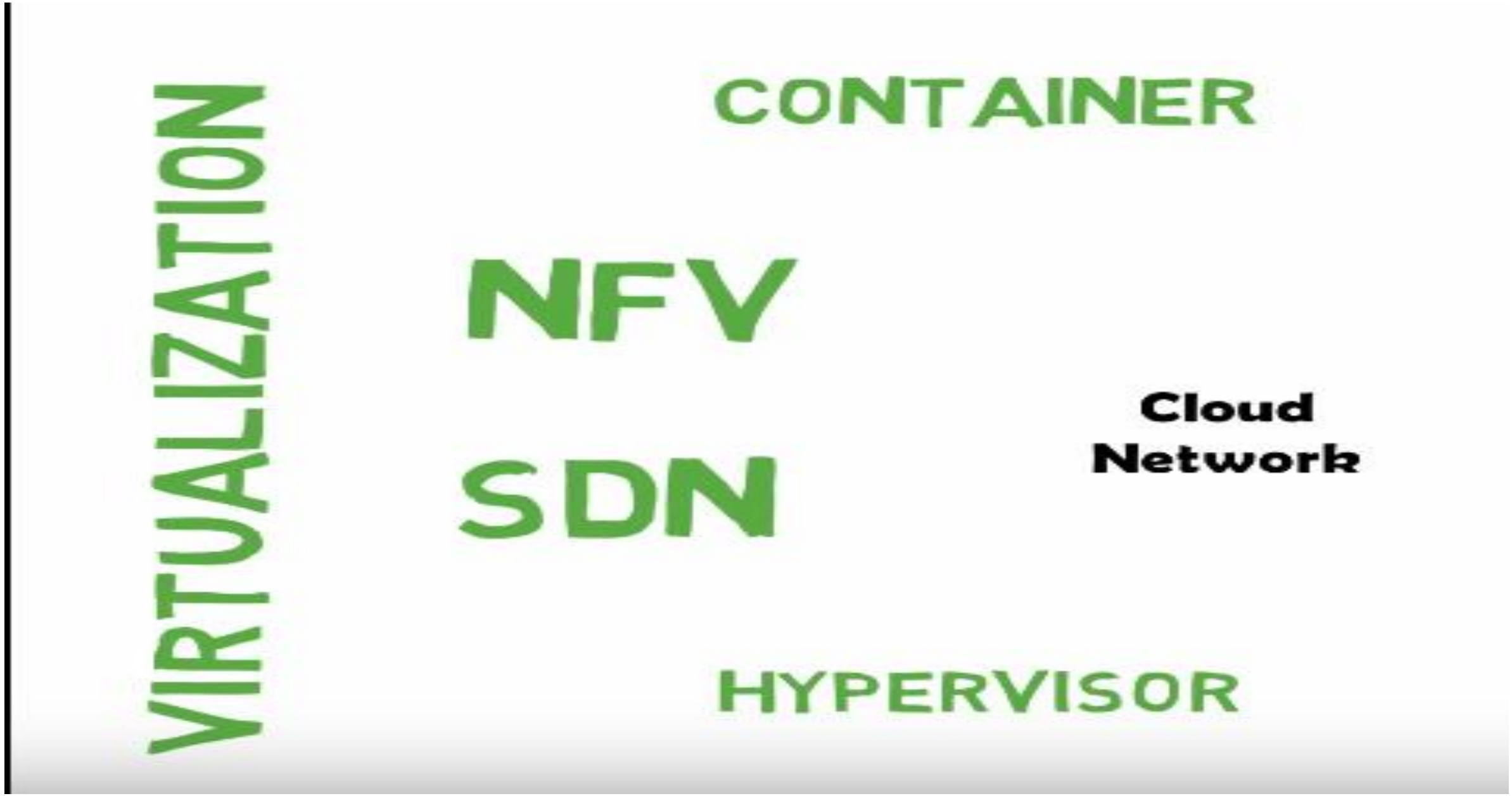
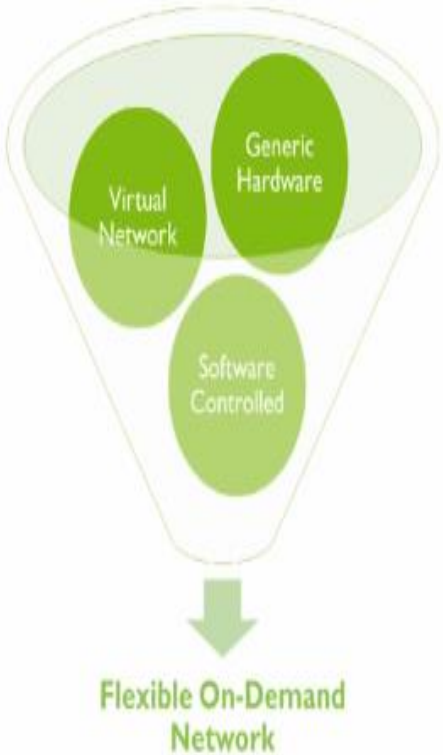
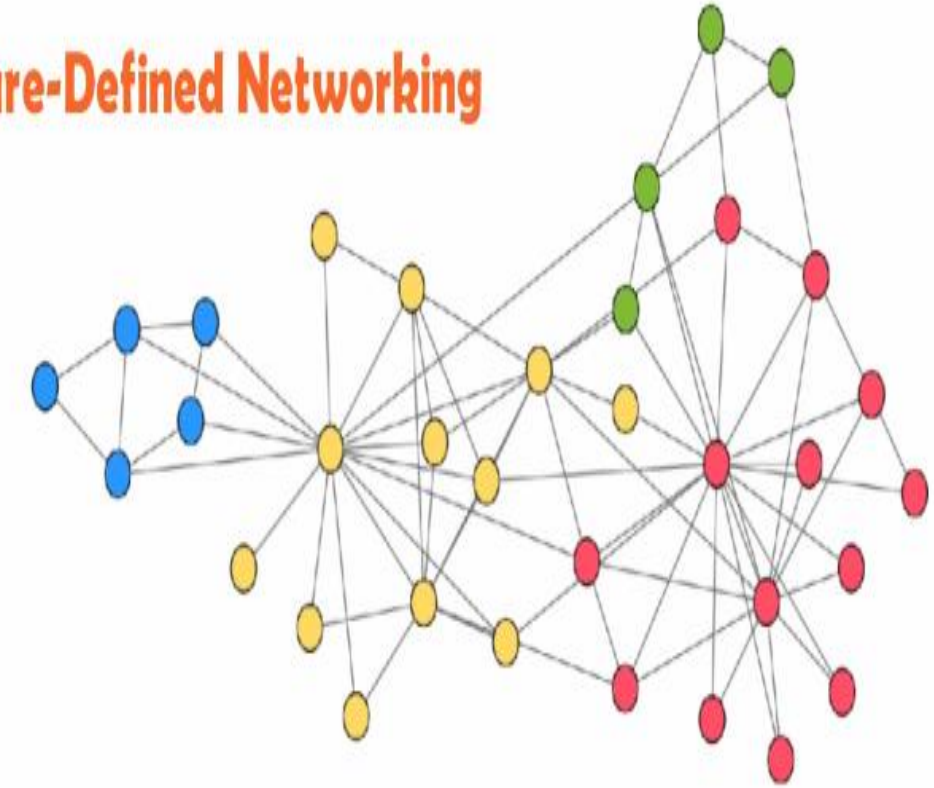

