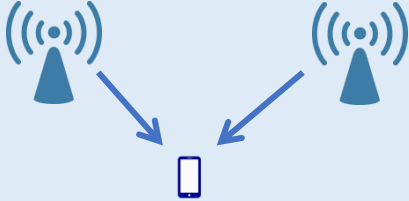




Multi-Connectivity for Reliability Enhancement

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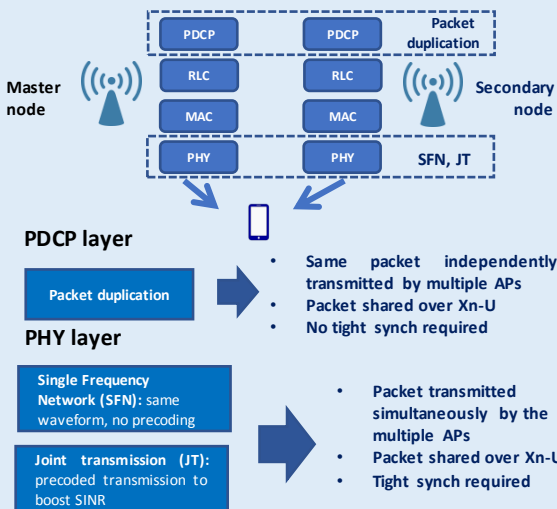


- Radio cells densification is foreseen as a valid solution for improving spectral efficiency and reliability of the wireless links in the light of 5G NR services.
- **Multi-connectivity:** multiple APs can simultaneously configure radio resources to a given terminal, introducing link diversity.
- **Benefits:** improved reliability.
- **Price to pay:** network throughput penalty, increased network resources
- Part of **ONE5G PoC#1: Cell-less megacity proof-of-concept**

Demo objective

Verifying the potential of multi-connectivity in improving the downlink reliability with limited impact on the network throughput

Multi-connectivity solutions

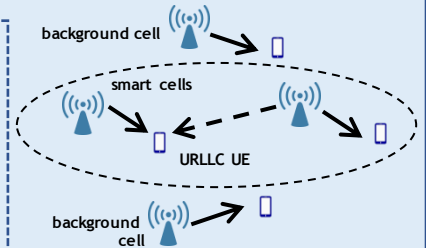


Demo scenario

- 4 cells, each cell with 1 AP and 1 UE.
- Each node is 2x2 MIMO capable.
- Full buffer mode
- 2 smart cells (multi-connectivity) and 2 background cells.
- Downlink only focus, with 1 URLLC UE and 3 eMBB UEs.
- Maximum Ratio Combining (MRC) and Interference Rejection Combining (IRC) receivers.



Testbed node (AP or UE)

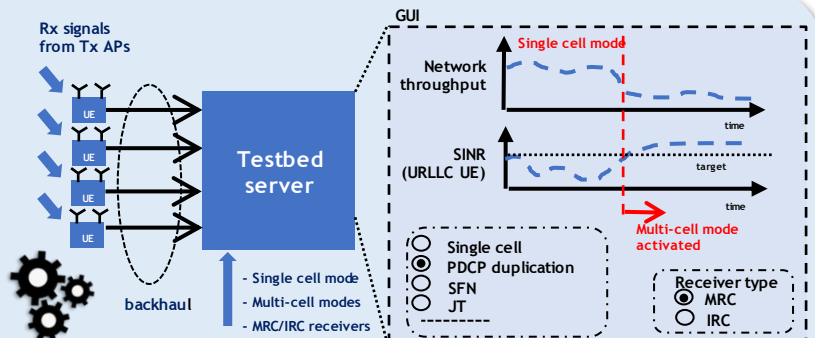


Node setup

- USRP RIO 2953R, 2x2 MIMO capable
- Intel I7 host PC
- UPS for ensuring uninterrupted mobility

Demo execution

- A testbed server controls all the nodes through an HTTP/REST interface.
- Network synchronization based on NTP server
- UEs are measuring the channel responses of the desired and interfering links, and report them to a testbed server via an Ethernet backhaul network.
- The testbed server calculates the KPIs and displays them on a GUI.
- Main KPIs are SINR of the URLLC UE, and network throughput



Multi-connectivity can improve the connection reliability of the URLLC UE, with limited impact on the network throughput in the occupied resources.

Future work

- Statistical analysis of multiconnectivity performance based on a large set of channel measurements performed in industrial facilities.
- Introducing dynamic cell selection
- Detailed latency analysis

