

Software-Defined Mobile Networks

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Outline

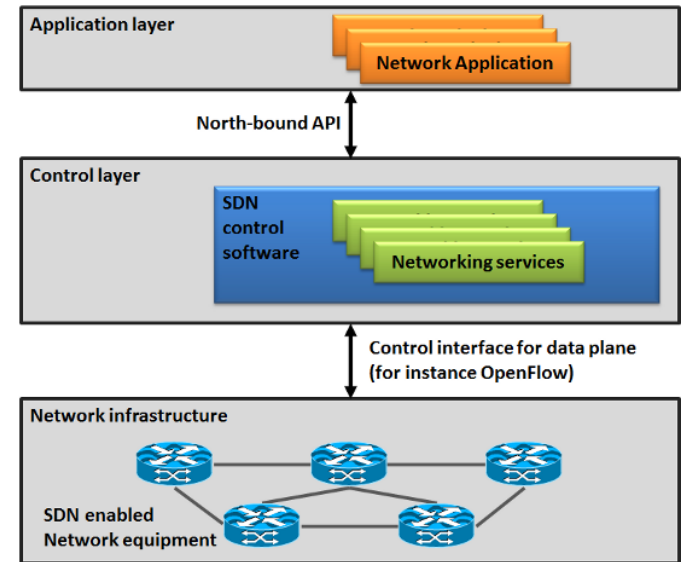
- Limitations in Current Mobile Technologies
- SDN Advent
- SDMN
- Advantages of SDMN
- Structure of a SDMN
 - MFFE
 - MFC
- Mobile Network Applications
- Mobility Management
- Operator Benefits

Limitations in current mobile technologies

- Problems:
 - Need for pricy, tightly integrated, and monolithic machinery
 - Difficult to configure and troubleshoot
 - All equipment must be from the same vendor
- Some solutions:
 - RFC5415 standard for control and provisioning of wireless access points (CAPWAP)
 - Machine-type communication (MTC) for operators

SDN Advent

- Software-Defined Networking (SDN):
 - a logically centralized network controller, and assorted applications that utilize controller-exposed information to orchestrate service delivery in the network
- Separated control and data plane
- Dominant standard:
 - OpenFlow



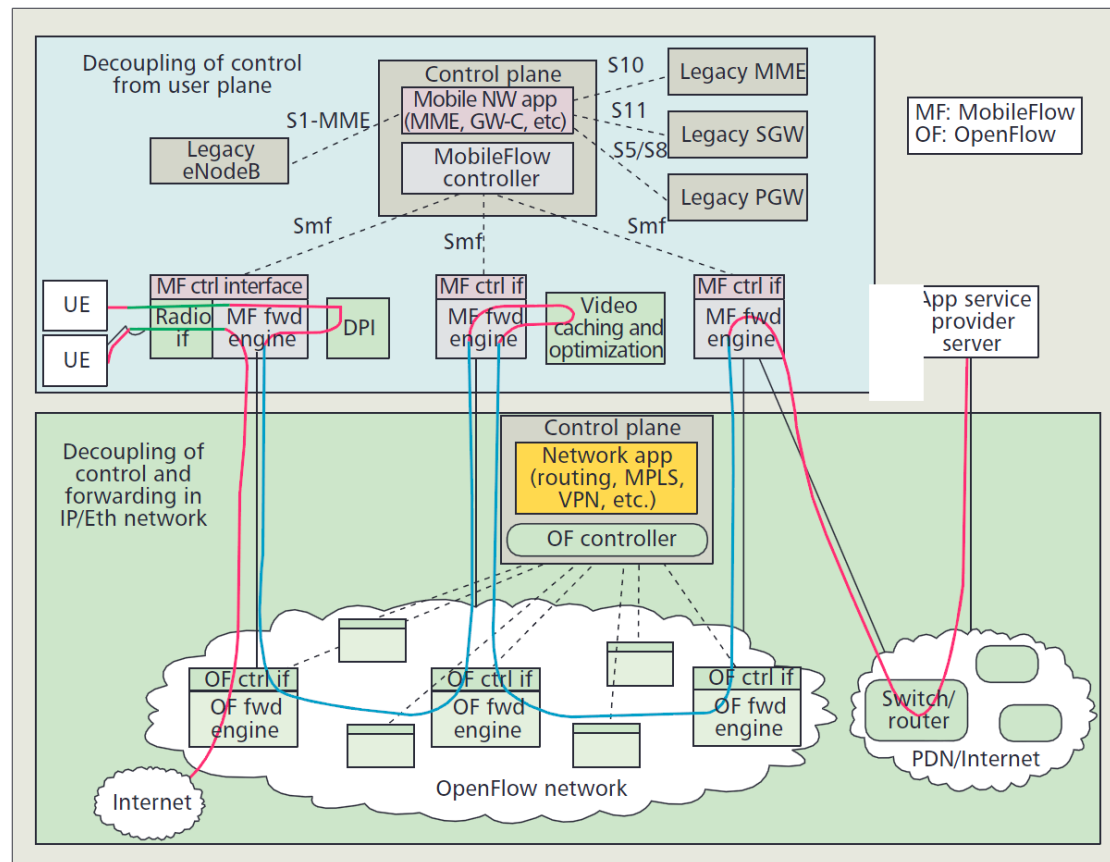
Software-Defined Mobile Network (SDMN)