VIRTUALIZATION
CONTAINER
NFV
SDN
Cloud
Network
HYPERVISOR

Network Abstraction



Software-Defined Networking

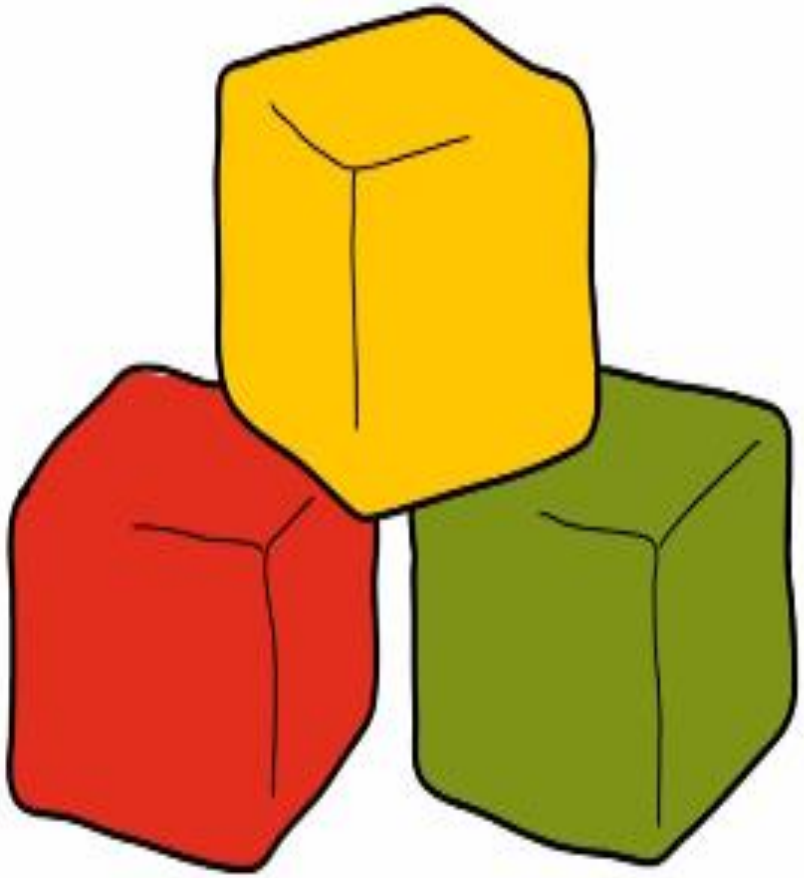


SDN

Softwarization

Intro Tutorial

NFV



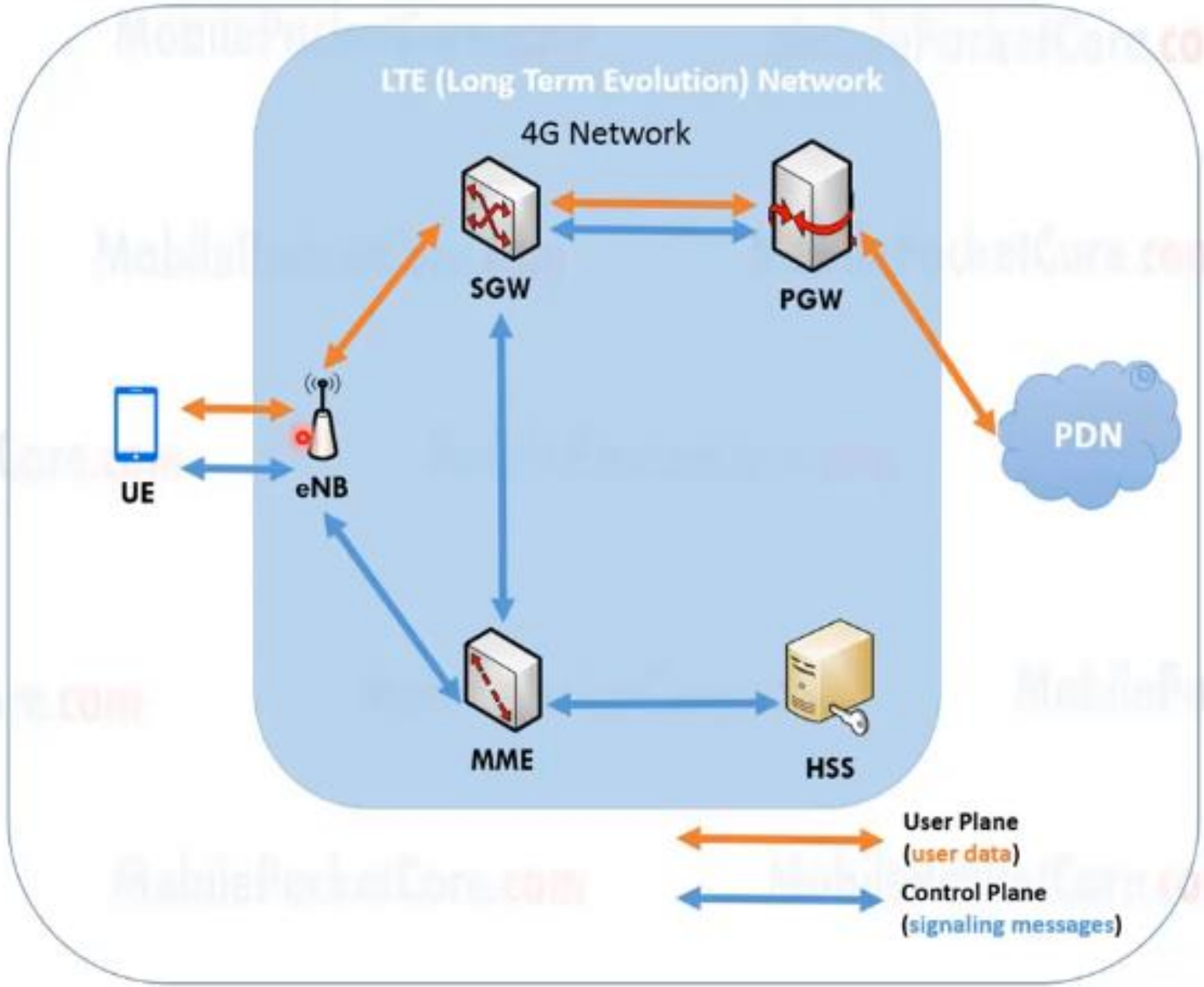
Virtualization

Orchestration

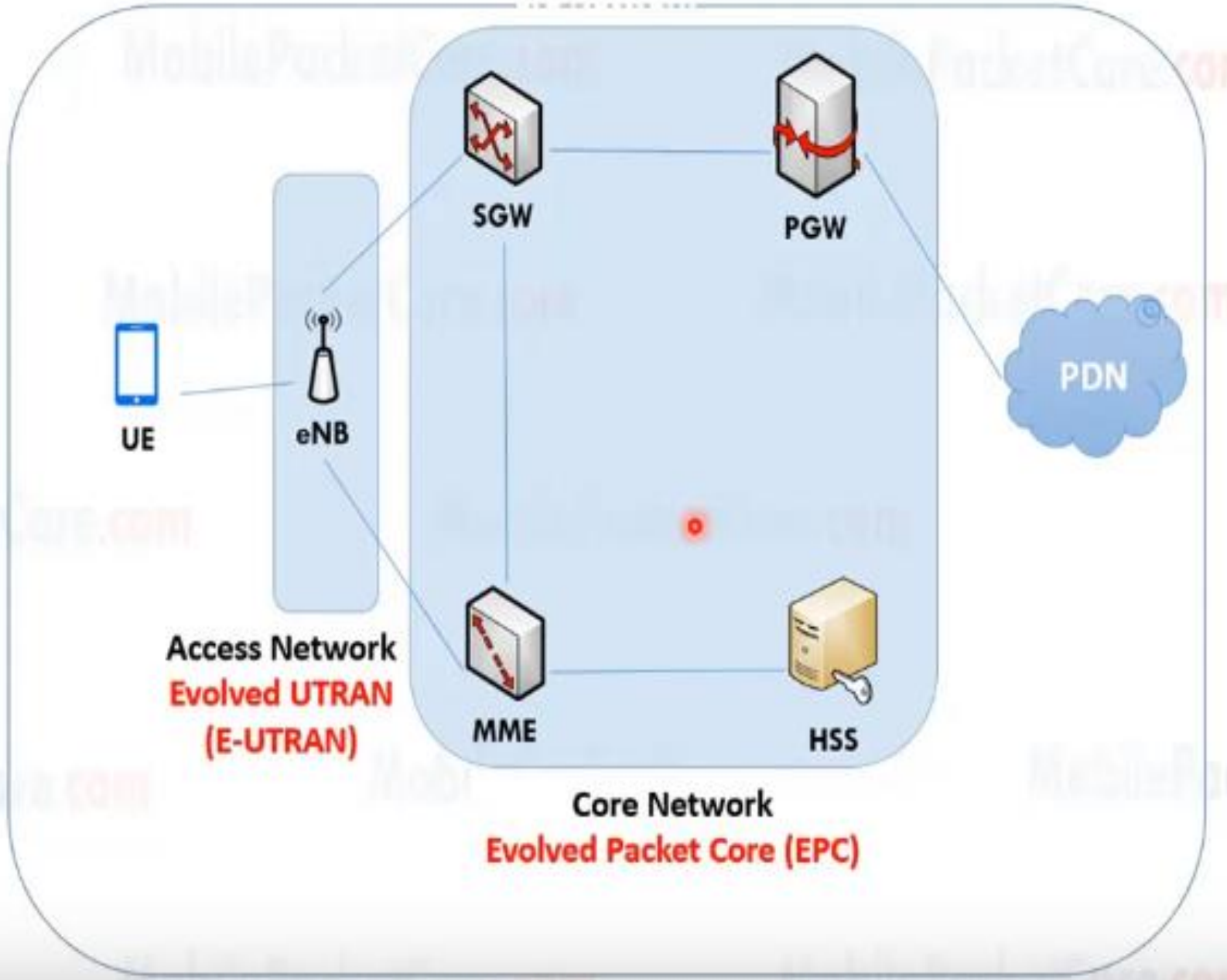
Control Plane vs. User Plane

Control Plane: Used to exchange signaling messages, in order to control UE data session.

User Plane: Used to exchange user data.



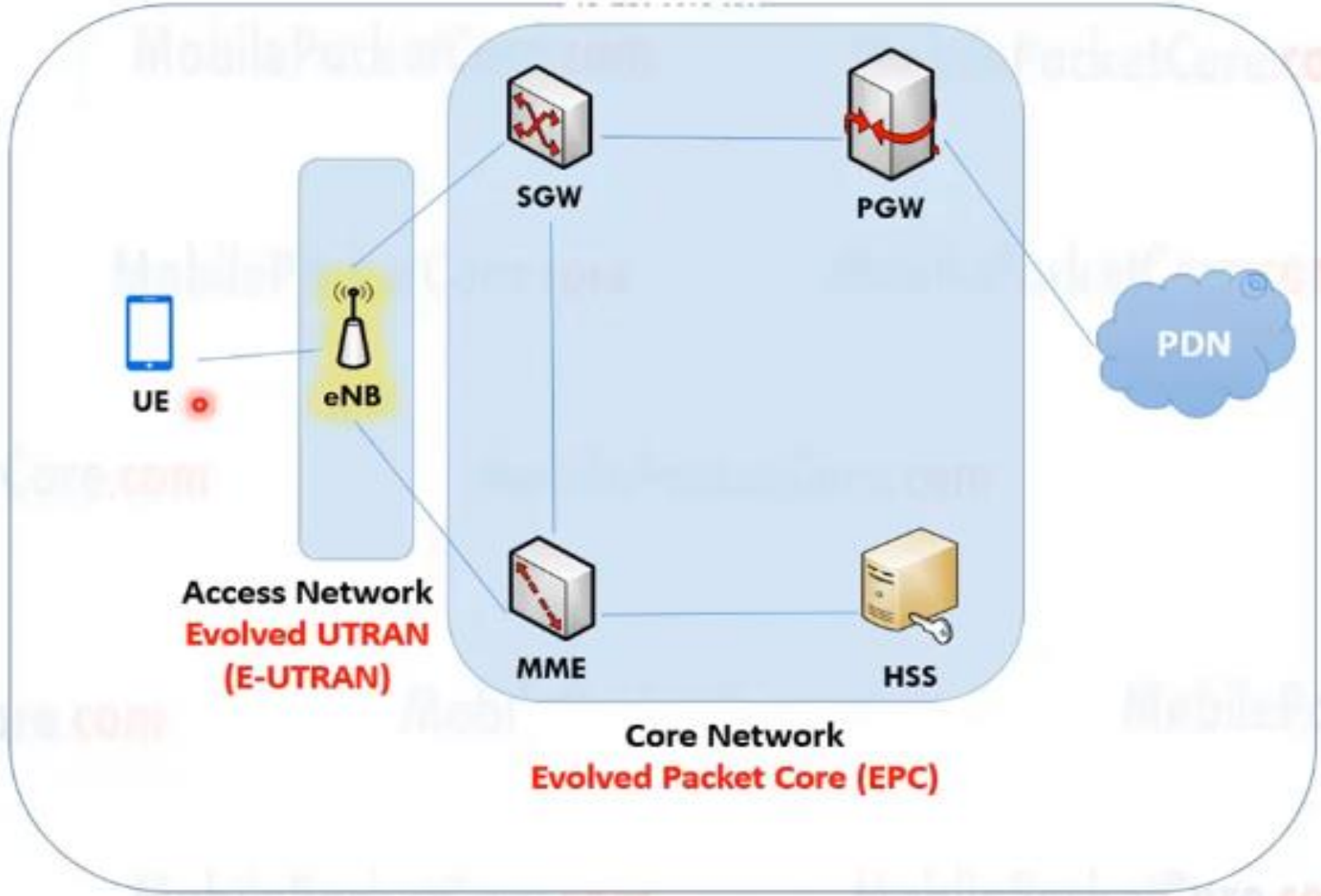
Network Architecture



Network Architecture

eNodeB:
(Evolved NodeB)

- Provides Radio Interface for the UE.

