5G Core - Introduction

Part-II

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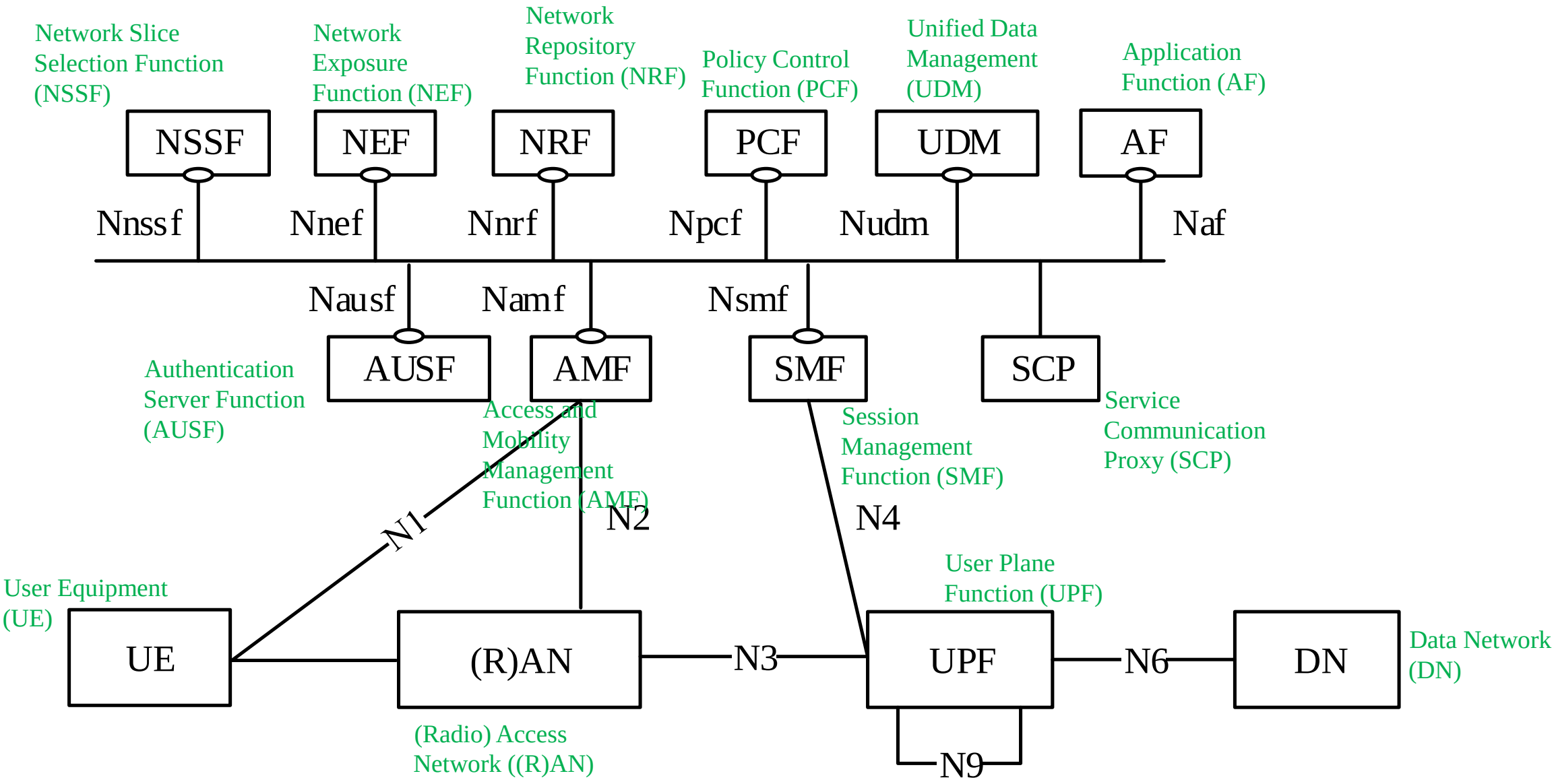
