

SDN&NFV in 5G architecture

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Abstract

This paper provides an overview of new generation of ICT technologies - concept and architecture of Software Defined Networking (SDN) and Network Function Virtualization (NFV) technologies. It also provides interconnection between SDN/NFV domain and 5G domain. It show how are these concepts used in 5G networks.

Intorduction

The 5G system will be able to provide the widest range of services and applications in the history of mobile and wireless communications. 5G is an abbreviation for the 5th generation of wireless system, which represents the next evolutionary stage in the development of mobile networks.

The ITU defines the following requirements for 5G networks:

- 1000x greater volume of mobile data to cover a certain area
- 1000x greater number of connected devices
- 100 times higher transmission speeds (peak ≥ 1 Gbit/s)
- 1/5x end-to-end delay (target: ≤ 1 ms)
- Transfer rate guaranteed to the user ≥ 50 Mbit/s
- Support for IoT terminals ≥ 1 trillion
- Availability $\geq 99.999\%$ (for some specific services)
- Promoting mobility at a speed of ≥ 500 km/h for land transport

To meet ITU requirements, the 5G network also brings improvements in network architecture. In addition to supporting multiple access technologies, it also provides modular and flexible network architecture.

Openflow

OpenFlow is an open standard originally developed at universities and currently maintained by Open Network Foundation (ONF) - a non-profit consortium with mission to commercialize and promote OpenFlow based SDN. OpenFlow is the most popular protocol used for communication between control plane and data forwarding plane - becoming the de facto standard.