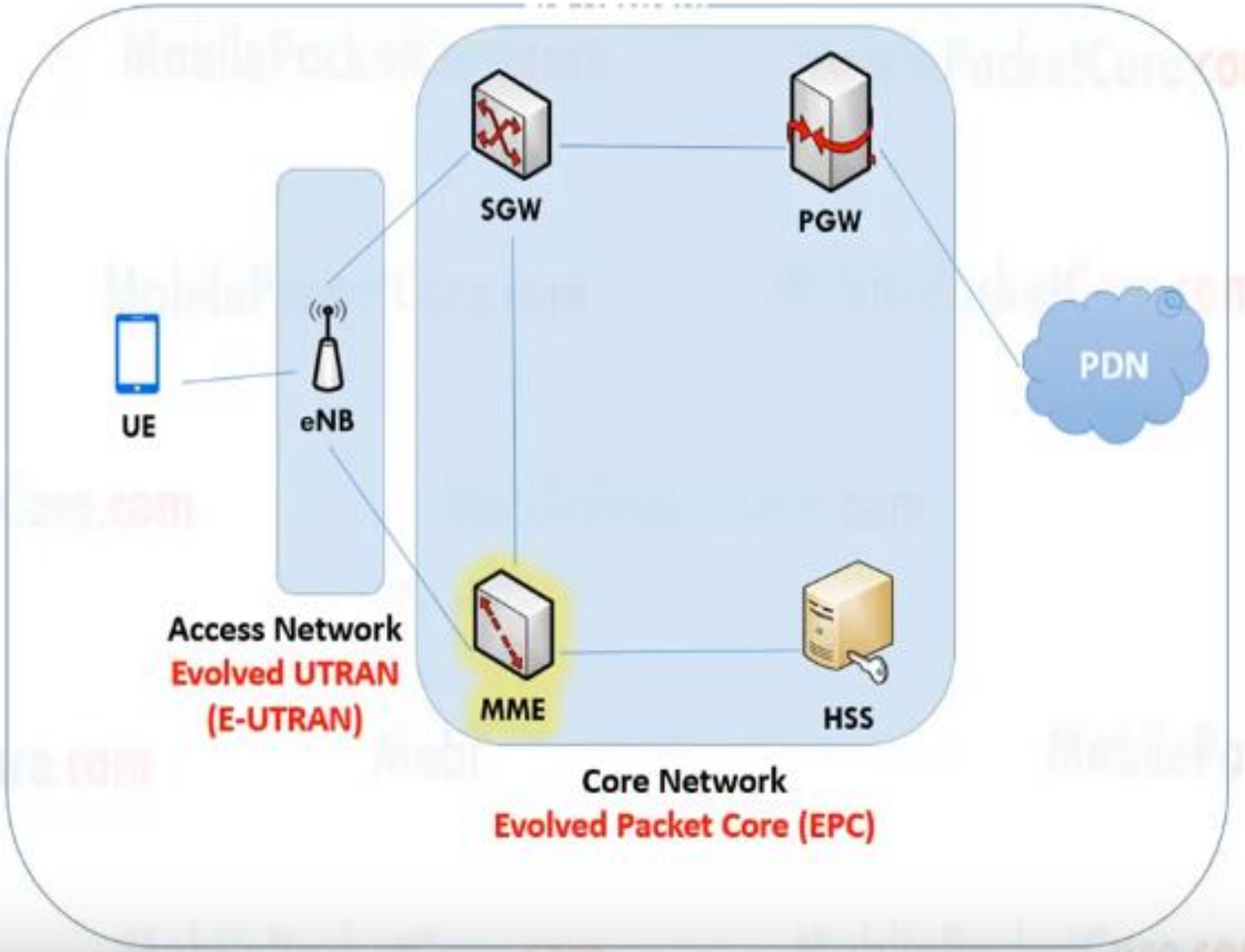


Network Architecture

MME:

(Mobility Management Entity)

- Authentication and Security.
- Tracks UE Location.
- Admission Control.

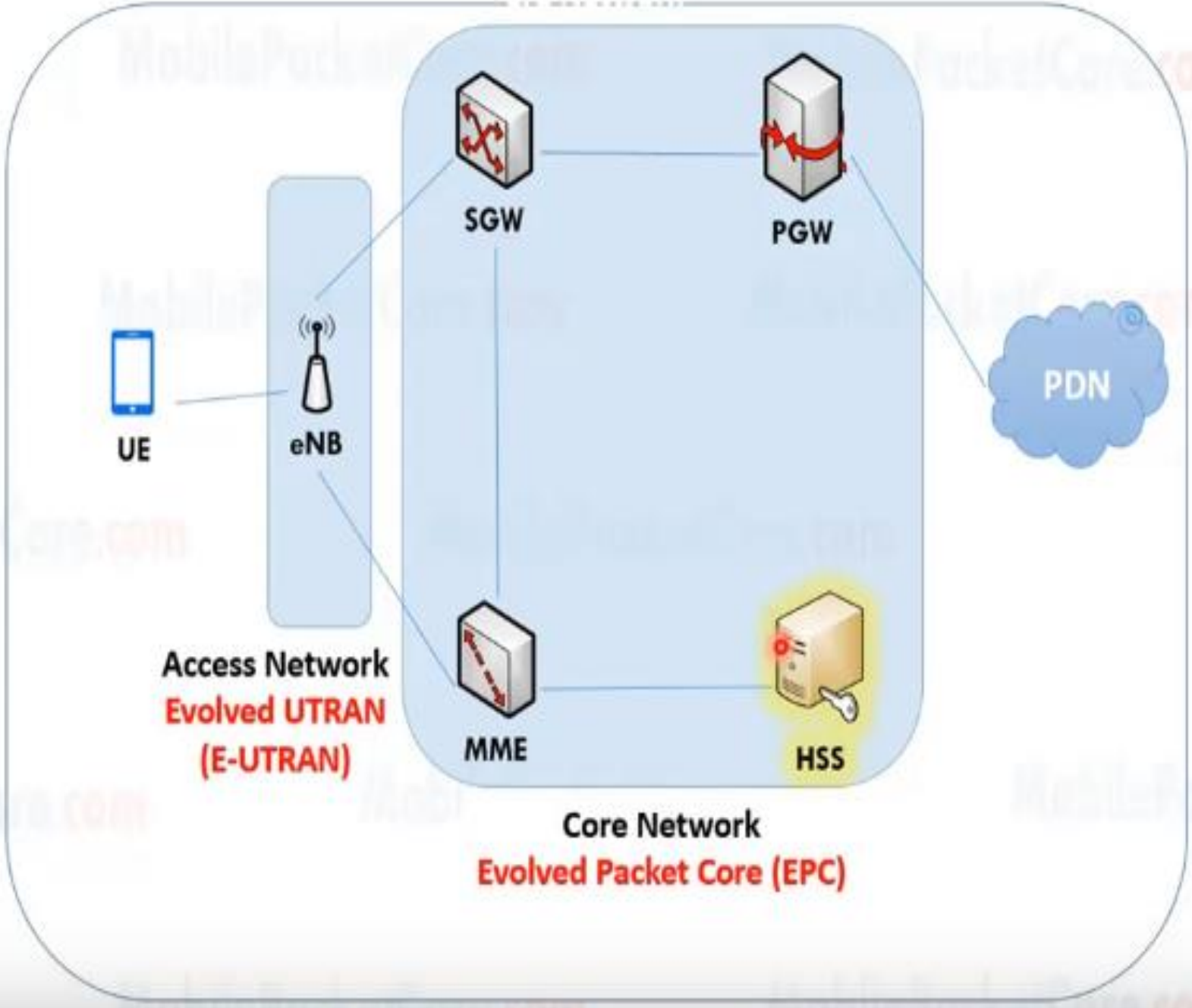


Network Architecture

HSS:

(Home Subscriber Server)

- Stores subscription information for all users.

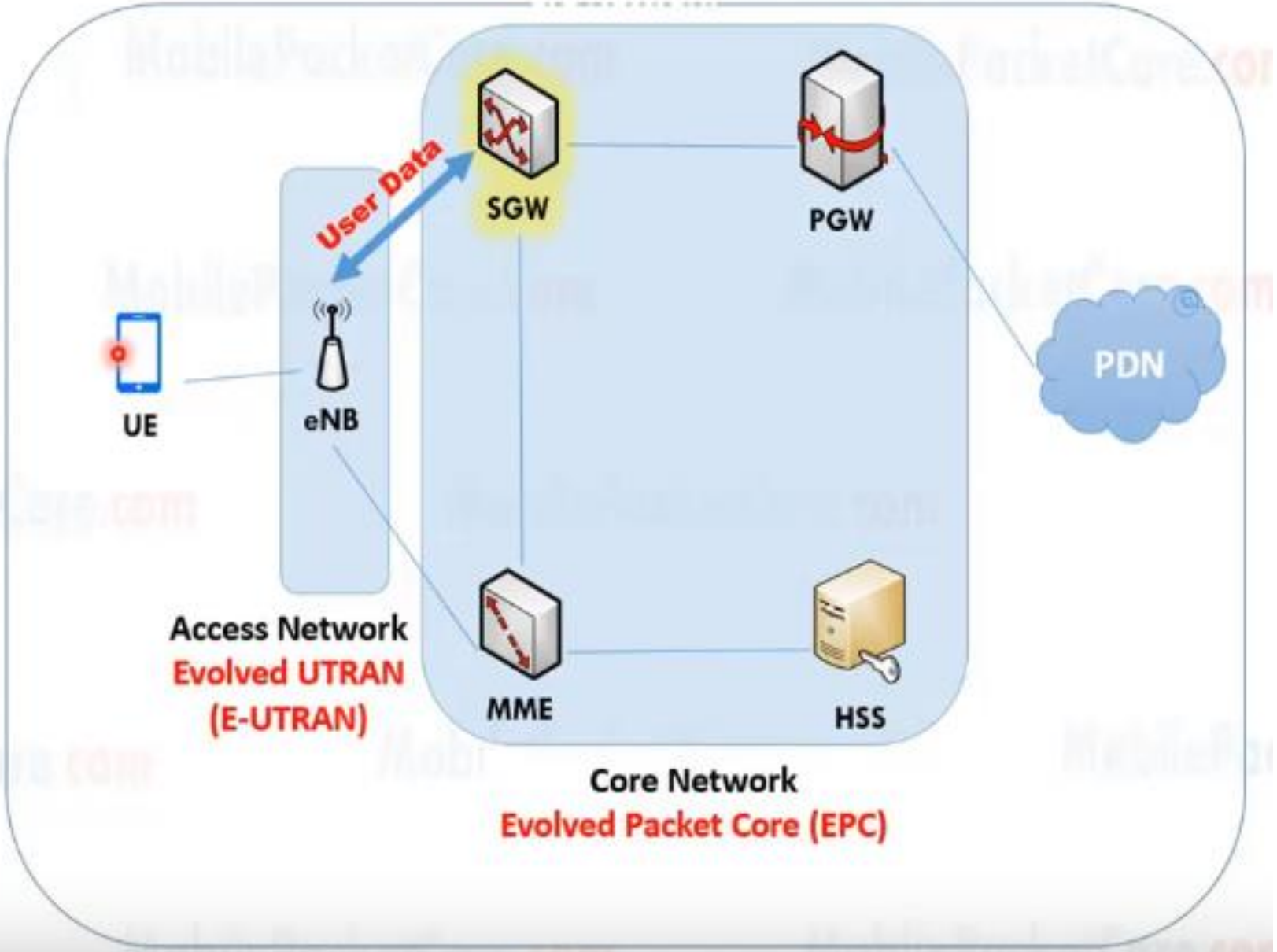


Network Architecture

SGW:

(Serving Gateway)

- Anchor point for user data.