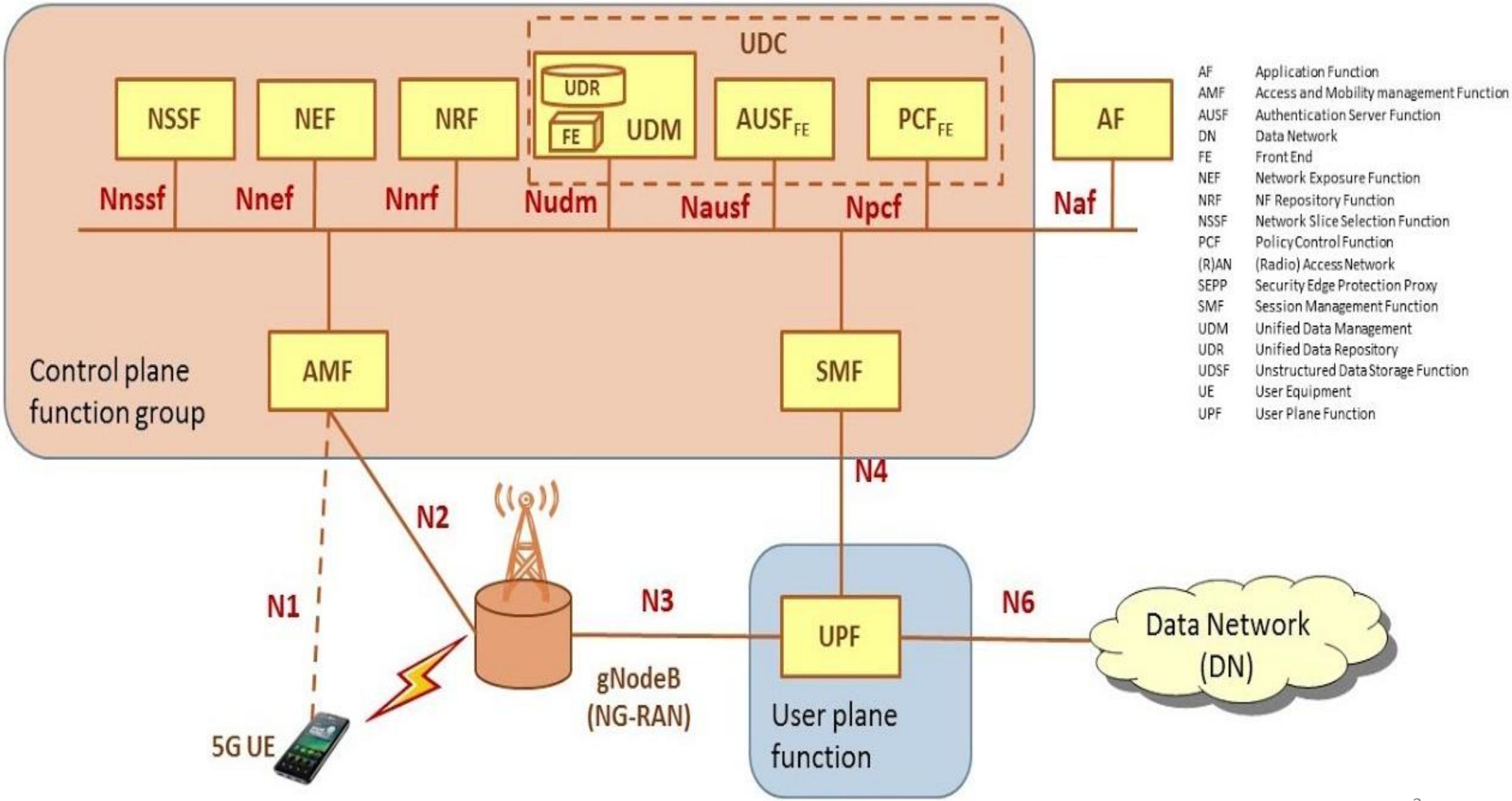
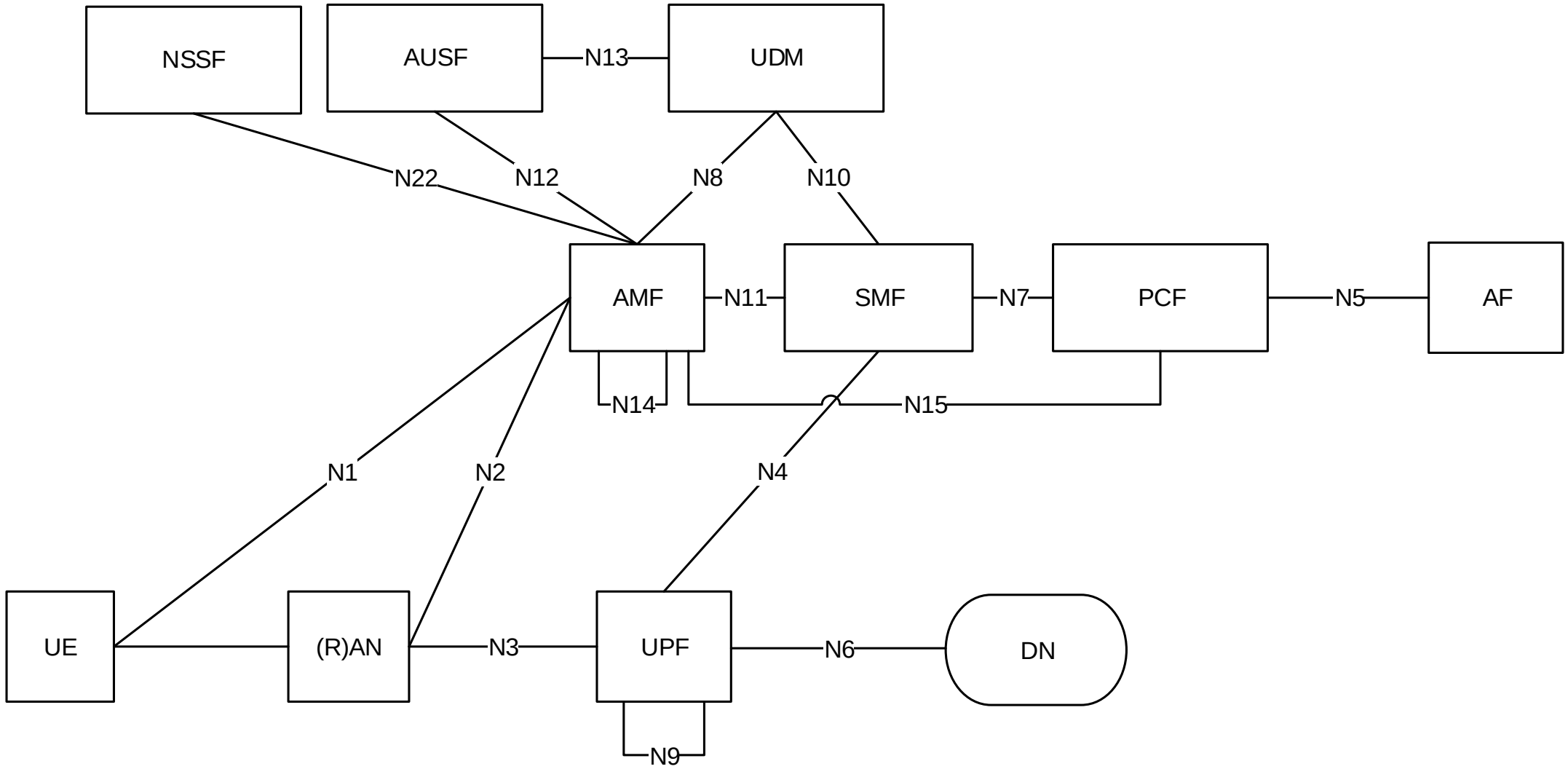
5G System architecture



