Supported Features and Configurations

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This release of the Aerial cuBB supports the following configurations and features. These features are verified with test vectors in a simulated environment using TestMAC and RU emulator.

PUSCH

- Process multiple cells (homogeneous and heterogeneous configurations) using CUDA streams or CUDA graphs

- Frequency multiplexing

- BW: 100 MHz

- Antenna ports: 4

- SU-MIMO layers: up to 4

- MU-MIMO layers: up to 4

- Modulation and coding rates: MCS 0 – MCS 27

- Optimized LDPC decoder

- UCI on PUSCH (HARQ up to 11 bits + CSI part 1 + CSI part 2 up to 11 bits)

- Time-interpolated channel estimation and equalization

- SINR reporting to L2

- MMSE-IRC receiver

- Early HARQ in UCI.indication

PUCCH

- Format 0 + DTX detection

- Format 1 + DTX detection

- Format 2 (unsegmented payload) + DTX detection

- Format 3 (unsegmented payload) + DTX detection

- SINR / confidence level reporting to L2

PRACH

- Format 0

- Format B4 (multiple per slot in FDM)

- Interference level reporting

PDSCH

- Process multiple cells (homogeneous and heterogeneous configurations) using CUDA streams or CUDA graphs.

- Frequency multiplexing

- BW: 100 MHz

- Antenna ports: 4

- SU-MIMO layers: up to 4

- MU-MIMO layers: up to 4

- Modulation and coding rates: MCS 0 – MCS 27

- Supports Cat-A O-RAN split and Cat-B O-RAN split. For Cat-A O-RAN split, PDSCH is implemented up to modulation and precoding (identity matrix precoder) For Cat-B O-RAN split, PDSCH is implemented up to the rate matching block.

- Precoding (4 layers)

PDCCH

- Process multiple cells (homogeneous and heterogeneous configurations) using CUDA streams or CUDA graphs.

- Interleaved and non-interleaved mode

- Aggregation level (AL) 1, 2, 4, 8, 16

- 1, 2, 3 symbol CORESET

- Precoding (1 layer)

SS Block

- Process multiple cells (homogeneous and heterogeneous configurations) using CUDA streams or CUDA graphs.

- PSS, SSS generation

- DMRS and PBCH generation and time-frequency mapping

- Precoding (1 layer)

CSI-RS

- Process multiple cells (homogeneous and heterogeneous configurations) using CUDA streams or CUDA graphs.

- NZP-CSI-RS

- ZP-CSI-RS

- Precoding (1 layer)

SRS

- Support SRS reporting for normalized 8 bit I/Q samples for upto 32T32R BB Antenna ports.

- Support SRS reporting according to 5G FAPI 222.10.04 for beamManagemnt, codebook and non-codebook SRS usage.

- Support SRS reporting according to 5G FAPI 222.10.02 for SINR reporting.

MIMO Features

- Support 32 Transmit and Receive antenna ports

- Support SRS-based channel estimation, buffering and FAPI-compliant reporting to L2

- Support PUSCH and PDSCH beamforming weight (BFW) calculation from SRS channel estimates (regularized zero-forcing)

- Support up to 4 layers multi-user MIMO PUSCH

- Support up to 8 layers multi-user MIMO PDSCH

- Limited set of configurations available

LDPC Decoder

- Standalone LDPC decoder

SHM Logger

- Support for C++ `std::format` syle logging like `std::format("{} {}!", "Hello", "world", "something");`

- Support for C `(printf)` style formatted strings.