- The term first appeared in early 2014
- An approach to the design of mobile networks where all protocol-specific features are implemented in software
- Maximizing the use of generic hardware and software in both core network and radio access network
- Making the forwarding substrate fully software-driven

Advantages of SDMN

- Providing maximum flexibility, openness, and programmability to future carriers without mandating any changes in UE
- Equipment can be manufactured/serviced by a wider range of vendors, lowering production /maintenance costs
- Support staff can be trained more quickly
- The network components can be scaled up in capacity by adding more computing power.
- Enabling speedy and smooth mobile network evolution and differentiation

Structure of a SDMN



Structure of a SDMN

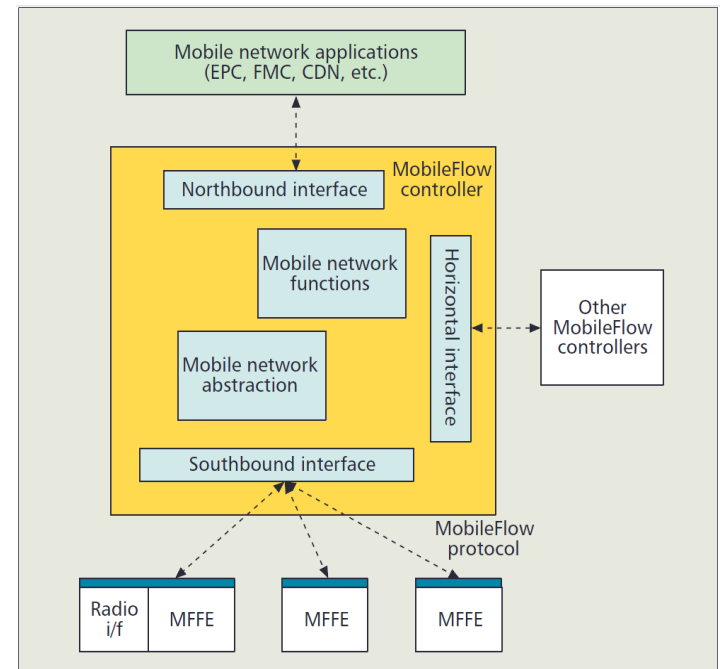
- Two key elements in SDMN:
 - Mobile-Flow forwarding engine (MFFE)
 - Mobile-Flow controller (MFC)

MFFE

- Fully software-defined forwarding
- Suitable for multitenant mobile networks
- Supports carrier-grade functionality
- May include the key functionality of a wireless access node
- Communicates with an MFC through “Smf” interface
- Faster innovation and different optimalities