Non-roaming reference architecture. Service-based interfaces are used within the Control Plane


UDC
UDR
FE
UDM
NSSF
NEF
NRF
AUSF FE
PCF FE
AF
Nnssf
Nnef
Nnrf
Nudm
Nausf
Npcf
Naf
Control plane function group
AMF
SMF
N4
N2
N1
N3
N6
UPF
Data Network (DN)
gNodeB (NG-RAN)
User plane function
5G UE
AF Application Function
AMF Access and Mobility management Function
AUSF Authentication Server Function
DN Data Network
FE Front End
NEF Network Exposure Function
NRF NF Repository Function
NSSF Network Slice Selection Function
PCF Policy Control Function
(R)AN (Radio) Access Network
SEPP Security Edge Protection Proxy
SMF Session Management Function
UDM Unified Data Management
UDR Unified Data Repository
UDSF Unstructured Data Storage Function
UE User Equipment
UPF User Plane Function



5G System Architecture in reference point representation

- **Access and Mobility Management function (AMF)** supports Termination of NAS signalling, NAS ciphering & integrity protection, registration management, connection management, mobility management, access authentication and authorization, security context management. *(AMF has part of the MME functionality from EPC)*
- **Session Management function (SMF)** supports session management (session establishment, modification, release), UE IP address allocation & management, DHCP functions, termination of NAS signalling related to session management, DL data notification, traffic steering configuration for UPF for proper traffic routing. *(AMF has part of the MME and PGW functionality from EPC)*
- **User plane function (UPF)** supports packet routing & forwarding, packet inspection, QoS handling, acts as external PDU session point of interconnect to Data Network (DN), and is an anchor point for intra- & inter-RAT mobility. *(UPF has part of the SGW & PGW functionality from EPC)*
- **Policy Control Function (PCF)** supports unified policy framework, providing policy rules to CP functions, access subscription information for policy decisions in UDR. *(PCF has part of the PCRF functionality from EPC)*

- **Authentication Server Function (AUSF)** acts as an authentication server. (part of HSS from EPC)
- **Unified Data Management (UDM)** supports generation of Authentication and Key Agreement (AKA) credentials, user identification handling, access authorization, subscription management. (part of HSS functionality from EPC)
- **Application Function (AF)** supports application influence on traffic routing, accessing NEF, interaction with policy framework for policy control. (same as AF in EPC)
- **Network Exposure function (NEF)** supports exposure of capabilities and events, secure provision of information from external application to 3GPP network, translation of internal/external information. (not present in EPC)
- **NF Repository function (NRF)** supports service discovery function, maintains NF profile and available NF instances. (not present in EPC)
- **Network Slice Selection Function (NSSF)** supports selecting of the Network Slice instances to serve the UE, determining the allowed NSSAI, determining the AMF set to be used to serve the UE. (not present in EPC)