Network Architecture

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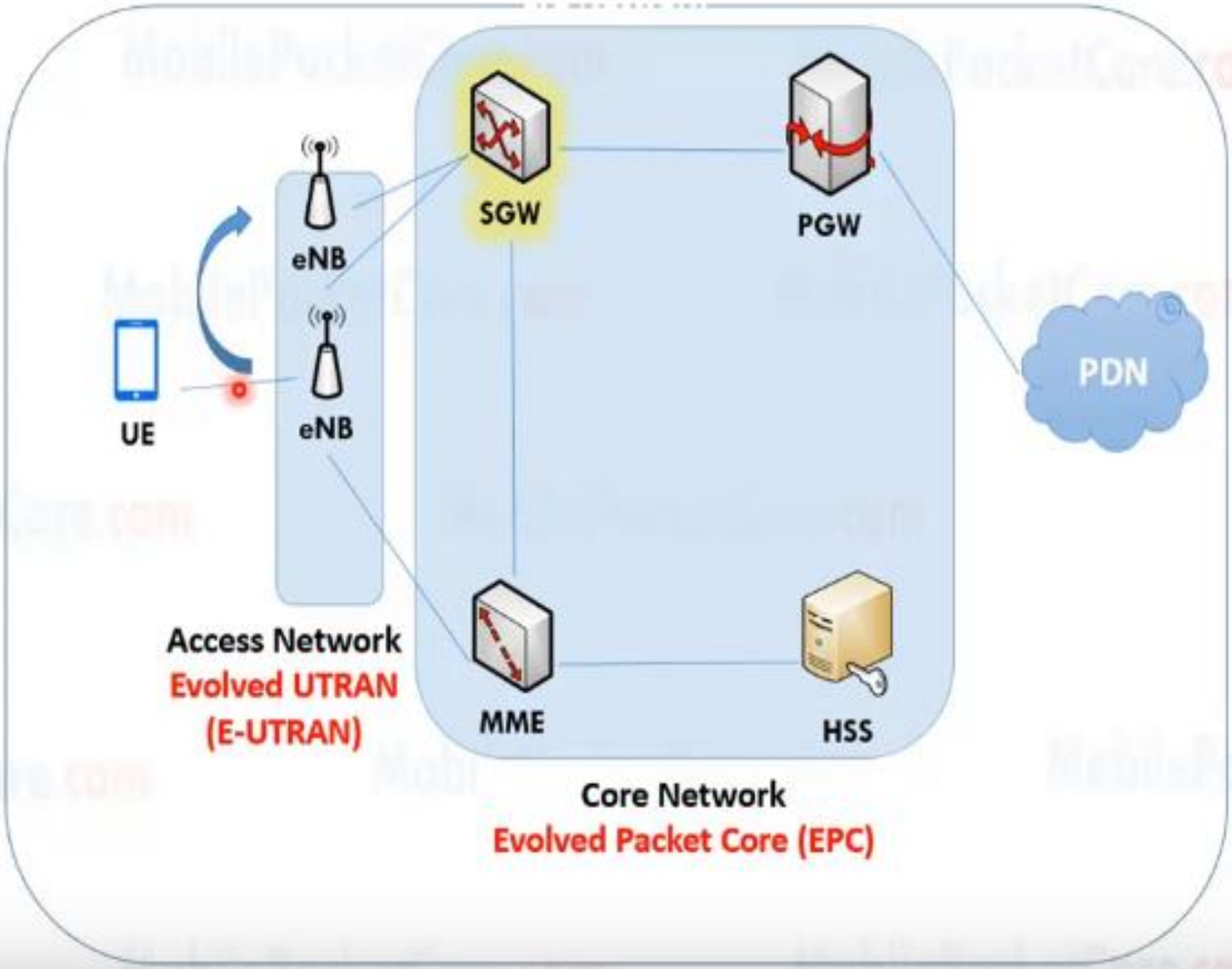
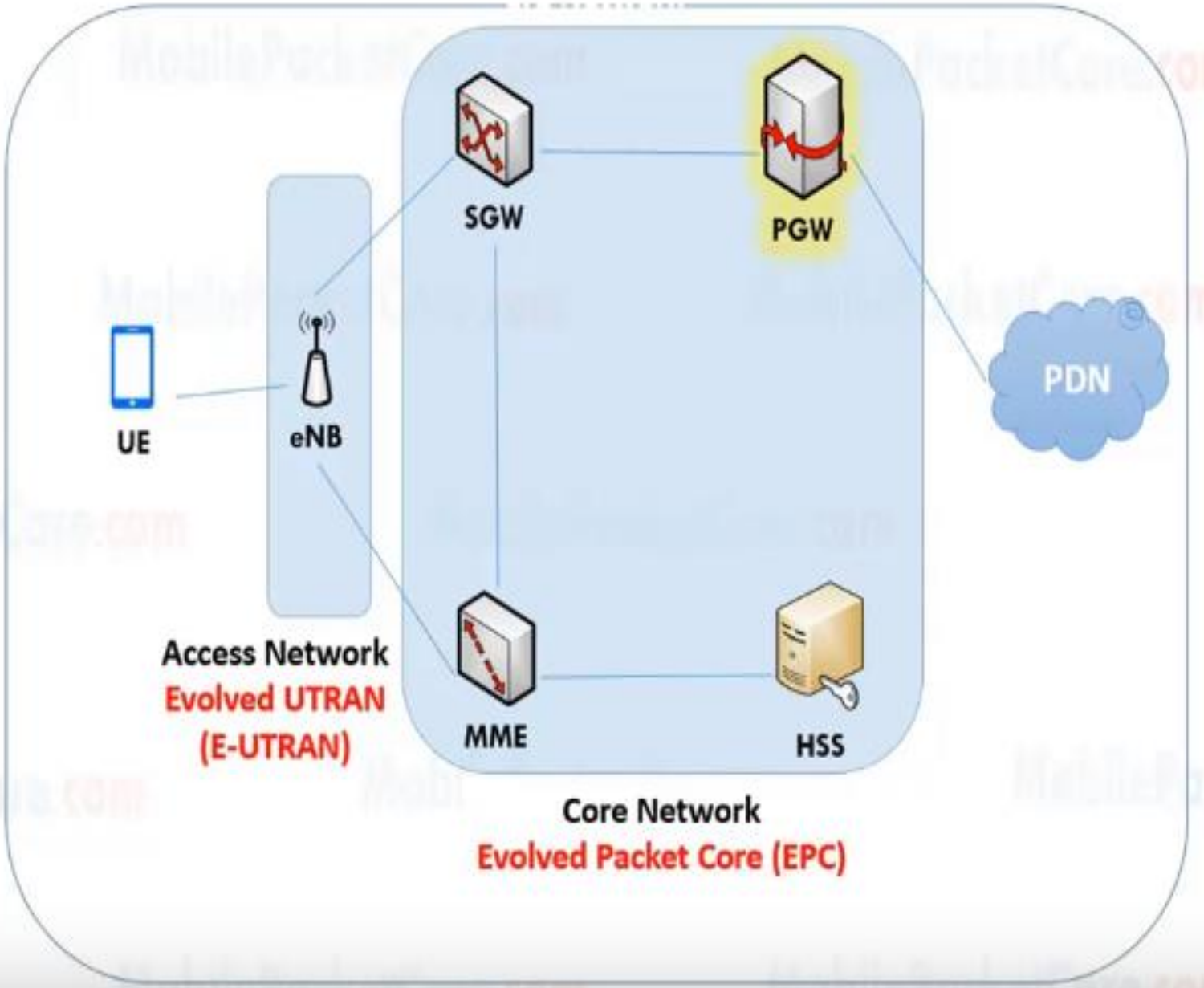


Network Architecture

PGW:

(PDN Gateway)

- Connects between the EPC and the PDN.



Network Architecture

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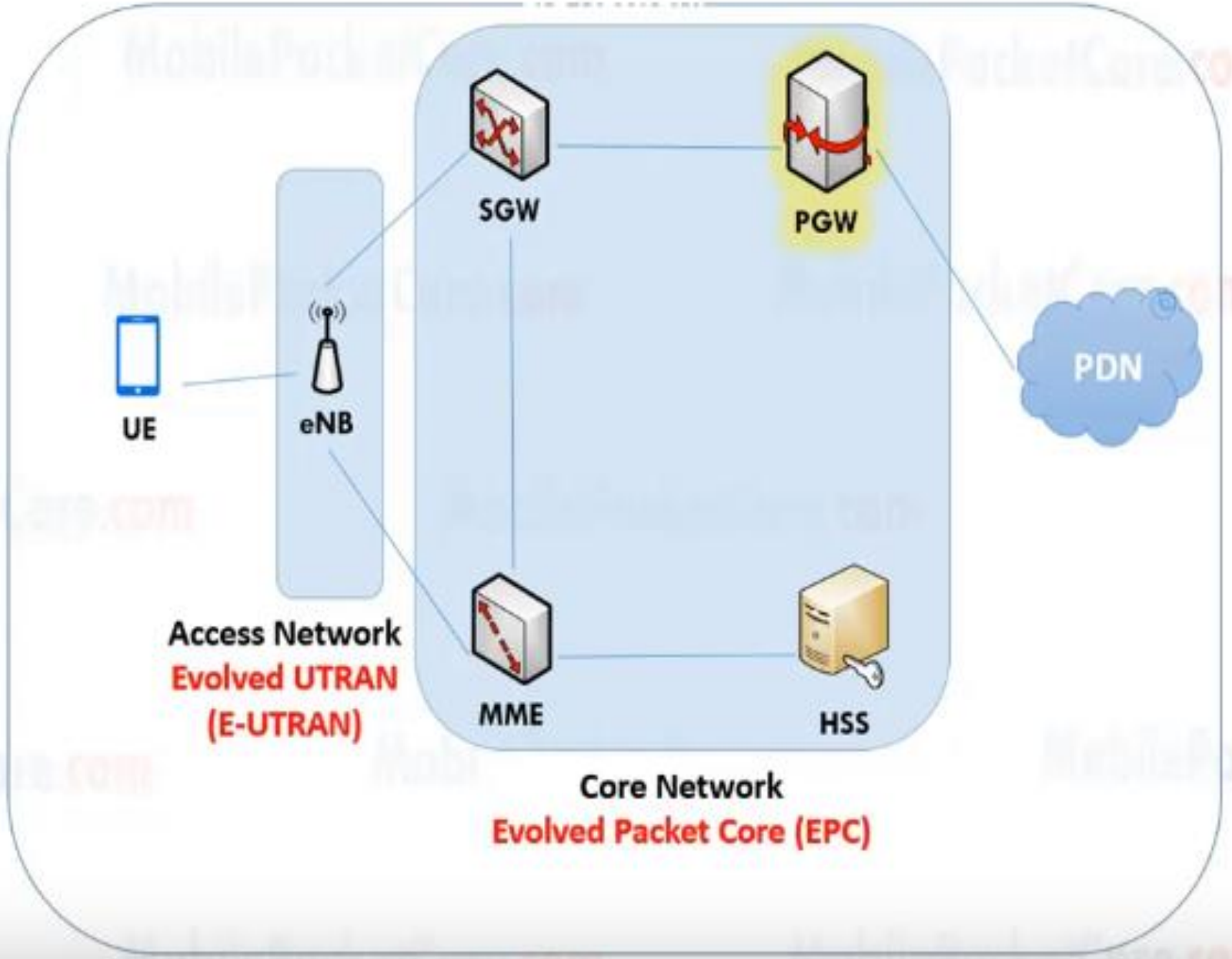
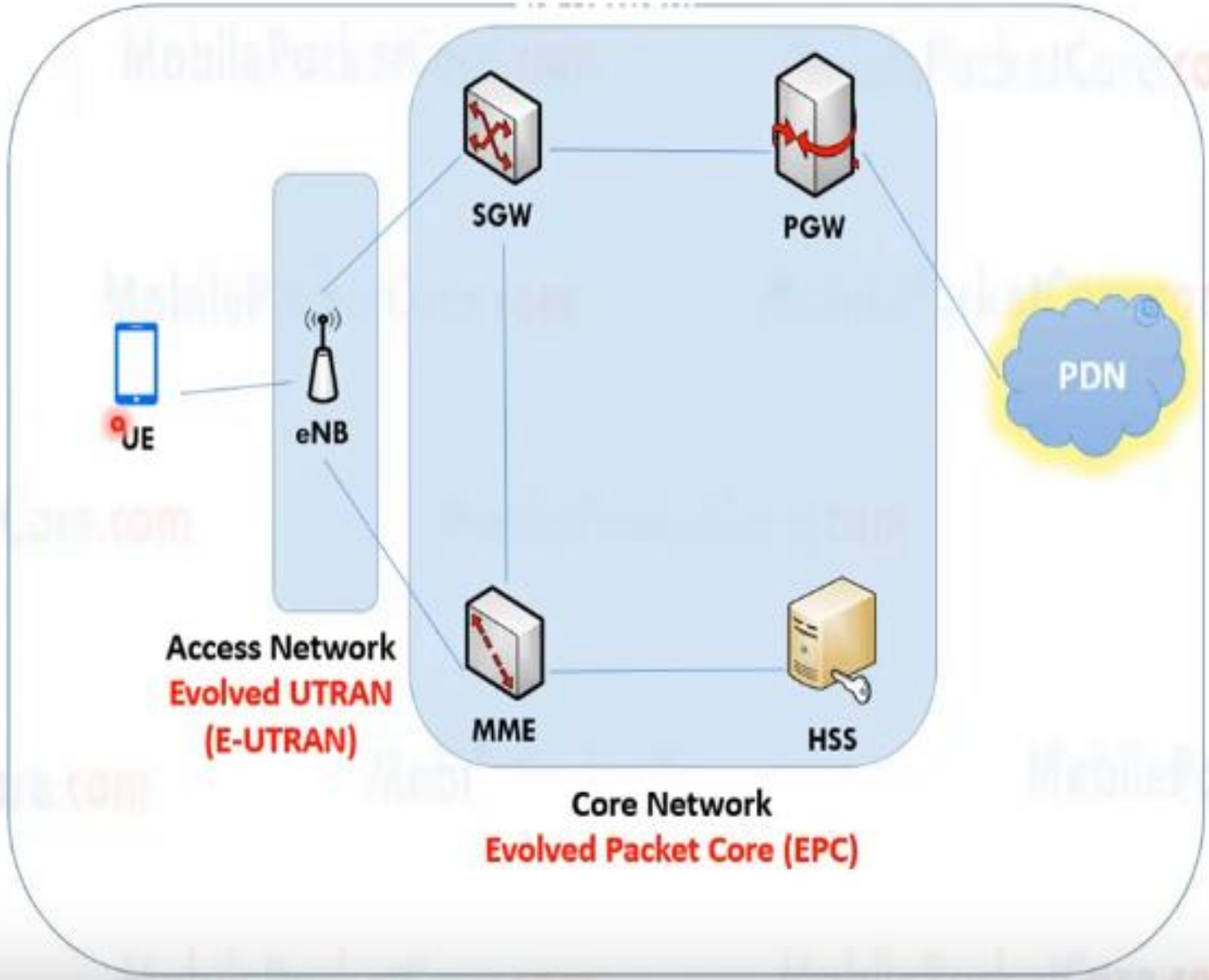


