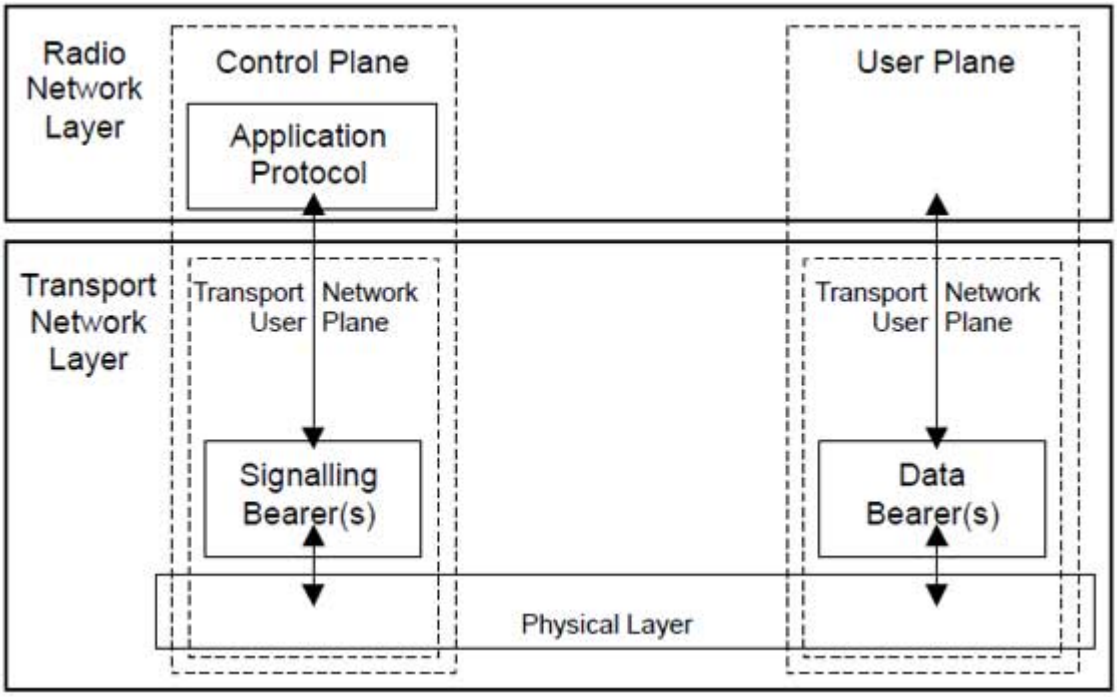
LTE RADIO PROTOCOL ARCHITECTURE

The radio protocol architecture for LTE can be separated into **control plane** architecture and **user plane** architecture as shown below:



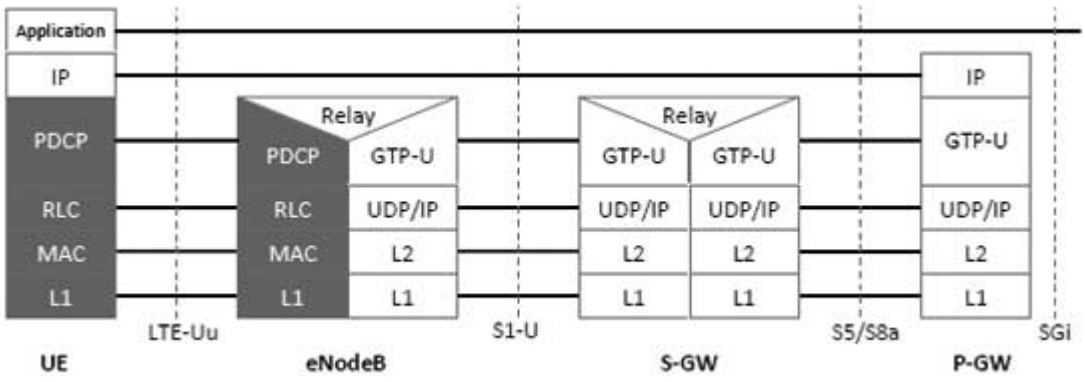
At user plane side, the application creates data packets that are processed by protocols such as TCP, UDP and IP, while in the control plane, the radio resource control *RRC* protocol writes the signalling messages that are exchanged between the base station and the mobile. In both cases, the information is processed by the packet data convergence protocol *PDCP*, the radio link control *RLC* protocol and the medium access control *MAC* protocol, before being passed to the physical layer for transmission.

User Plane

The user plane protocol stack between the e-Node B and UE consists of the following sub-layers:

- PDCP *PacketDataConvergenceProtocol*
- RLC *radioLinkControl*
- Medium Access Control *MAC*

On the user plane, packets in the core network *EPC* are encapsulated in a specific EPC protocol and tunneled between the P-GW and the eNodeB. Different tunneling protocols are used depending on the interface. GPRS Tunneling Protocol *GTP* is used on the S1 interface between the eNodeB and S-GW and on the S5/S8 interface between the S-GW and P-GW.



Packets received by a layer are called Service Data Unit *SDU* while the packet output of a layer is referred to by Protocol Data Unit *PDU* and IP packets at user plane flow from top to bottom layers.

Control Plane

The control plane includes additionally the Radio Resource Control layer *RRC* which is responsible for configuring the lower layers.

The Control Plane handles radio-specific functionality which depends on the state of the user equipment which includes two states: idle or connected.

Mode	Description
Idle	The user equipment camps on a cell after a cell selection or reselection process where factors like radio link quality, cell status and radio access technology are considered. The UE also monitors a paging channel to detect incoming calls and acquire system information. In this mode, control plane protocols include cell selection and reselection procedures.
Connected	The UE supplies the E-UTRAN with downlink channel quality and neighbour cell information to enable the E-UTRAN to select the most suitable cell for the UE. In this case, control plane protocol includes the Radio Link Control *RRC* protocol.

The protocol stack for the control plane between the UE and MME is shown below. The grey region of the stack indicates the access stratum *AS* protocols. The lower layers perform the same functions as for the user plane with the exception that there is no header compression function for the control plane.