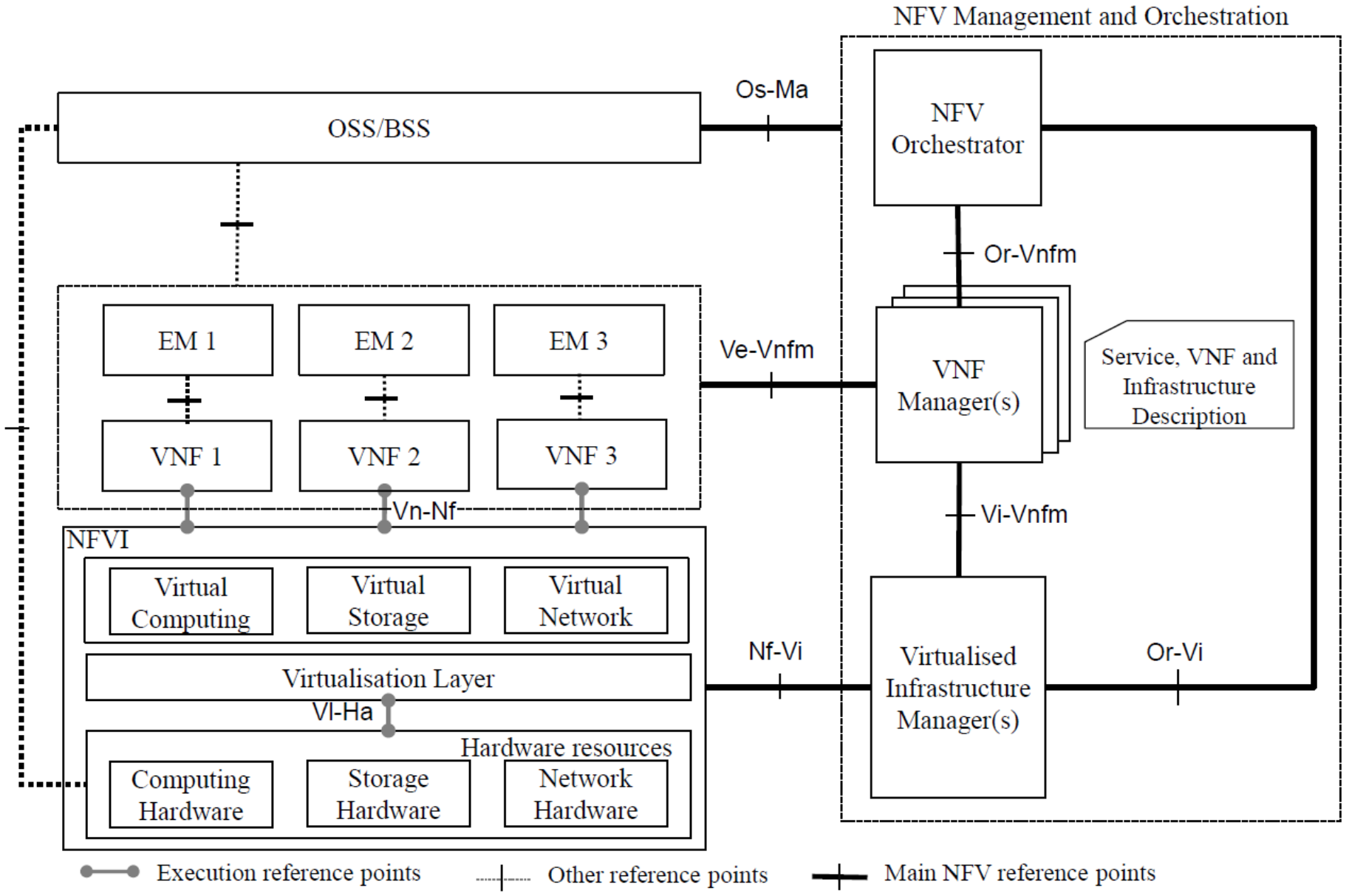
– ***Softwarization: Virtualization (NFV) and Orchestration, Slicing , SDN***