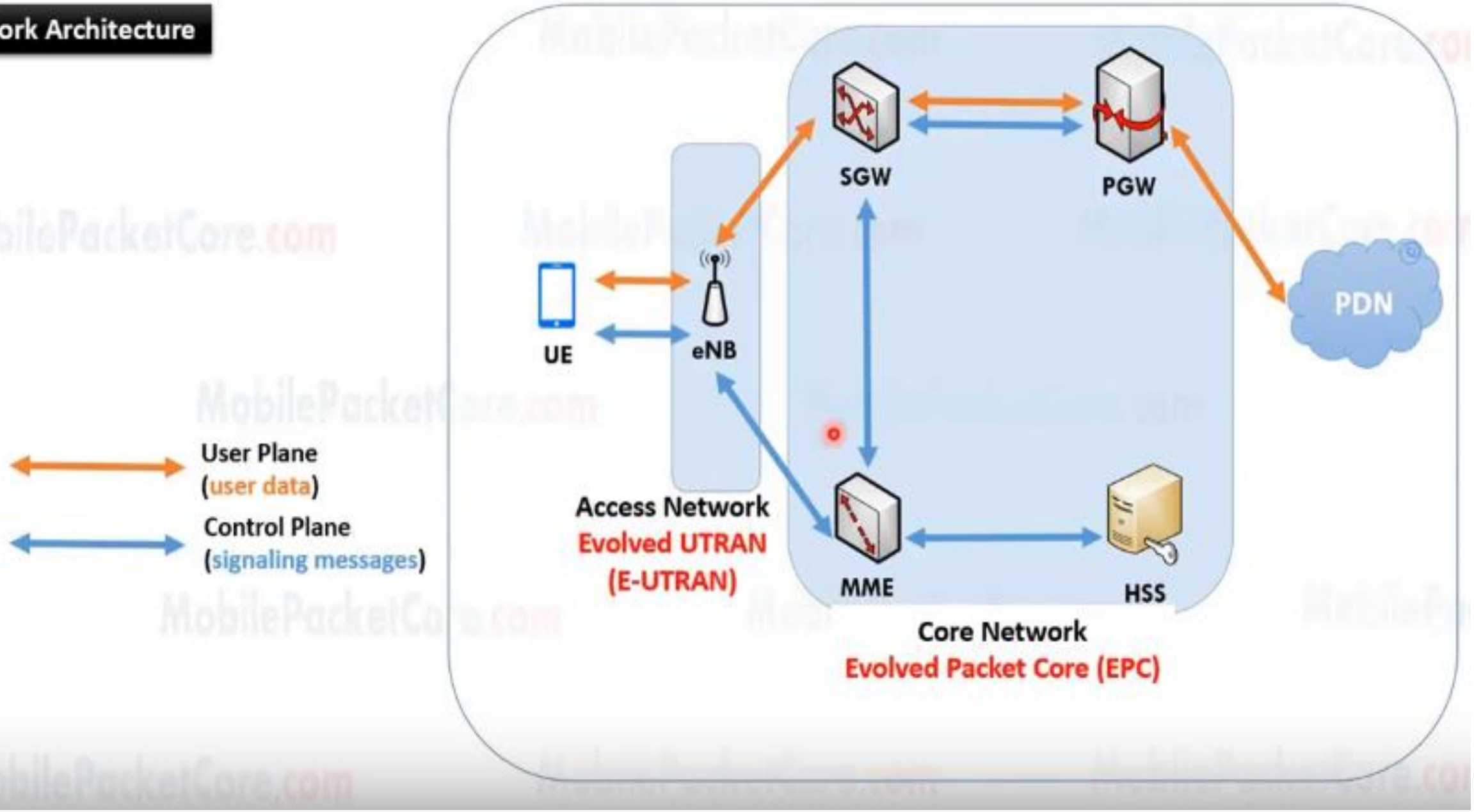
Network Architecture

PDN:

(Public Data Network)
- The external network the UE connects to.

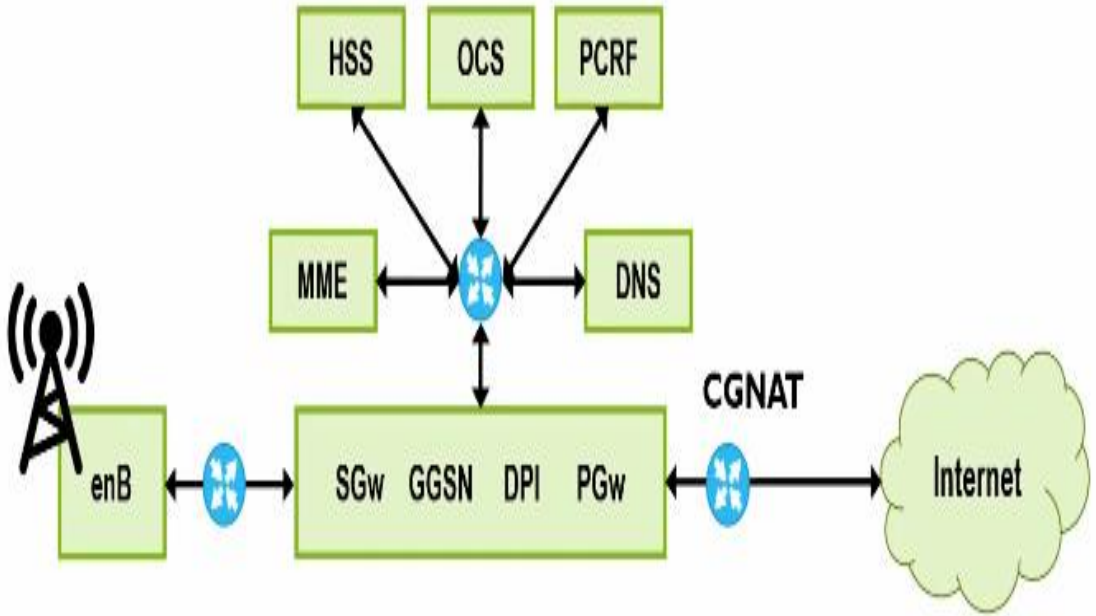


Network Architecture



NFV : Network function Virtualization

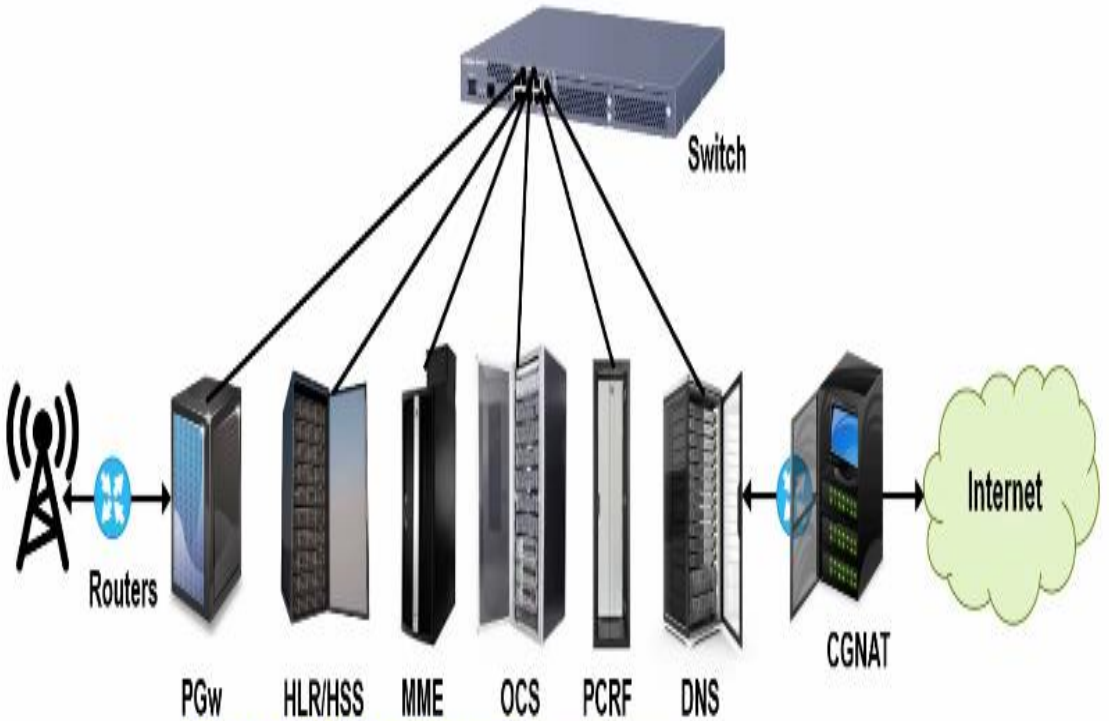
also known as virtual network function (VNF)