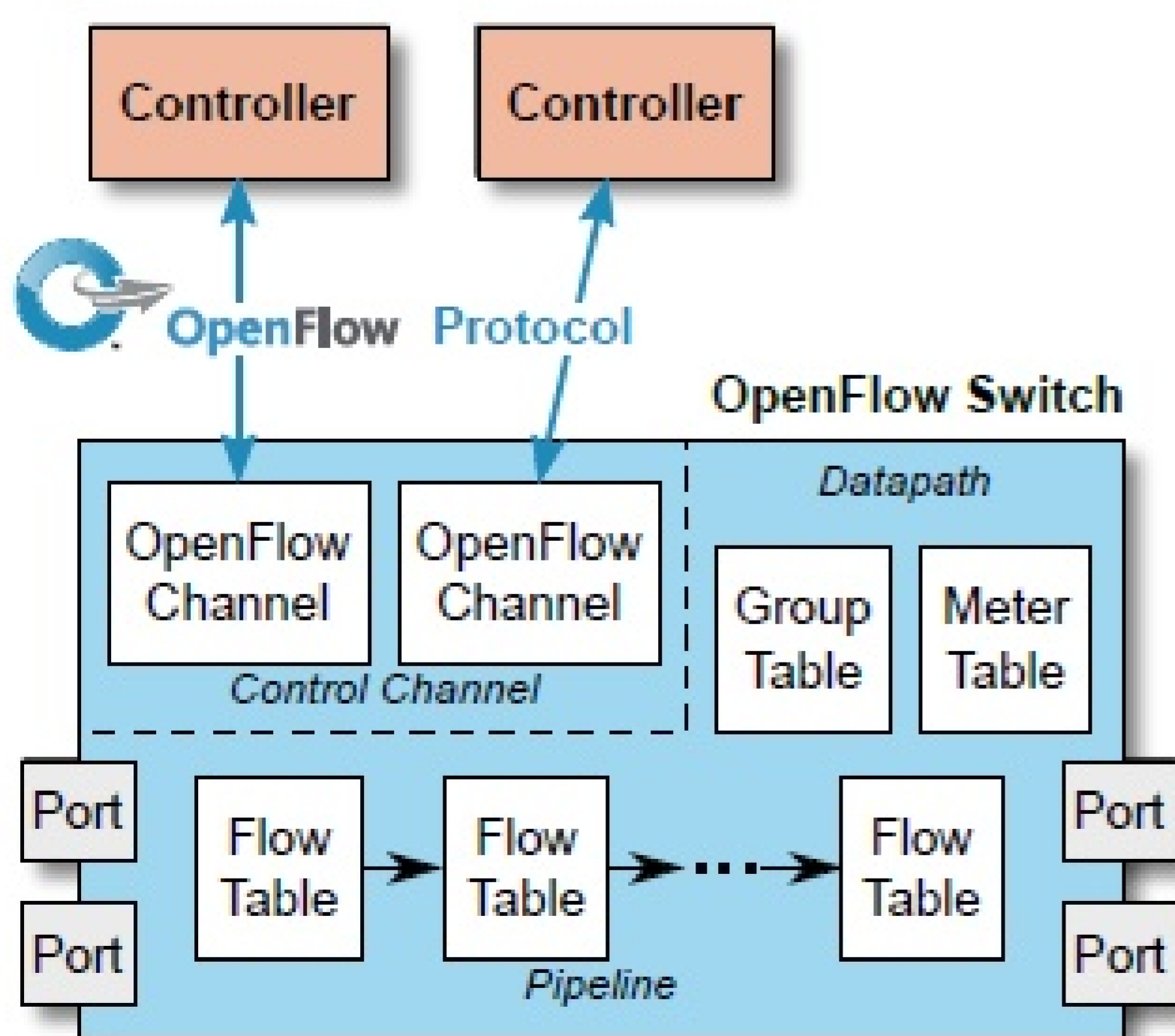


Figure 1. OpenStack architecture.

5G Basics And Architecture

5G system architecture is defined to support data connectivity and services enabling deployments to use techniques such as e.g. NFV (Network Function Virtualization) and SDN (Software Defined Networking).

Network Slicing

One of the major novelties of the 5G network is a network slicing aims for building dedicated logical networks that exhibit functional architectures customized to the respective telco services.

Network slice is a logical network serving a defined business purpose or customer, consisting of all required network resources configured together.

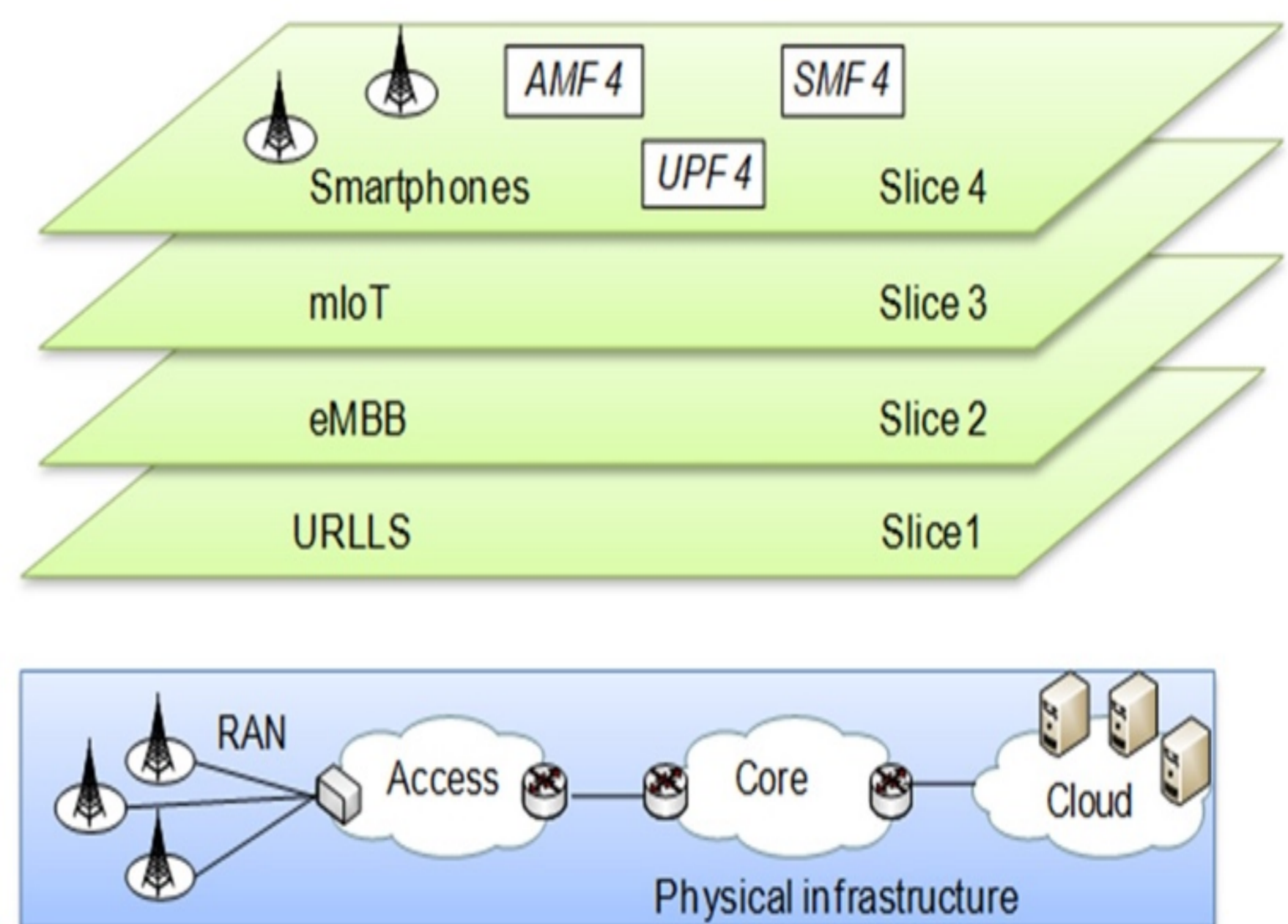


Figure 2. Network slicing

Management and Orchestration

The management and orchestration of 5G networks is based on the advanced ETSI / NFV MANO (Management and Orchestration) architecture [115]. Special aspect can be considered as network slicing, multi-tenancy, multi-domain or multi-operator operation.