Network Softwarization for IMT-2020

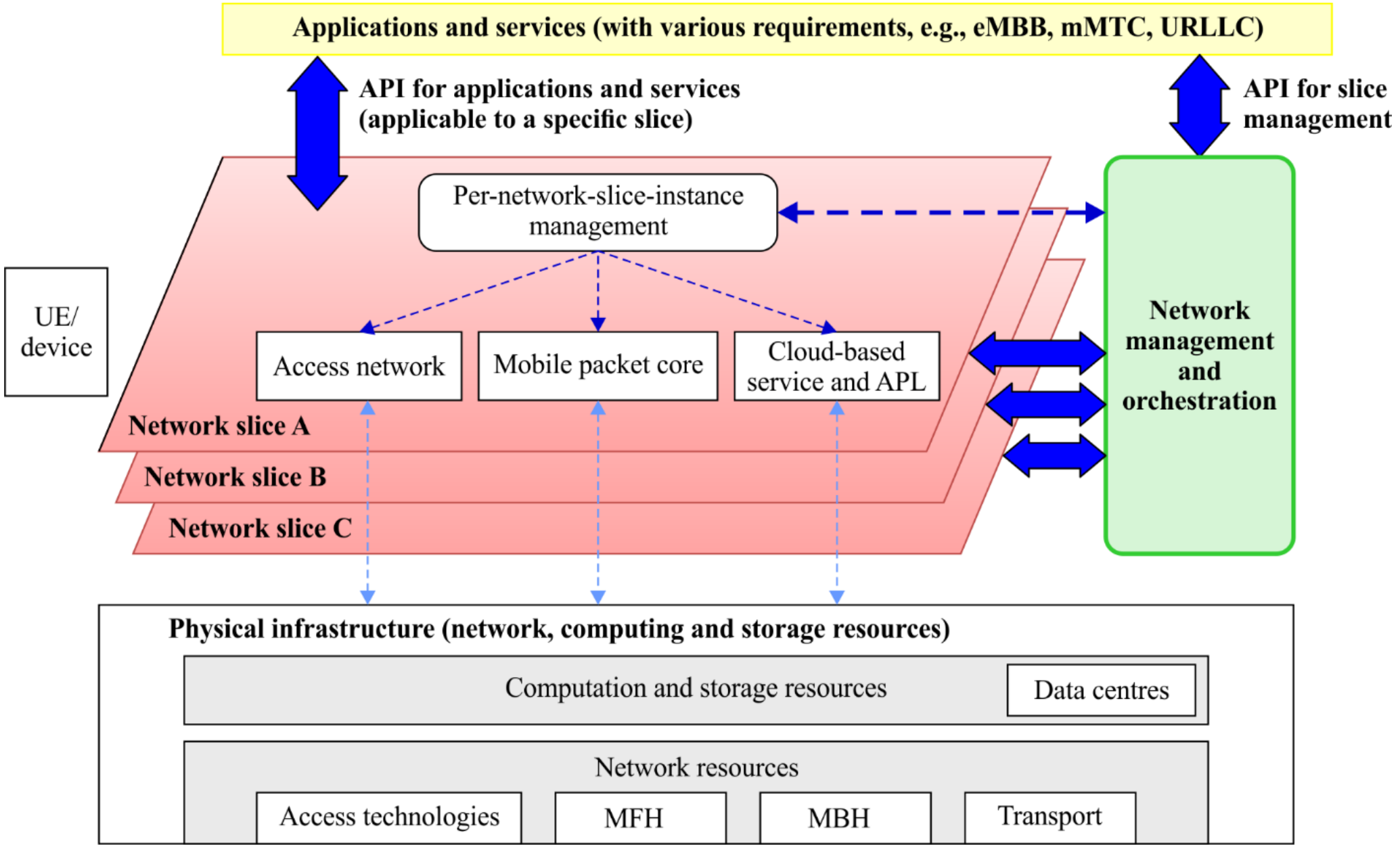
With network softwarization, underlying heterogeneous physical infrastructure is abstracted as network, computing and storage resources. With management and orchestration, these resources and functions form multiple isolated networks as network slices. Individual network slices can have specific characteristics that reflect various different requirements derived from application and services.

Key components to realize this are SDN, NFV and cloud computing.

