Edge Network Architecture

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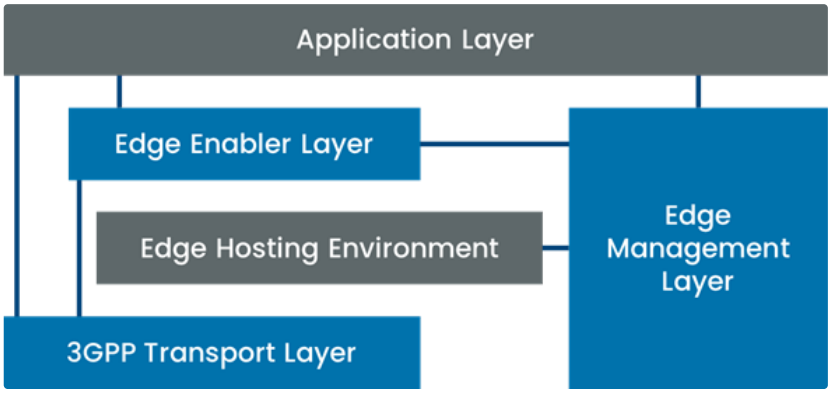
By now it should be clear that edge computing has become vital in modern telecommunications. When a technology becomes important and common, it needs to become regulated so that devices can function across PLMNs. As 4G technology was built out to include more and more edge technology, the importance of redesigning telecommunications starting with the need for edge computing in mind became clear. Indeed, 5G was designed with native support for MEC as a goal. That design comes in 4 layers, shown in the image below. We will look at the enablement and transport layers.



Edge Enablement Layer

3GPP's specifications for MEC essentially define an architecture for a network of edge data centers that enable edge computing. (Thus, a 5G network consists of (at least) three sub-networks: access network, core network, and edge network.) That edge network architecture has reference points between entities where communication happens via HTTP/2 API calls named Edge-1 through Edge-9.

Definition: Application clients are the aspects of applications that reside in the UE.

AC for short. There are regulations on application clients that ensure service continuity under mobility.

Definition: Edge application servers are the aspects of the application that reside in the MEC hosts.

EAS for short. Application clients connect to edge application servers in order to perform edge computing. That connection consists of a PDU session with the edge data network as the data network (not the internet) which contains a SDF between the UE and EAS, the latter being the app for the SDF. An EAS may communicate with the core via the NEF to place or modify policies stored in the PCF.

Definition: An edge enabler server is the entity in a MEC host that enables UE to discover edge application servers.

EES for short. The EES may communicate with the core via the NRF to facilitate discovery of MEC hosts and their edge application servers (EAS). The EAS plays a role in the edge network similar to the SMF in the core network.

Definition: An edge enabler client is the entity in the UE that accesses the edge enabler server in a MEC host to allow the UE to discover edge application servers in that MEC host.

EEC for short.

Definition: An edge configuration server provides context in API calls by an edge enabler client to an edge enabler server.

ECS for short. An ECS may communicate with the core via the NEF to ensure compliance with policies stored in the PCF.

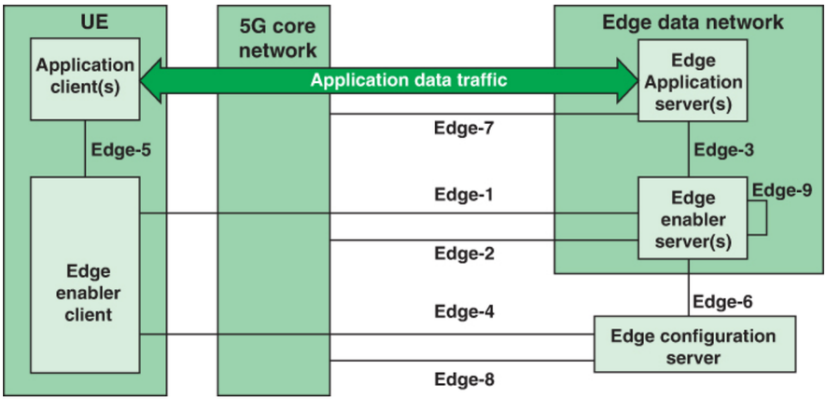


FIGURE 10.13 Architecture for Enabling Edge Applications

Edge-2, Edge-7, and Edge 8 are for communication with the 5G core through the NEF.

Transport Layer

There are three ways for flows in PDU sessions to be served at edge UPFs; in the

1. distributed anchor point method the PSA is at a edge UPF. For mobility the PSA must be reassigned.
2. session breakout method a UL-CL/BP UPF facilitates sending some of the service data flows (SDFs) to an edge UPF and some to a (more) central UPF. for mobility the UL-CL-BP must be reassigned but the anchor can stay permanent.
3. multiple UPFs serve as PSAs, with at least one at an edge site. This is done by having multiplePDU sessions for the UE. Only the edge PSA must change for mobility.