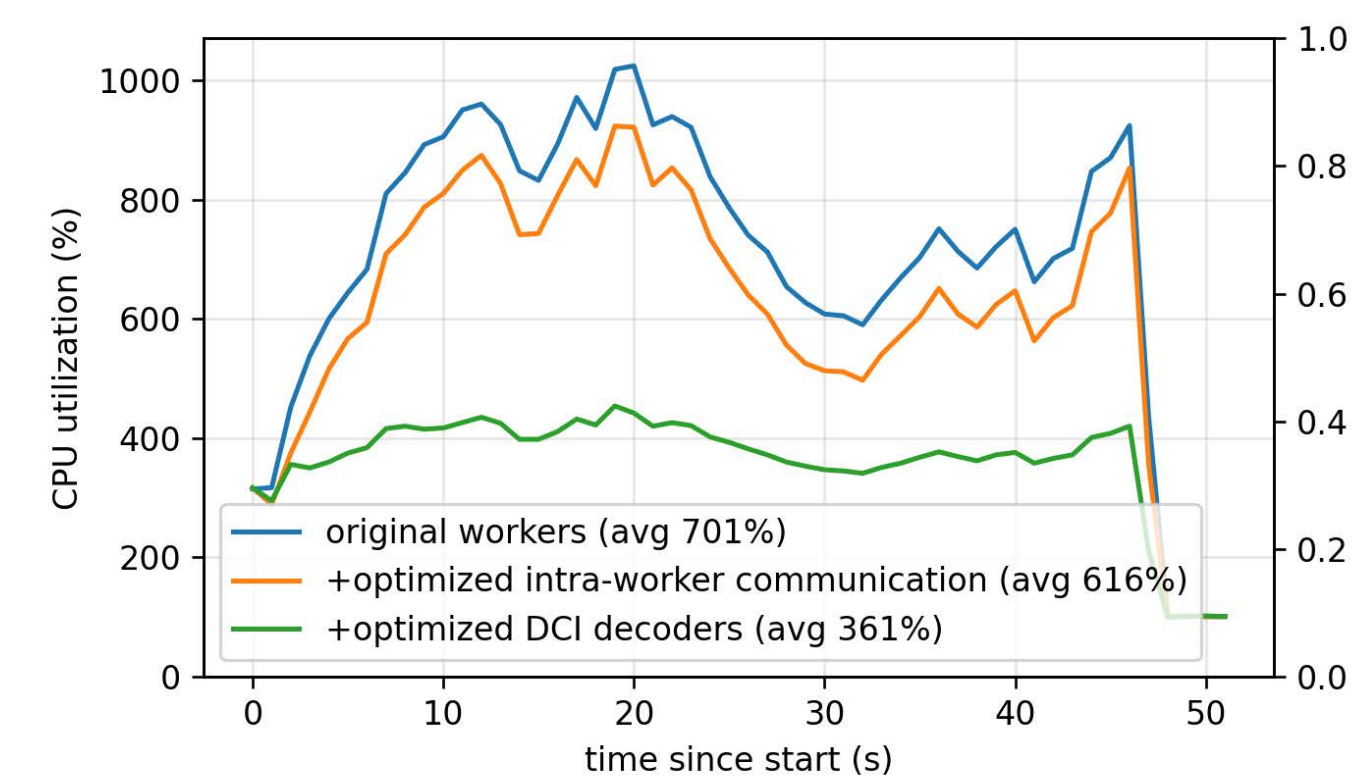


NR-Scope gives vendors and operators insight into network conditions, performance, usage patterns, and more — in real time.

Sensitivity and Performance Optimizations



We added support for the **SC-2430 signal conditioner** and **x410 SDR**, to improve reception in challenging environments, and **optimized NR-Scope's architecture and decoding algorithms** to reduce compute requirements.