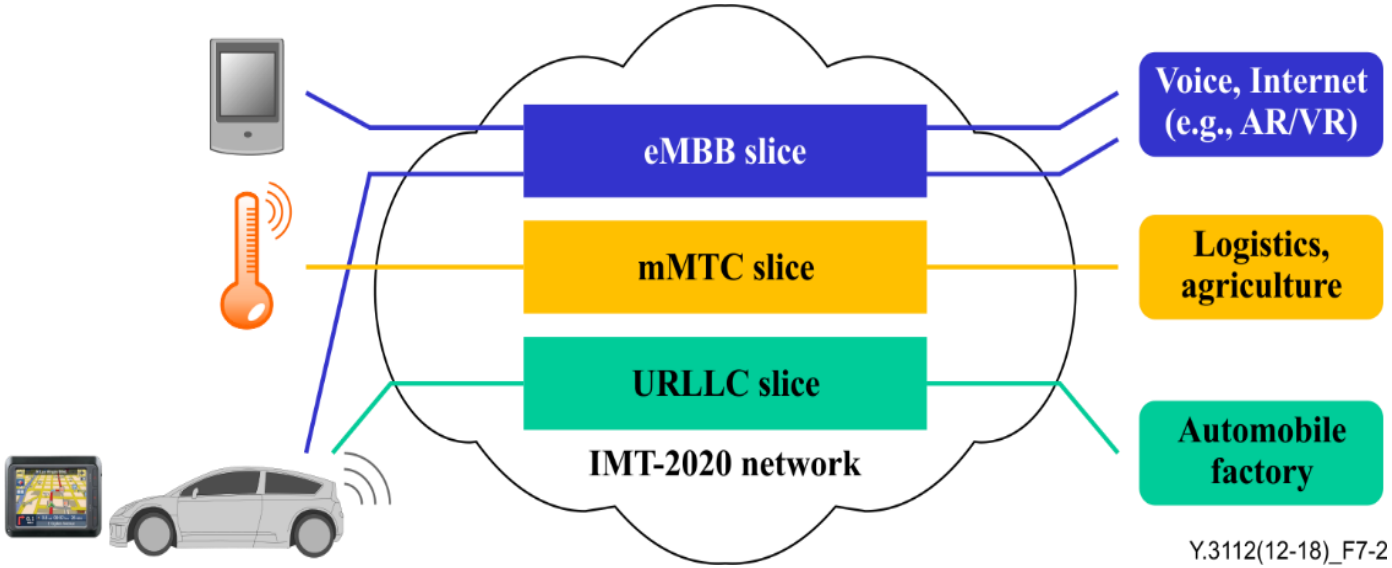
Network Function Virtualization - NFV



Network softwarization for IMT-2020



Network slicing in the IMT-2020 network



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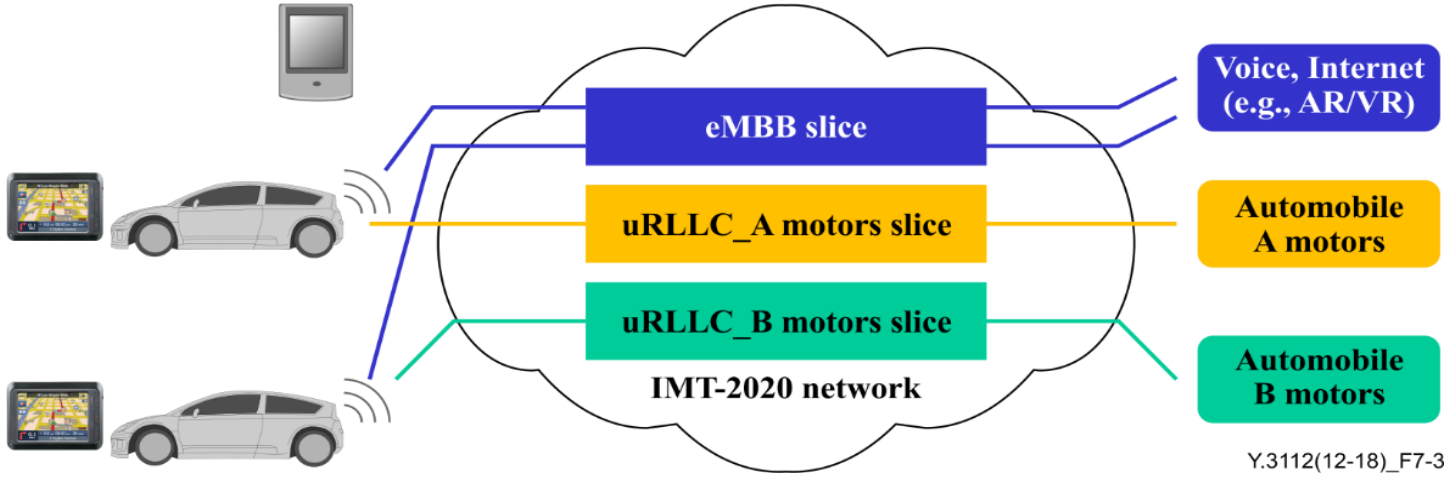

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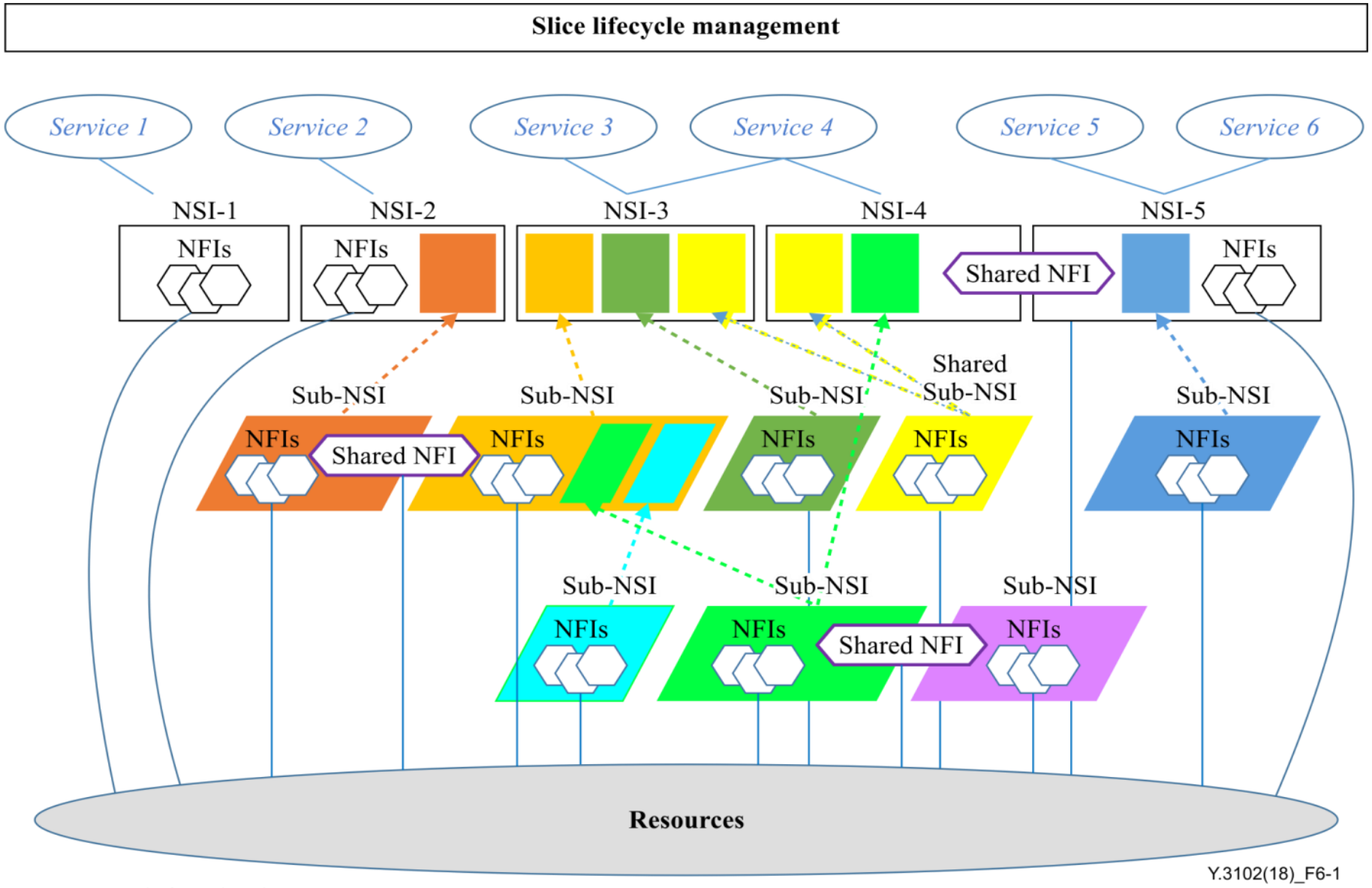
Conceptual overview of network slicing in the IMT-2020 network

