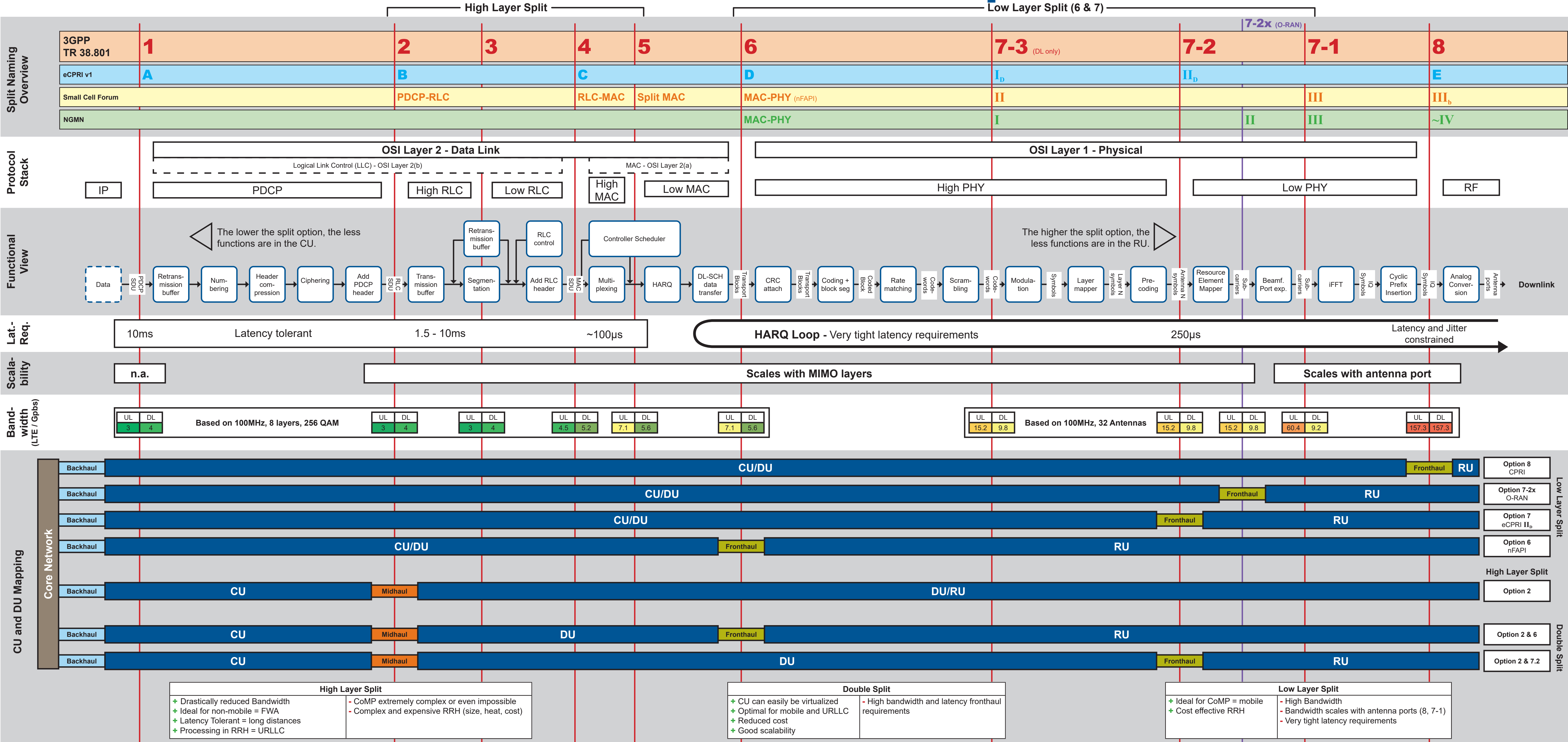


5G Fundamentals : Functional Split Overview



Split	1	2	3	4	5	6	7-3	7-2	7-2x	7-1	8
Pros	<ul style="list-style-type: none">Low bandwidth requirements.Bitrate scales with MIMO layers.Separate User Plane and centralized RRC/RRM.*It may in some circumstances provide benefits in handling some edge computing or low latency use cases where the user data needs to be located close to the transmission point.*	<ul style="list-style-type: none">Fundamentals for achieving a PD-CP-RLC split have already been standardized for LTE Dual Connectivity.*The 2-2 option enables centralization of the PDCP layer.*Option 2-2 allows a separate UP and a centralized RRC/RRM.*	<ul style="list-style-type: none">Very Low bandwidth requirements.Low latency requirements.More robust under non-ideal transport conditions.*Possibility of reduced processing and buffer requirements in DU.*In option 3-2 Rx RLC is placed in the CU, there is no additional transmission delay of PDCP/RLC reestablishment procedures.*	<ul style="list-style-type: none">Low bandwidth requirements.Bitrate scales with MIMO layers.	<ul style="list-style-type: none">Low bandwidth requirements.Reduced latency requirements if HARQ processing and cell-specific MAC functionalities are performed in DU.*Efficient interference management across multiple cells and enhanced scheduling technologies such as CoMP, CA, etc.*	<ul style="list-style-type: none">Bitrate scales with MIMO layersSignificant bandwidth reduction compared to split option 7-3.Joint Transmission is possible.*Centralized scheduling is possible.*Allows resource pooling for layers including and above MAC.*	<ul style="list-style-type: none">Bitrate scales with MIMO layersReduced bandwidth requirements compared to split option 7-1.Coordinated multi-point schemes are possible if CU/DU are colocated.*Transmit and receive joint processing is possible.*	<ul style="list-style-type: none">Bitrate scales with MIMO layersReduced bandwidth requirements compared to split option 7-1.Coordinated multi-point schemes are possible if CU/DU are colocated.*Transmit and receive joint processing is possible.*	<ul style="list-style-type: none">Simplified interfaceOpen interface protocol specifically designed to enable interoperability between RUs and DUs from different vendors.Bitrate scales with MIMO layersReduced bandwidth requirements compared to split option 7-1.	<ul style="list-style-type: none">The required bitrate is more than half of split option 8.Coordinated multi-point schemes are possible if CU/DU are colocated.*Transmit and receive joint processing is possible.*	<ul style="list-style-type: none">Small and cost effective RU.Easy to centralize CU/DU enabling coordinated multi-point (CoMP) schemes.*Majority of processing can be centralized at a BBU hotel or CU-pool.*RUs can be used for different generations of RAT (GSM, 3G, 4G)