MFC

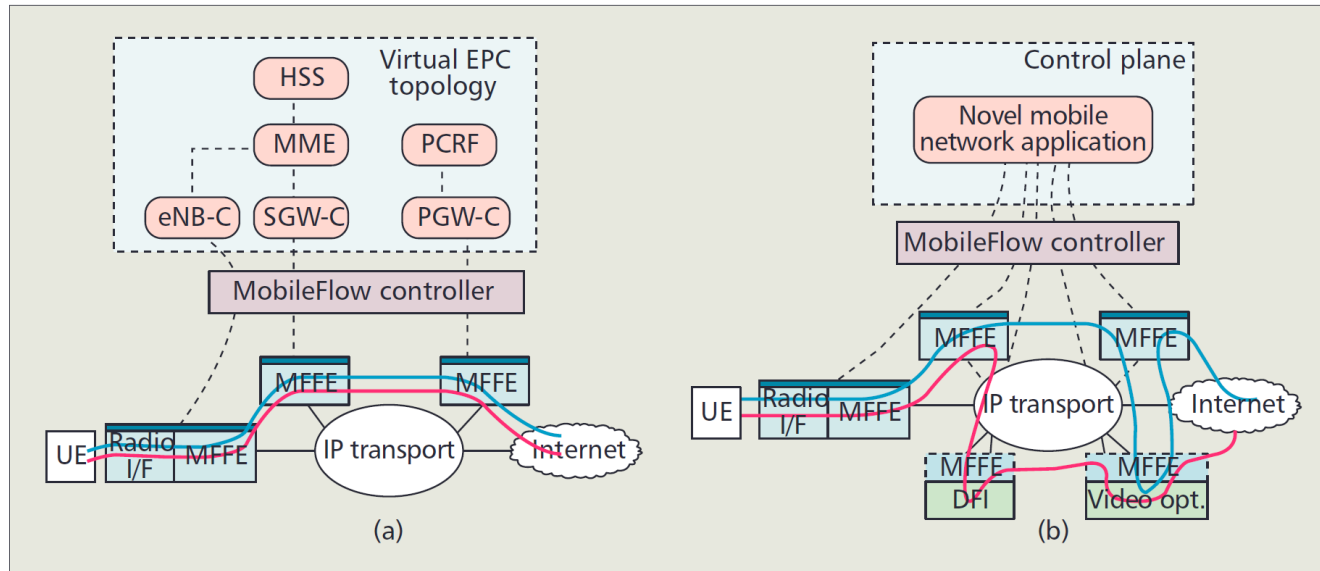
- Mobile network functions
 - Tunnel processing, mobility anchoring, routing, charging
- Mobile network abstraction
 - topology auto-discovery
 - topological resource view
 - network resource monitoring
 - network resource virtualization
- Interface corresponding functional blocks



Mobile Network Applications

- Developed by SDMN northbound interface
- 2 models of mobile-Flow application:
 - Network function virtualization approach; 1:1 mapping between the virtual gateway and MFFE via the mobile-Flow controller
 - 1:m mapping between one all-encompassing mobile-Flow application and several MFFEs
- Both models support m:1 mapping between mobile-Flow applications and MFFEs

Mobile Network Applications



Mobile-Flow application models

Mobility Management

- SDMN can be used to implement the current generation of control functionality in a 3GPP
- MFFE's handling the user traffic are controlled by their “-C” control counterparts.
- the -C virtualized function, translates the GTP signaling /context into flow rules and sends the rules via the MFC to each of the MFFE's involved in handling the particular flow.
- One challenging aspect is how to split the functionality of an eNB. The interface between eNB-U and eNB-C consists of the forwarding control and wireless bearer control. The wireless bearer control is relevant to the radio handoffs required in mobility management processes

Operator Benefits

- By separating the transport stratum from the mobile network stratum:
 - The two strata can be developed and deployed independently.
 - The operator can start to deploy MFFEs, which can interoperate with legacy equipment and experiment with new services based on software-defined part.
- SDMN enables operators to use infrastructure resources to orchestrate on demand the creation of various mobile network pipes based on different mobile architectures



***Thank you...
Any Questions?***