A network slice instance (NSI) is composed of a set of network function instances (NFIs) running over the allocated resources. An NSI constitutes a logical network that provides specific network capabilities and characteristics



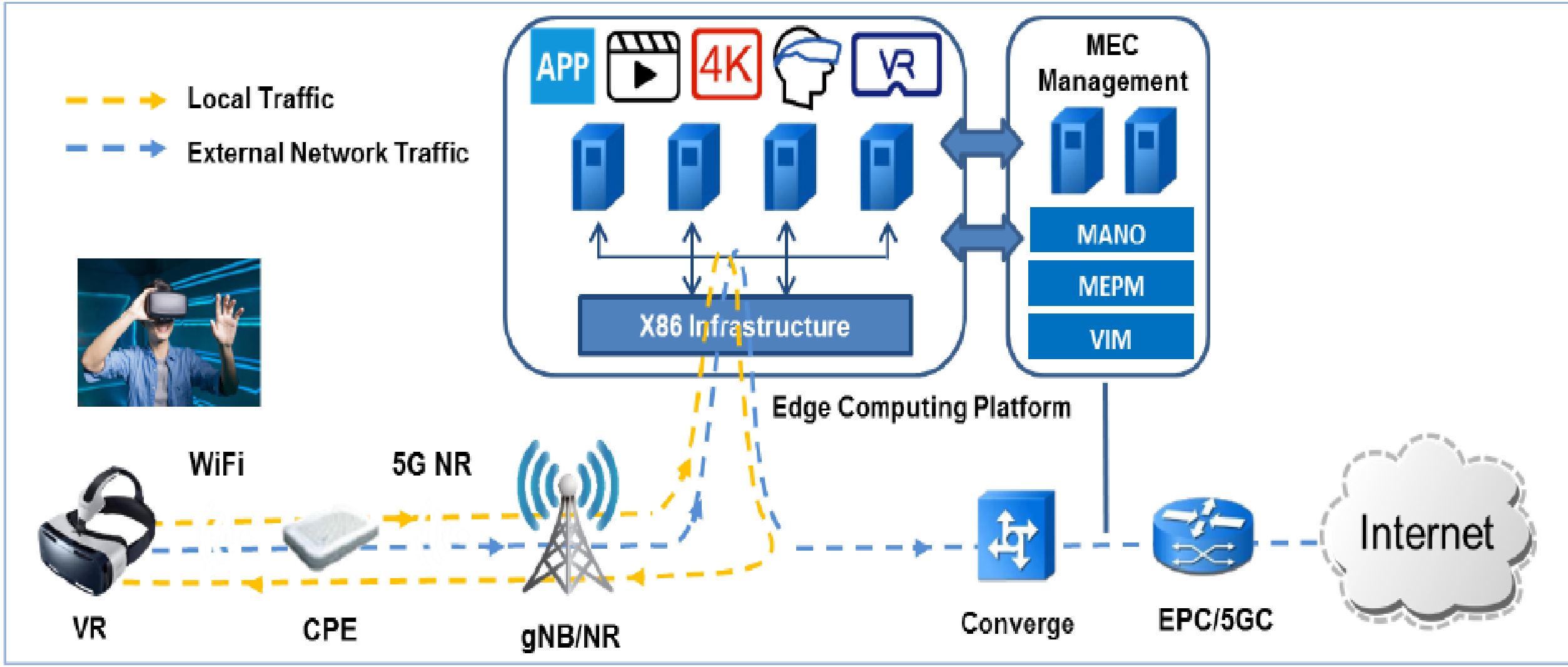
NFI: Network function instance
NSI: Network slice instance

MEC

ETSI formed the specifications group for **Mobile Edge Computing** in 2014.