Introduction to NFV

Traditional LTE Netwo

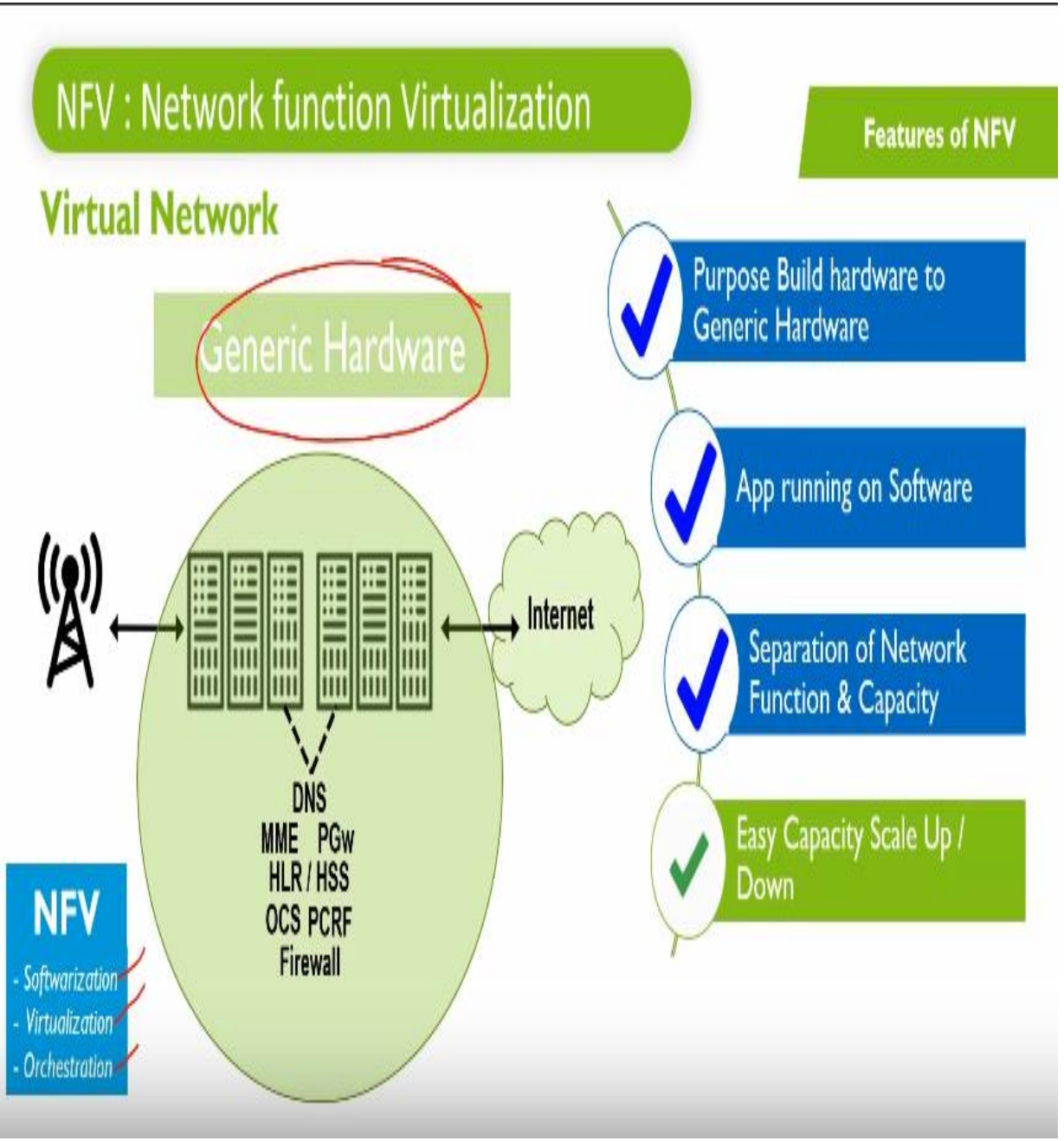
NFV : Network function Virtualization

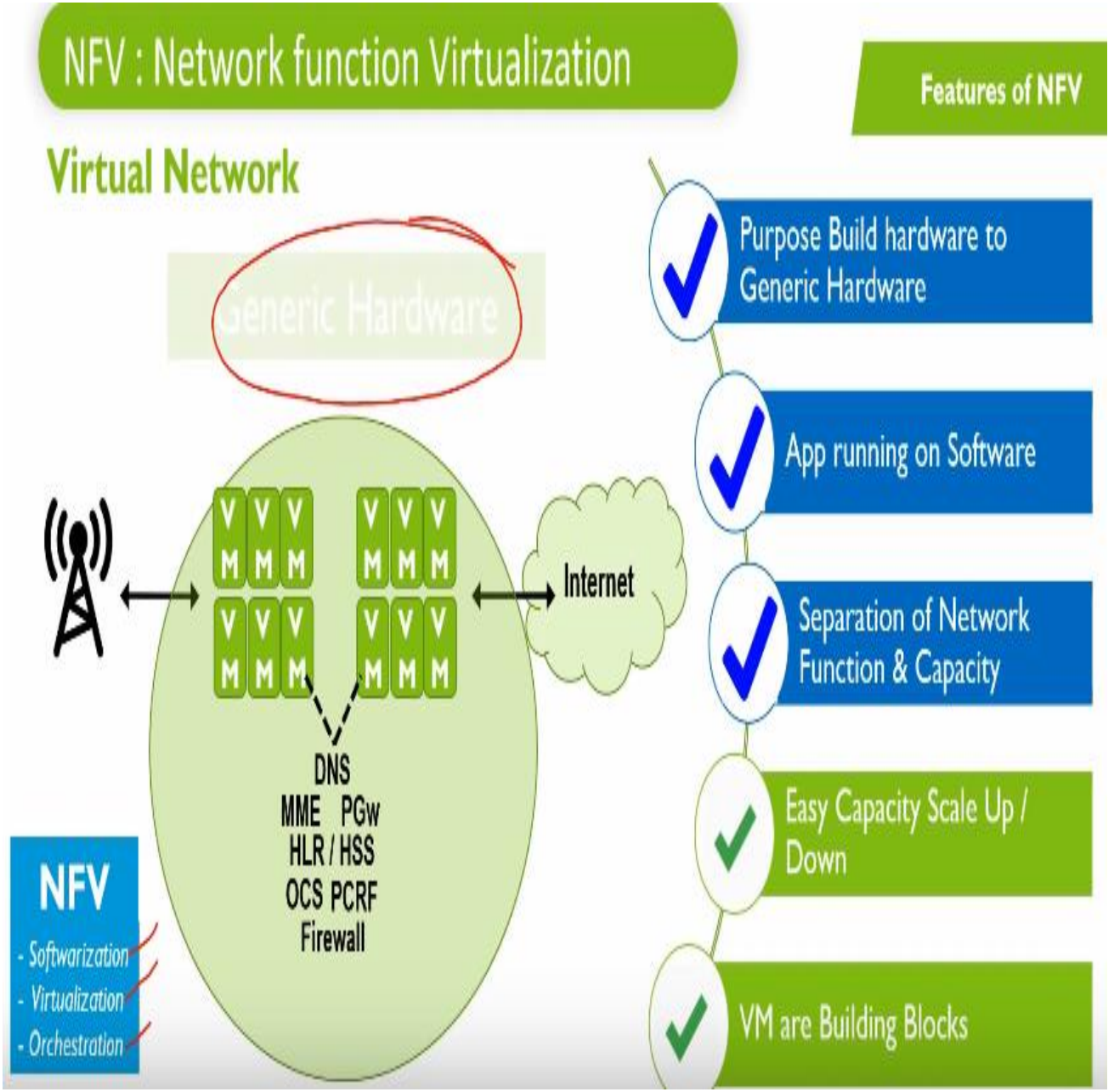


Specialized Appliances / Purpose Build

Combination of Capacity & Functionality

Traditional LTE Network


NFV : Network function Virtualization
Features of NFV
Virtual Network
Generic Hardware
Purpose Build hardware to Generic Hardware
App running on Software
Separation of Network Function & Capacity
Easy Capacity Scale Up / Down
Internet
DNS
MME PGw
HLR / HSS
OCS PCRF
Firewall
NFV
- Softwarization
- Virtualization
- Orchestration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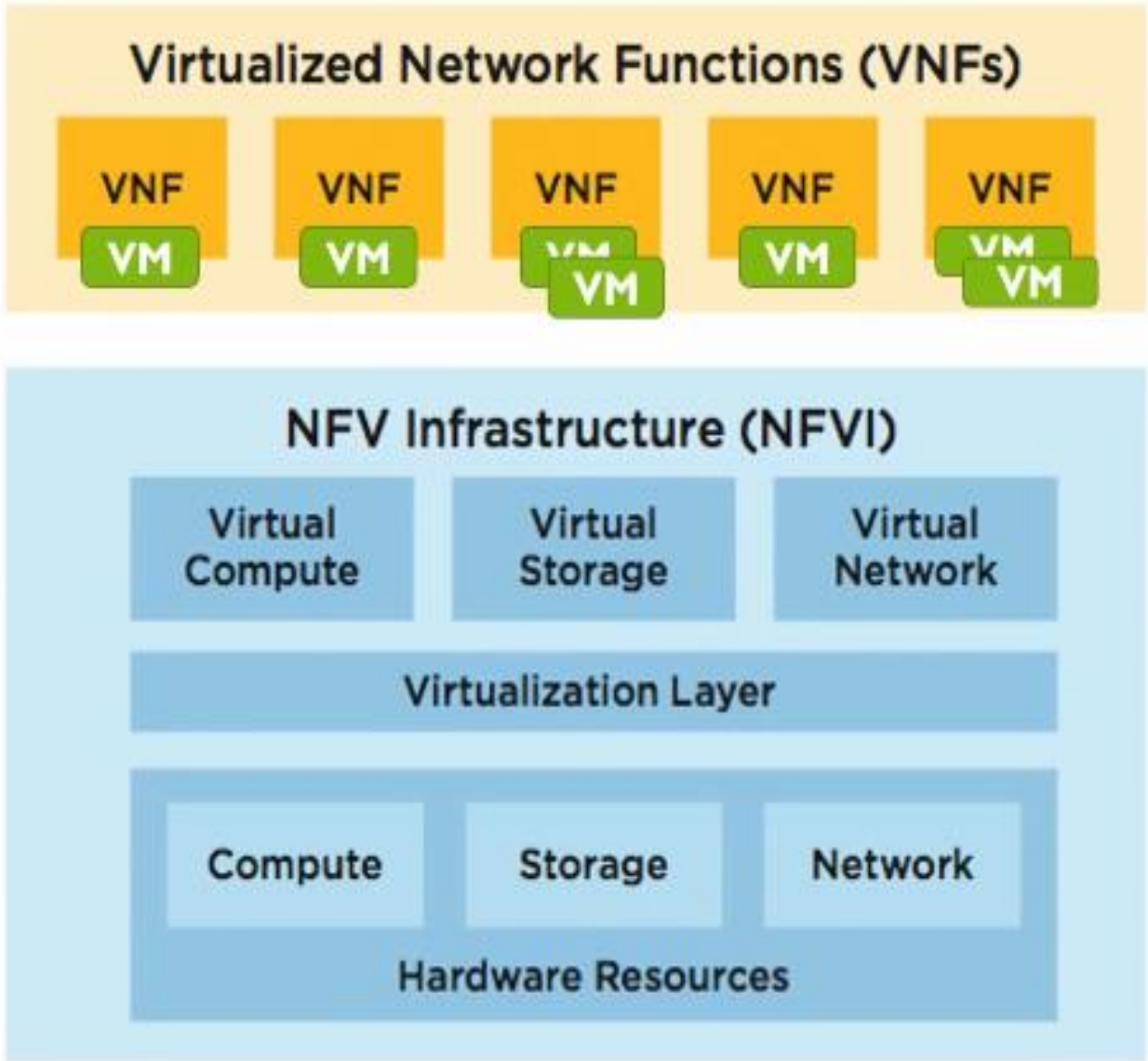
NFV Architecture



