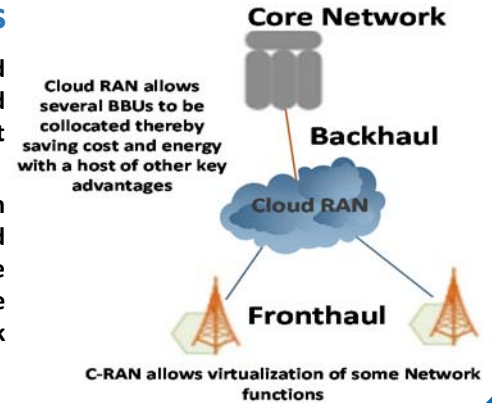


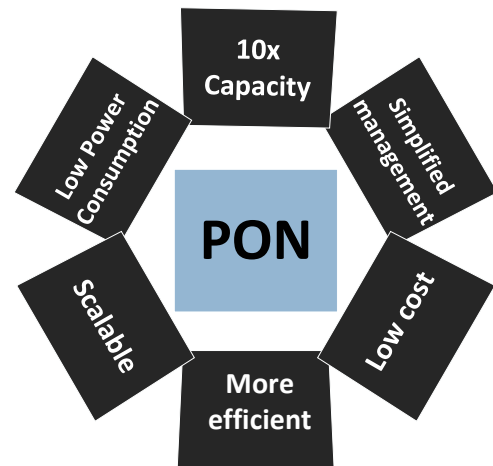
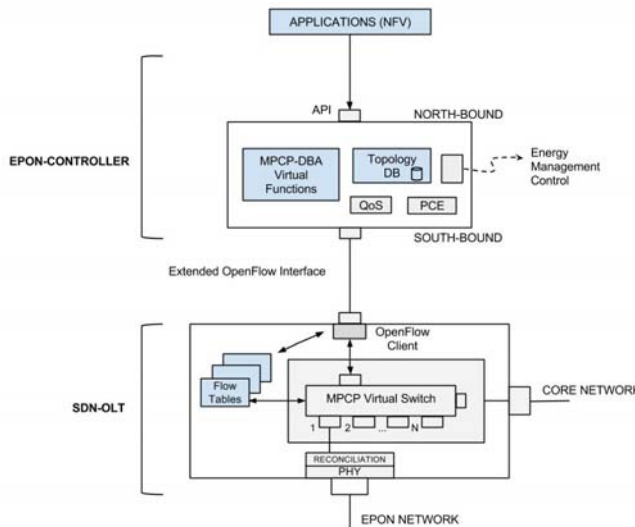
5G NETWORK SCENARIO AND PONs

- 5G is a key driver for flexible, cost-efficient, and scalable networks based on concepts like Cloud RAN, virtualization and Network Slicing to support technologies such as IoT, Smart Cities, etc.
- Passive Optical Networks (PONs) will play an important role in 5G backhaul and fronthaul (Cloud RAN). PONs are composed of an Optical Line Terminal (OLT) connected to the backbone, passive fiber cables and splitters, and Optical Network Units (ONUs) at the client side.



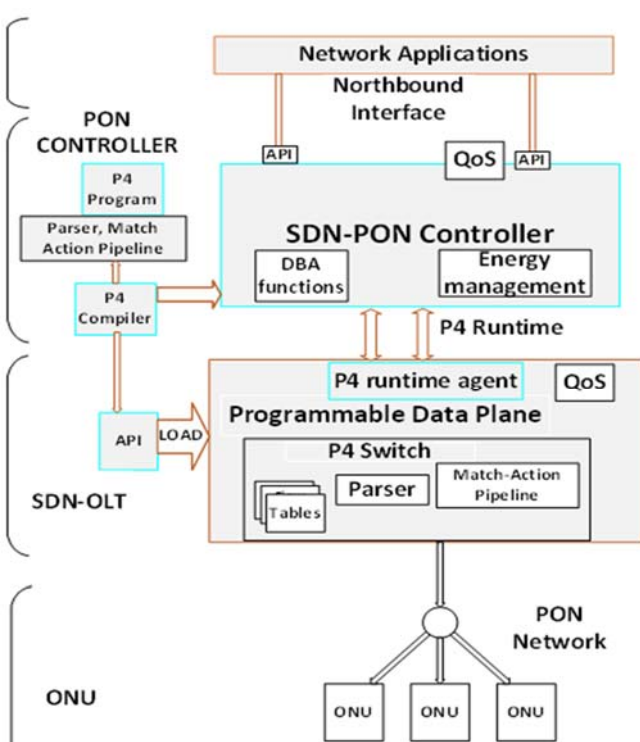
SDN-BASED PON ARCHITECTURE (Khalili et al, 2018)

- The intelligence of the network is moved to the EPON-Controller which runs remotely on a dedicated server with a global view of the Network.
- The forwarding functions of the MPCP sublayer are executed in the SDN-OLT which is built around an OpenFlow switch.
- Drawback: The OpenFlow protocol is fixed in nature and has limitations such as lack of programmability and difficulties for supporting new protocols.



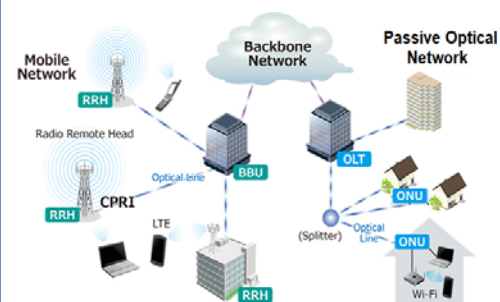
- 100 Gbps PONs are well positioned to play a crucial role in 5G due to their high capacity and cost effectiveness.
- There is need for the management and operations of the PON to be optimized to meet the emerging mission-critical services in 5G era.
- An SDN/NFV-based PON management plane is a key enabler for these goals.

A P4-BASED PON ARCHITECTURE (Haastrup et al, 2018)



- In 5G, PONs need a new architecture to meet users' demands. A P4-based PON brings in flexibility into our architecture by building the OLT around a P4-based switch
- This allows us to push some functionalities of the network to the P4-based switch to reduce cost and improve performance.
- Functions that are executed at short timescales remain at the switch while those executed at long time scales are migrated to the PON controller thereby ensuring faster service setup.
- It brings about improved scalability and service agility for better support for time critical services in the 5G scenario, and is currently in the design phase.

5G-AWARE PASSIVE OPTICAL NETWORKS (PONs)



- Our final goal is to enhance and ease the integrated management of backhaul and fronthaul in 5G networks with SDN and P4 technologies.