Cons	<ul style="list-style-type: none">Very complex and expensive DU/RU.It's not clear if this option can support aggregation based on alternative 3C.*	<ul style="list-style-type: none">Coordination of security configurations between different PDCP instances for Option 2-2 required.*	<ul style="list-style-type: none">Split 3-1 is more latency sensitive than 3-2 due to the ARQ in CU and not DU.*	<ul style="list-style-type: none">No benefits for LTE.*	<ul style="list-style-type: none">Complex interface between CU and DU.*Difficulty in defining scheduling operations over CU and DU.*Limitations for some CoMP schemes.*	<ul style="list-style-type: none">May require subframe-level timing interactions between MAC layer in CU and PHY layers in DUs.*Round trip fronthaul delay may affect HARQ timing and scheduling.*	<ul style="list-style-type: none">High bandwidth requirements.Relatively high latency requirementsComplex timing for RU and CU/DU link.*	<ul style="list-style-type: none">High bandwidth requirements.Relatively high latency requirementsComplex timing for RU and CU/DU link.*	<ul style="list-style-type: none">High bandwidth requirements.Relatively high latency requirements.	<ul style="list-style-type: none">Still relatively high bandwidth requirement especially for the uplink.Bandwidth scales with number of RUs.*Very latency constrained.Complex timing for RU and CU/DU link.*	<ul style="list-style-type: none">Highest bandwidth requirements of all functional split options.Bandwidth scales with number of RUs.*Very latency and jitter constrained.Distance between RU and DU/CU limited to ~20km due to latency constraint.Interoperability between radio equipment vendors not specified
Use Cases	<ul style="list-style-type: none">Best suited for low latency and/or edge computing scenarios.	<ul style="list-style-type: none">Suited for high layer split between CU and DU. Very latency tolerant enabling distances up to 40km.	<ul style="list-style-type: none">Low bitrate and latency insensitive midhaul connections between CU and DU with non-ideal transport conditions.*	<ul style="list-style-type: none">No specific advantage for use cases.	<ul style="list-style-type: none">Ideal for scenarios where distances greater than 20km between DU and CU need to be bridged.	<ul style="list-style-type: none">Ideal for small cell deployments.	<ul style="list-style-type: none">Suited for setup with limited fiber capacity in the fronthaul.	<ul style="list-style-type: none">Current 5G eCPRI radios use this split option.	<ul style="list-style-type: none">Ideally suited for virtualized RAN and virtual DU running on general purpose processing platforms.	<ul style="list-style-type: none">High fiber capacity available between radio and centralized location.	<ul style="list-style-type: none">High fiber capacity available between radio and centralized location.Real time communication applications.Possible to integrate in Ethernet based networks using Radio over Ethernet.

* 3GPP TR 38.801 V14.0.0 (2017-03); „Study on new radio access technology: Radio access architecture and interfaces.“