NFV Management and Orchestration

NFV Layers

Governing Specs

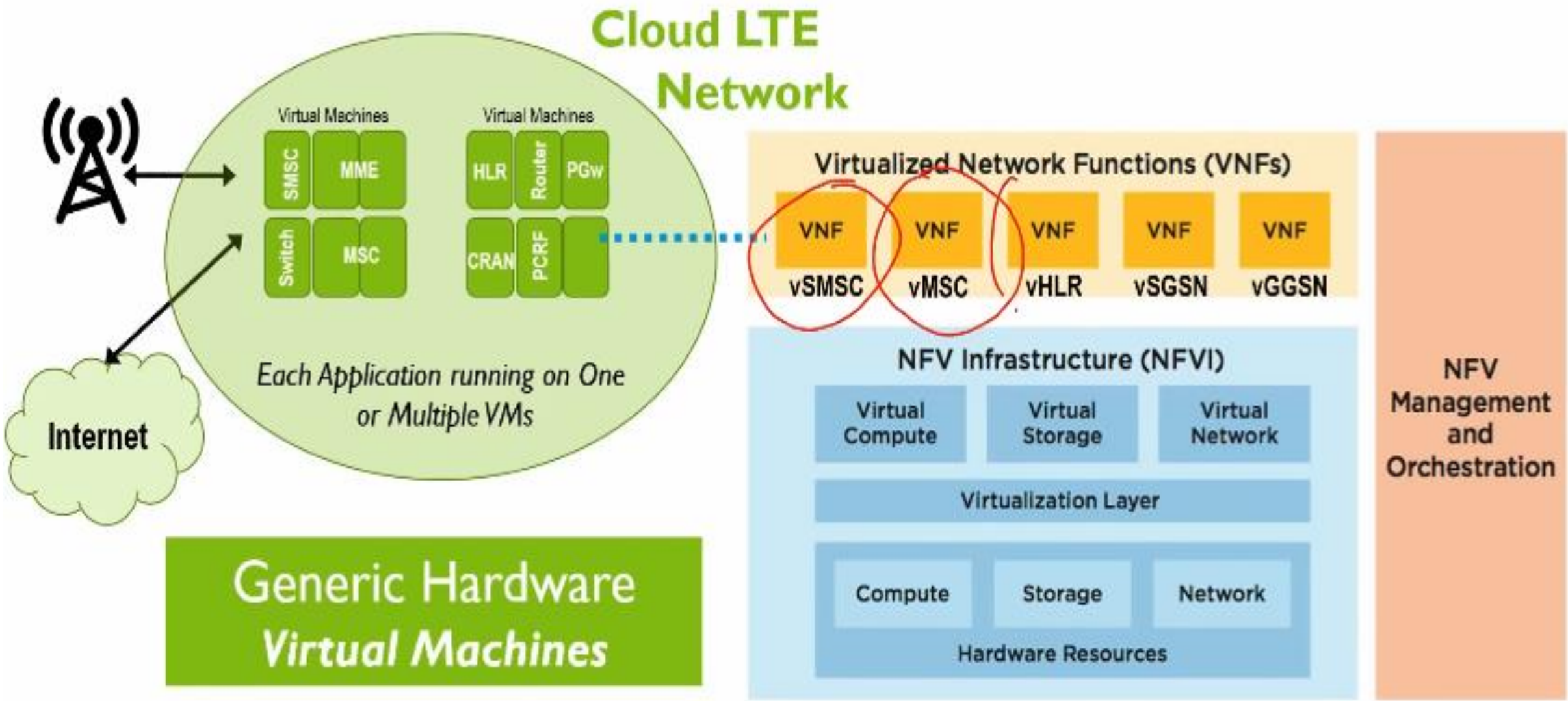
ETSI
World Class Standards

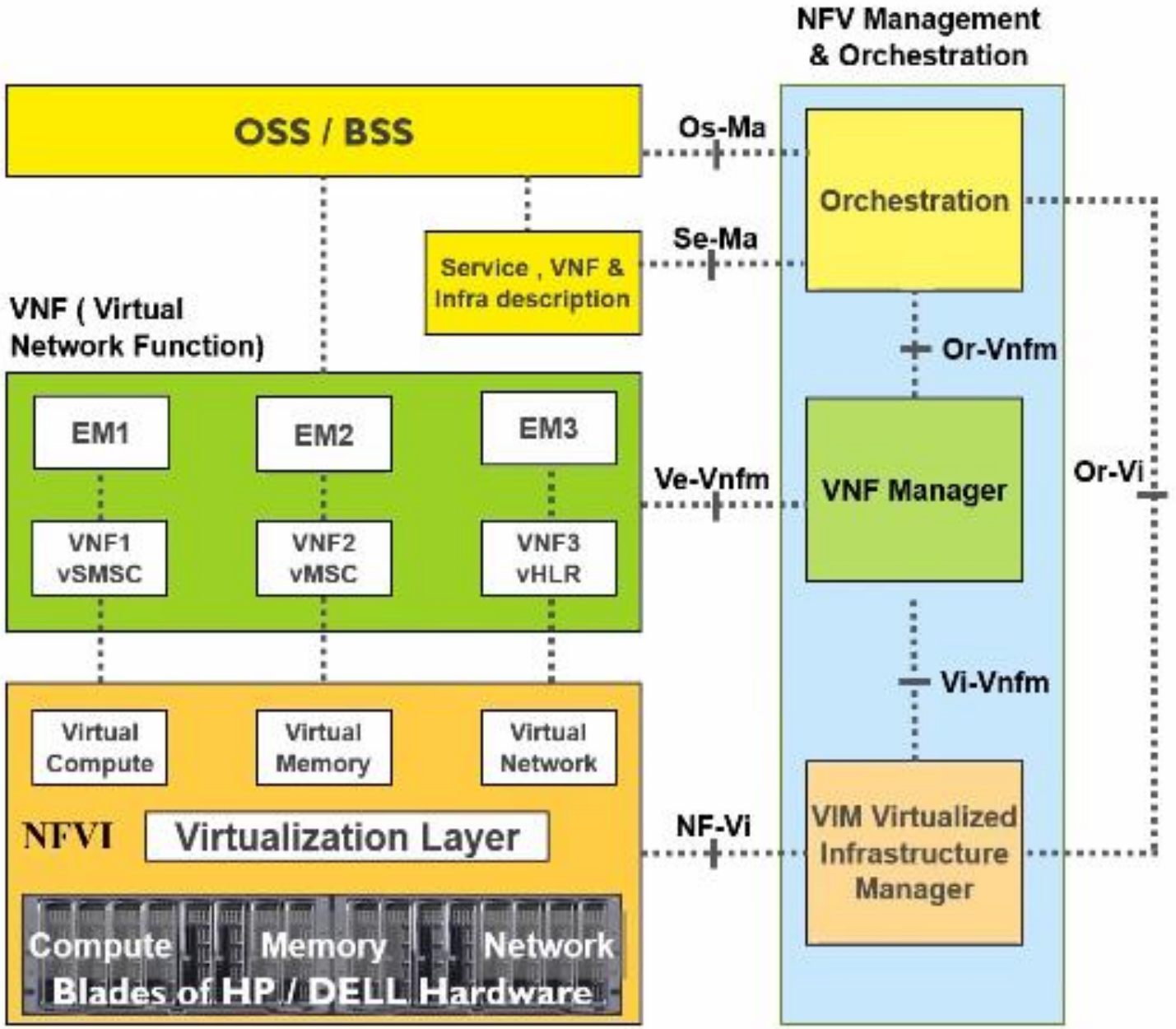
October 2012
White Paper

- AT&T USA
- BT
- CenturyLink
- China Mobile
- Colt
- Deutsche Telekom
- KDDI
- Orange
- Telecom Italia
- Telefonica
- Telstra
- Verizon

NFV : Network function Virtualization

Components of NFV





NFV Layers

NFVI

(Network Function Virtualization Infrastructure)

