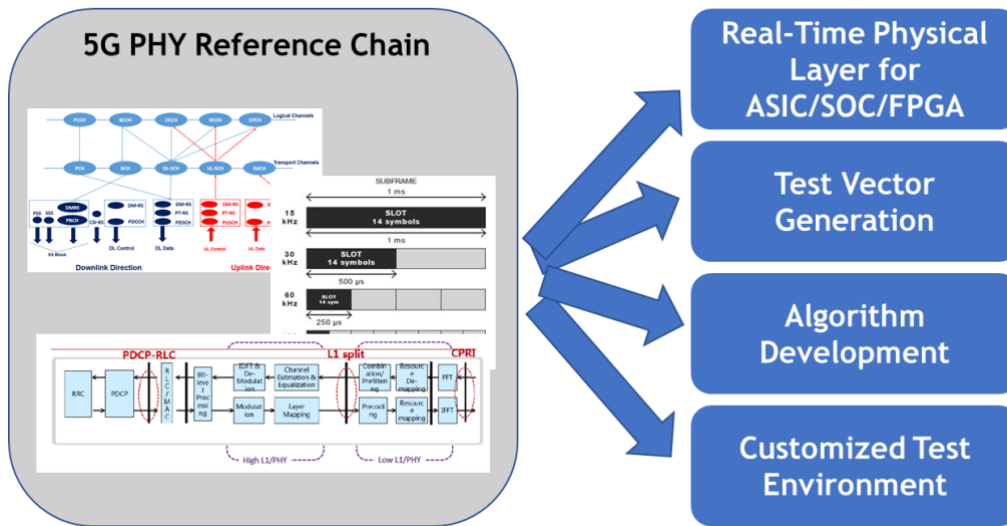


5G gNodeB, UE PHY Reference Chains

Portable 5G Physical Layer for Small Cells, Terminals



5G product developers recognize the difficulty of creating complex products with limited time and budget. In particular, development of the physical layer of wireless products is highly demanding, requiring not only algorithmic knowledge but a deep understanding of the radio access network as well as a solid grip on the entire development process. Developers with such skills are highly specialized, and they have a great appreciation for development tools and references that can reduce complexity, risk and costs of product development.

CommAgility's extensive expertise in DSP technology and algorithms has been invested into creating the 5G Physical Layer Reference Chain, with versions for 5G gNodeB and User Equipment product developers. These two products support developers through the entire process of algorithm development to creation of a real-time physical layer for a specific baseband device to testing of the physical layer and radio subsystem.

The reference chains support 3GPP Release 15 Technical Specifications 38.211, 38.212, 38.213 and 38.214, and will be continually developed to meet market needs as 3GPP specifications evolve. They have multiple uses:

- Algorithm development and validation
- Reference for development of real-time physical layer for baseband SoC and FPGA implementations
- Creating test vectors for physical layer and radio validation
- Creating a specialized test environment for customized development projects

Written in fixed-point ANSI C, the products are full physical layer solutions, optimized with table-based implementation and portable for most DSP platforms. They offer flexible architectures to enable easy integration with available hardware accelerators and libraries.

Contents include the following:

- Error detection on the transport channel and indication to higher layers
- FEC encoding/decoding of the transport channel
- Hybrid ARQ soft-combining
- Rate matching of the coded transport channel to physical channels
- Mapping of the coded transport channel onto physical channels
- Power weighting of physical channels
- Modulation and demodulation of physical channels
- Frequency and time synchronisation
- Radio characteristics measurements and indication to higher layers
- Multiple Input Multiple Output (MIMO) antenna processing
- Digital and analog beamforming
- Signal conditioning algorithms

Key Features

- Full physical layer implementation in ANSI C
- 3GPP Release 15 compliant
- Static test frameworks with hundreds of test cases and test vectors
- Advanced algorithms for channel estimation, equalization and synchronization
- Small Cell Forum 5G FAPI compliant

Initial release supports:

- Subcarrier spacing - FR1: 15kHz/30kHz
- Bandwidths up to 100MHz
- SISO and MIMO with max. 2 layers and 4TX/4RX
- Downlink channels and reference signals (SSB block (PSS/SSS/PBCH), CORESET, PDCCH, PDSCH, and CSI-RS)
- Uplink channels with limited formats - PUSCH, PUCCH with F0/F2, PRACH with F0, and SRS

Resulting Benefits

- Reduced efforts for algorithm development and validation
- End products that work with all 3GPP compliant networks
- Reduced investment in test equipment and creating custom test environments
- High performing proprietary algorithms provide competitive advantage
- Fast integration with CommAgility or other protocol stack



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