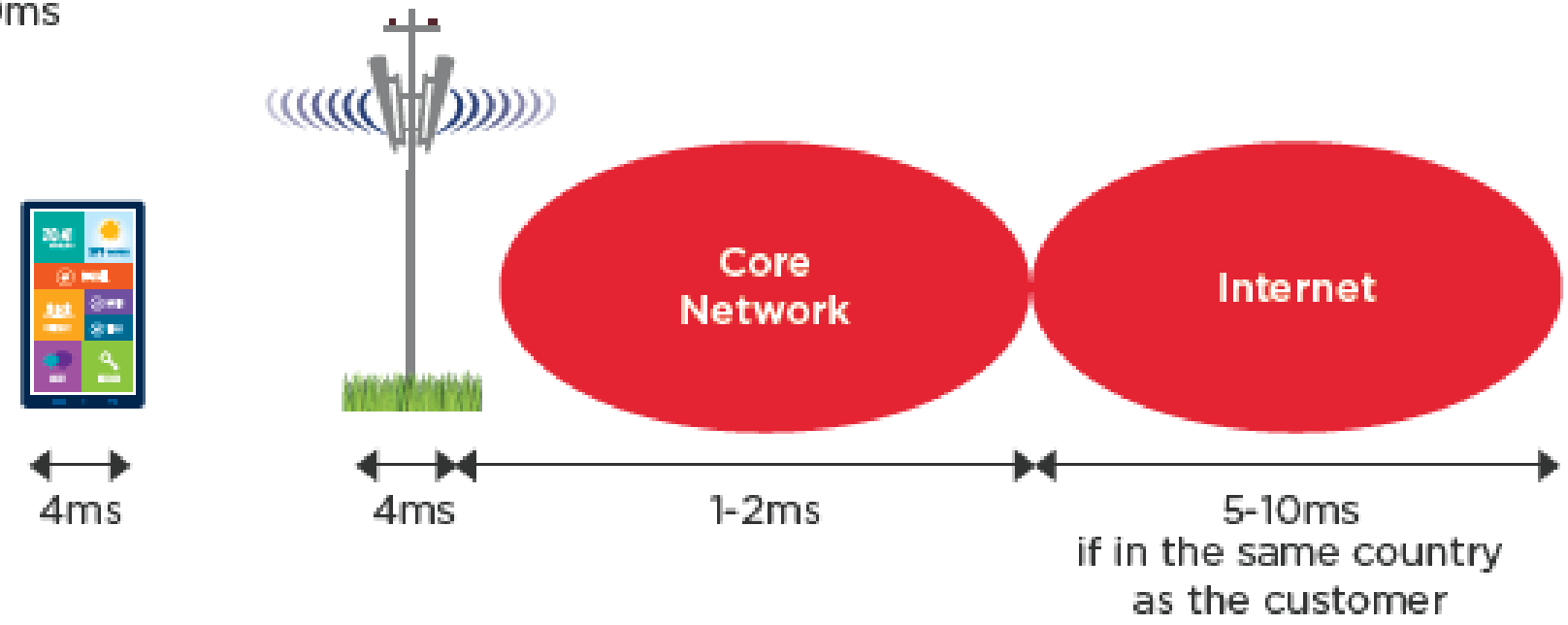
In 2017, ETSI changed the name to **Multi-access Edge Computing** because it was clear various access points may establish a network edge, not solely a mobile network. The ETSI MEC ISG outlines MEC standards for testing and applying MEC use cases. Included in the standards are definitive meanings of MEC terms, a recommended architecture, APIs, and general requirements for a technology to fall under MEC

Illustration of an in-building streaming media system

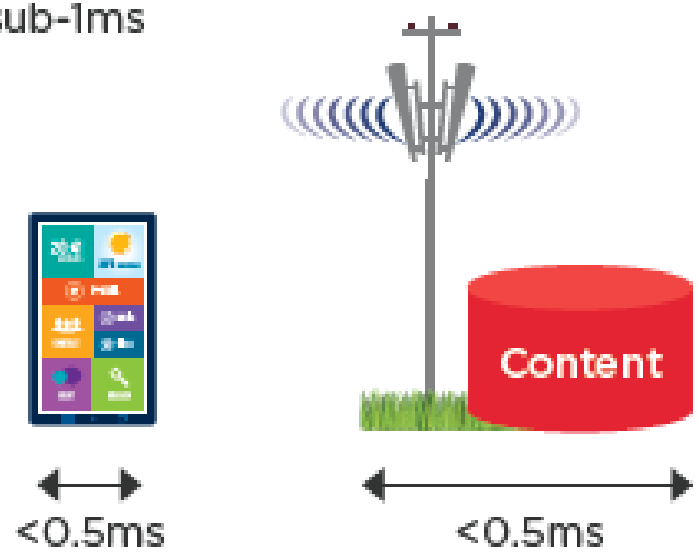


MEPM : Muli-Access Edge Platform Manager
VIM : Virtual Infrastructure Manager

LTE – min 10ms



5G service sub-1ms



THANK YOU