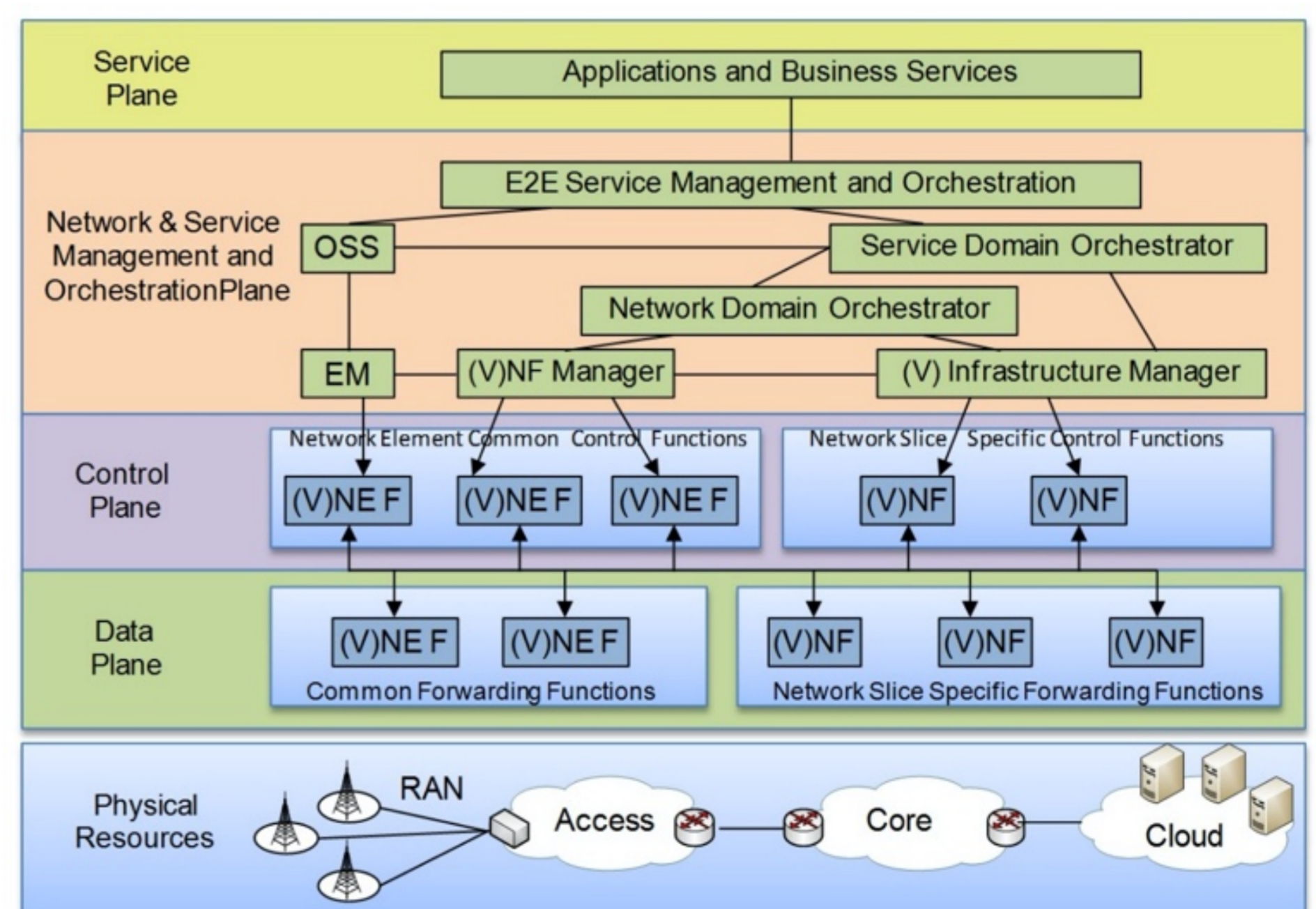


Figure 3. Management and orchestration of the 5G network

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