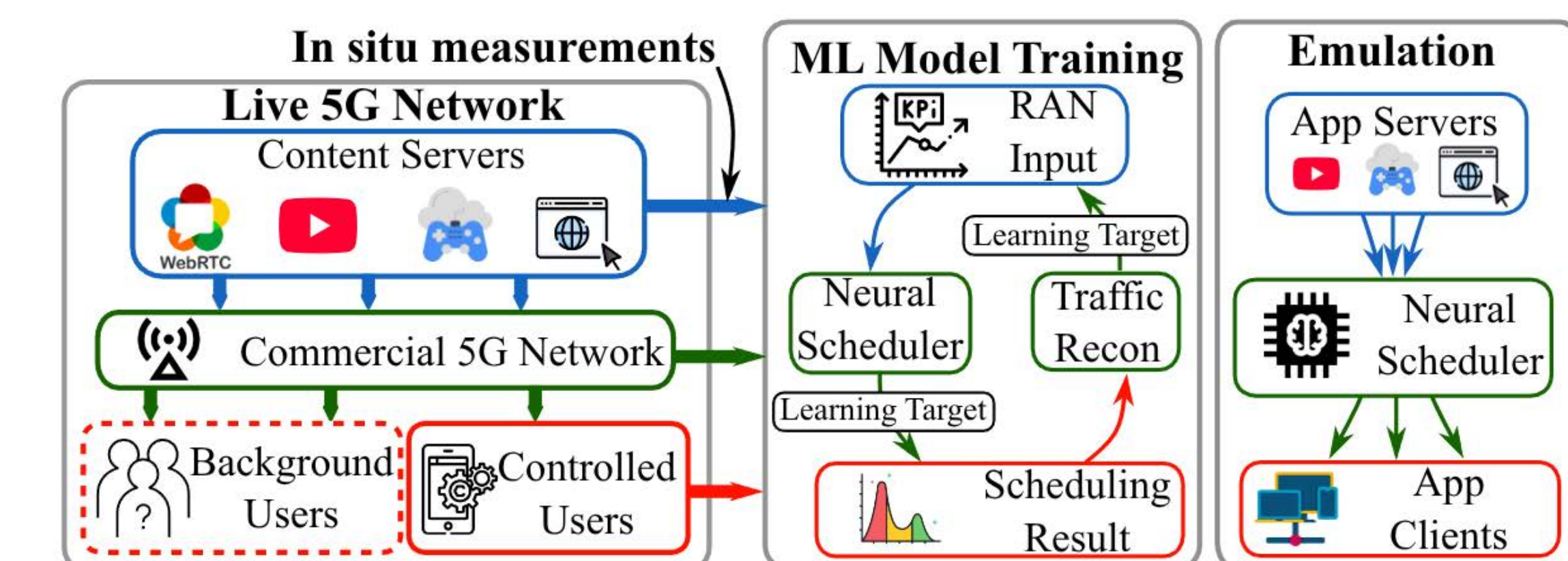


Spectrum Consumption Modeling

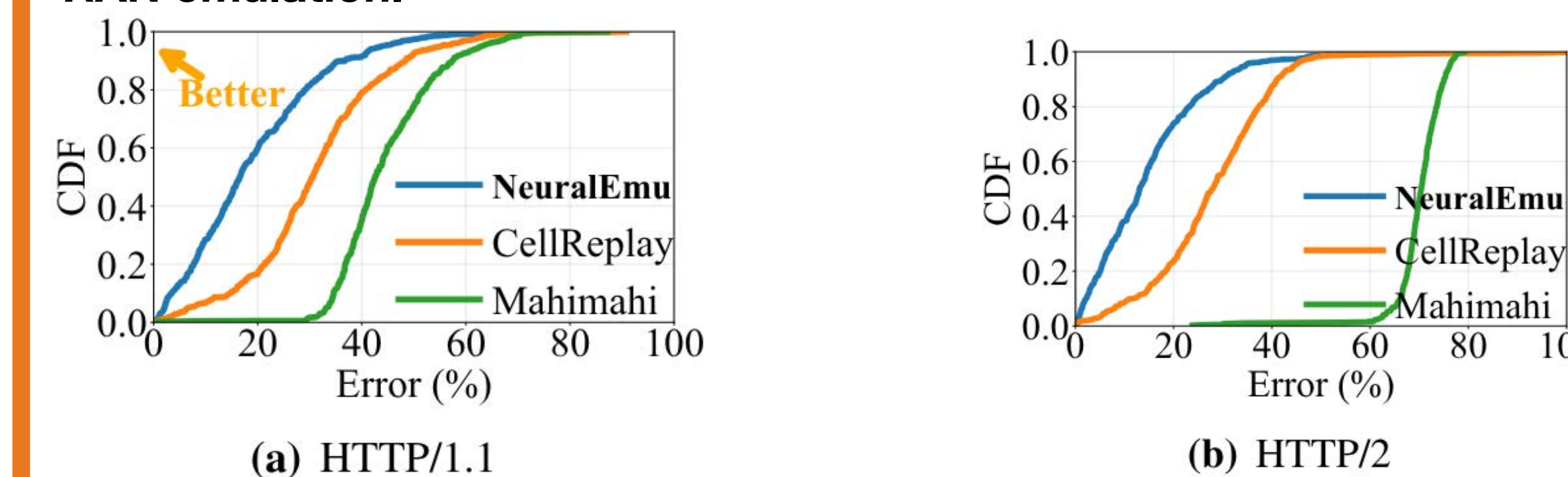
NR-Scope's telemetry is used to derive standardized (IEEE 1900.5.2) Spectrum Consumption Models, for finer-grained spectrum sharing via zone management systems (ZMS), such as the COSMOS ZMS.



5G Scheduler Modeling and Emulation



CellTwin (to appear at NSDI 26) uses NR-Scope's telemetry to produce **neural-network models** of 5G RAN schedulers, which enable **high-fidelity RAN emulation**.



References and Acknowledgements

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