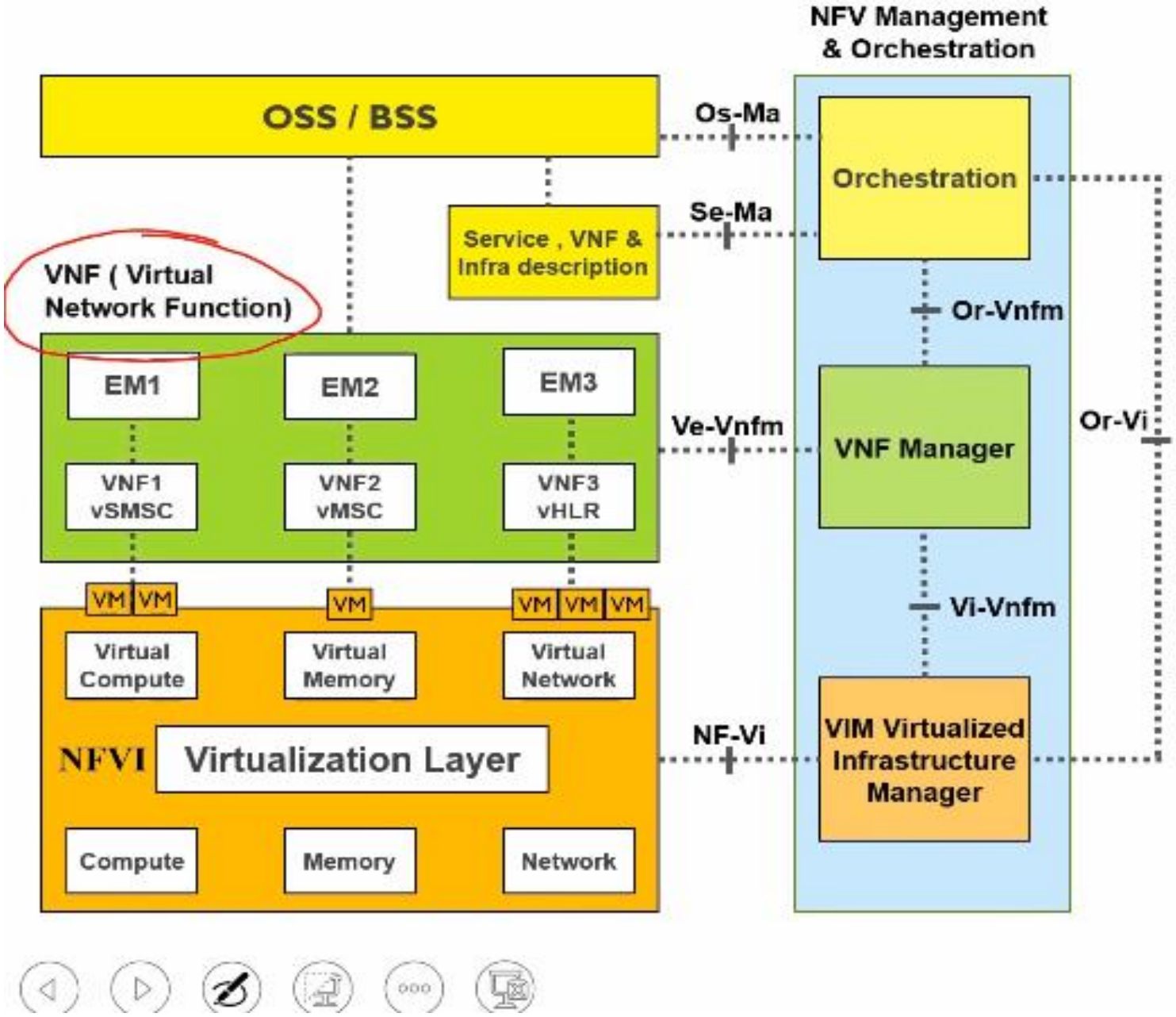
- Manage Physical part in NFVI
- Hypervisor : Responsible for abstracting physical resources into virtual resources

VIM

(Virtualized Infrastructure Manager)

- Management / Control for NFVI
- Also manages Reports & events

NFV Architecture



NFV Layers

VNF

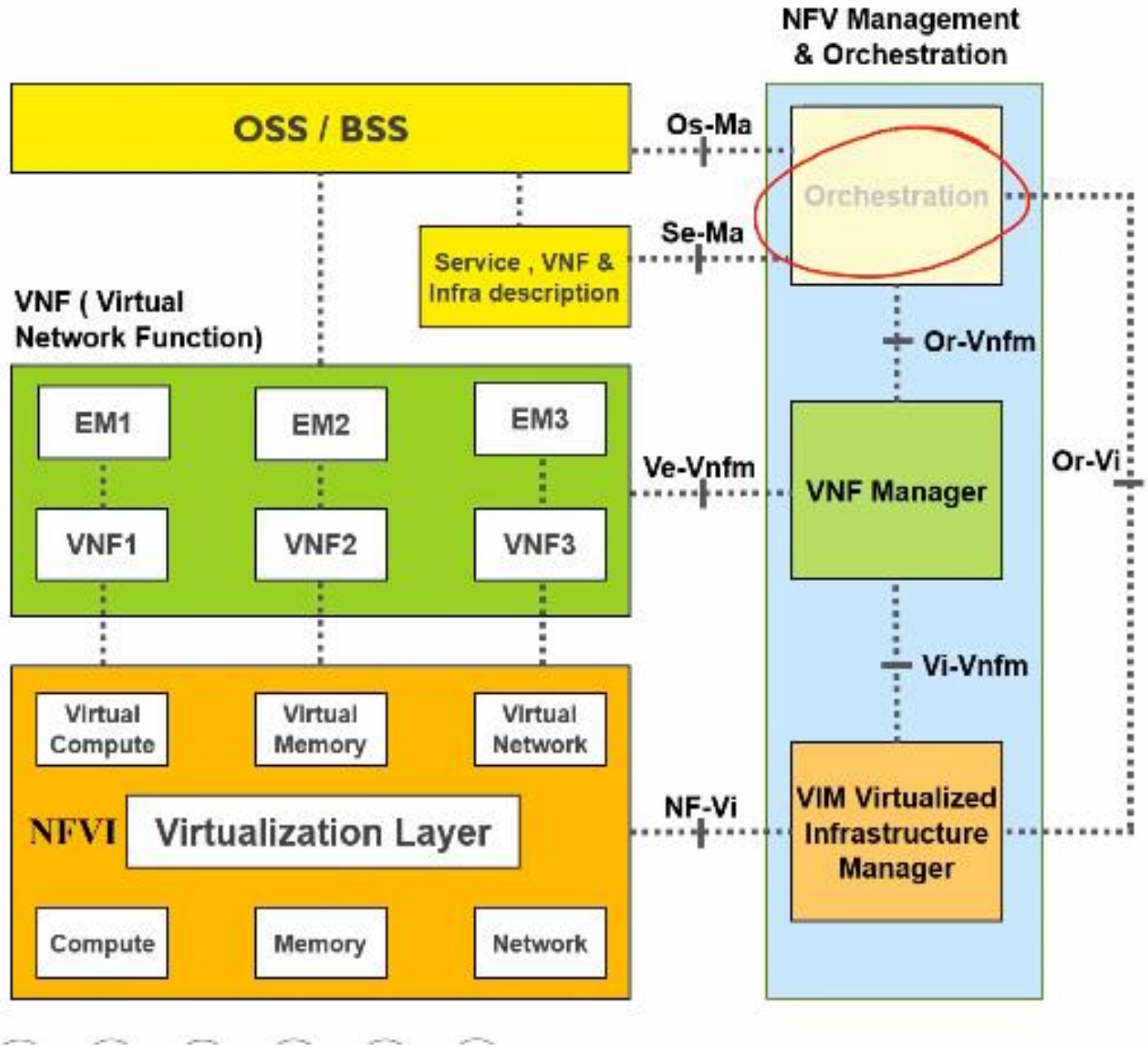
- A VNF is the basic block in NFV Architecture , Example :-
  - vIMS
  - vMME
  - vMSC
  - vSwitch
  - vRouter

- **EM (Element Management)** *FCAPS of Application such as Link down , KPI Degradation etc.*

VNF Manager

- Life cycle VNFs :
  - setting up/
  - Maintaining
  - Tearing down
- FCAPS of Virtualization and VNF

NFV Architecture



NFV Layers

NFV Orchestrator (NFVO)

- Key to Automation of SDN & NFV
- Performs :-
  - Resource orchestration
  - Network service orchestration
- Global resource management of NFVI resources via VNFM & VIM
- Allocating and scaling resources
- Single Orchestrator for NFV service

NFV Architecture

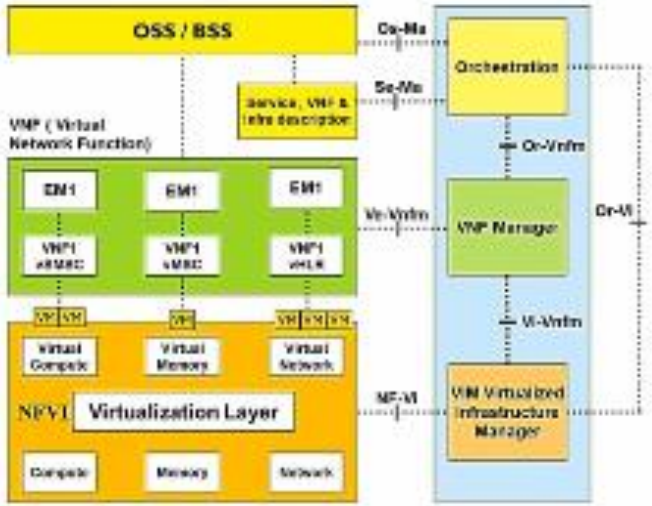
Why SDN ?

New Service or Node

Virtual Compute

Few Seconds

NFV



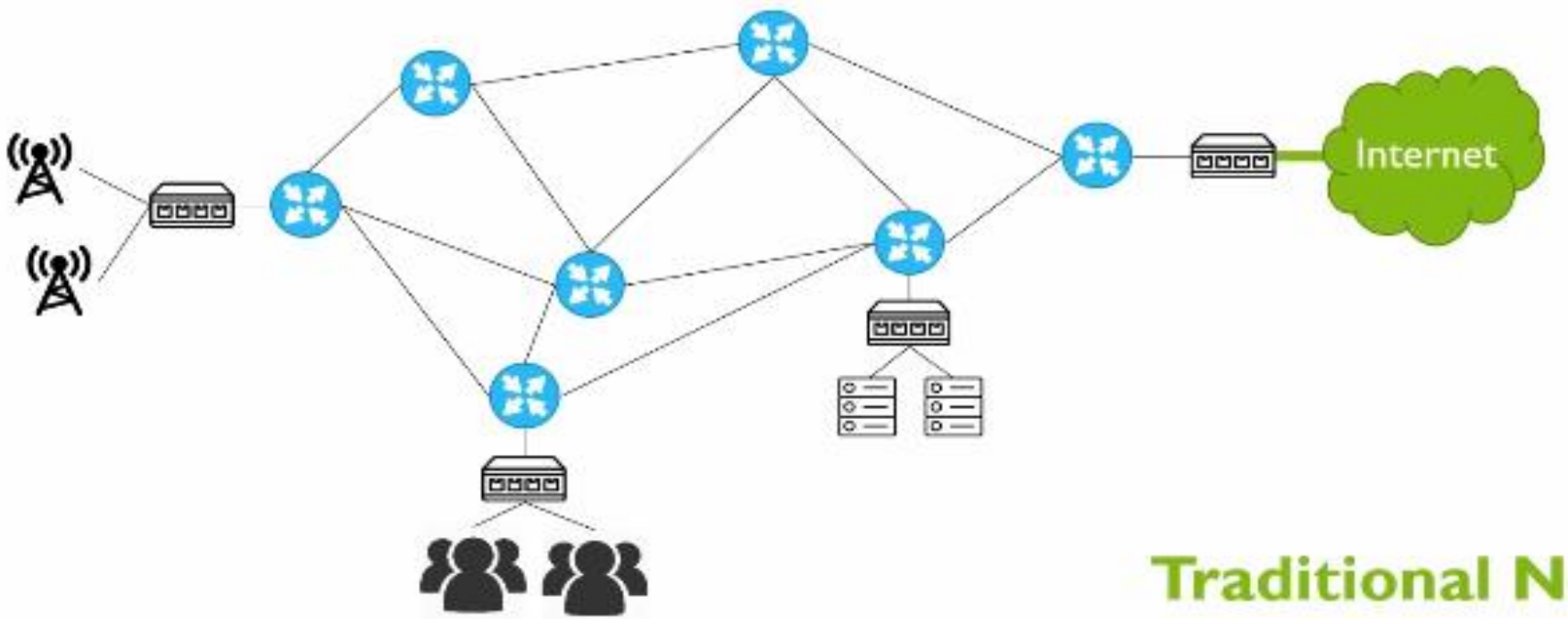
Network Reachability

?

- IP Allocation
- Policy Opening
- Routing changes
- Bandwidth Allocation
- End to End Reachability
- Service testing

Few Days

What is SDN (Software-Defined Networking)

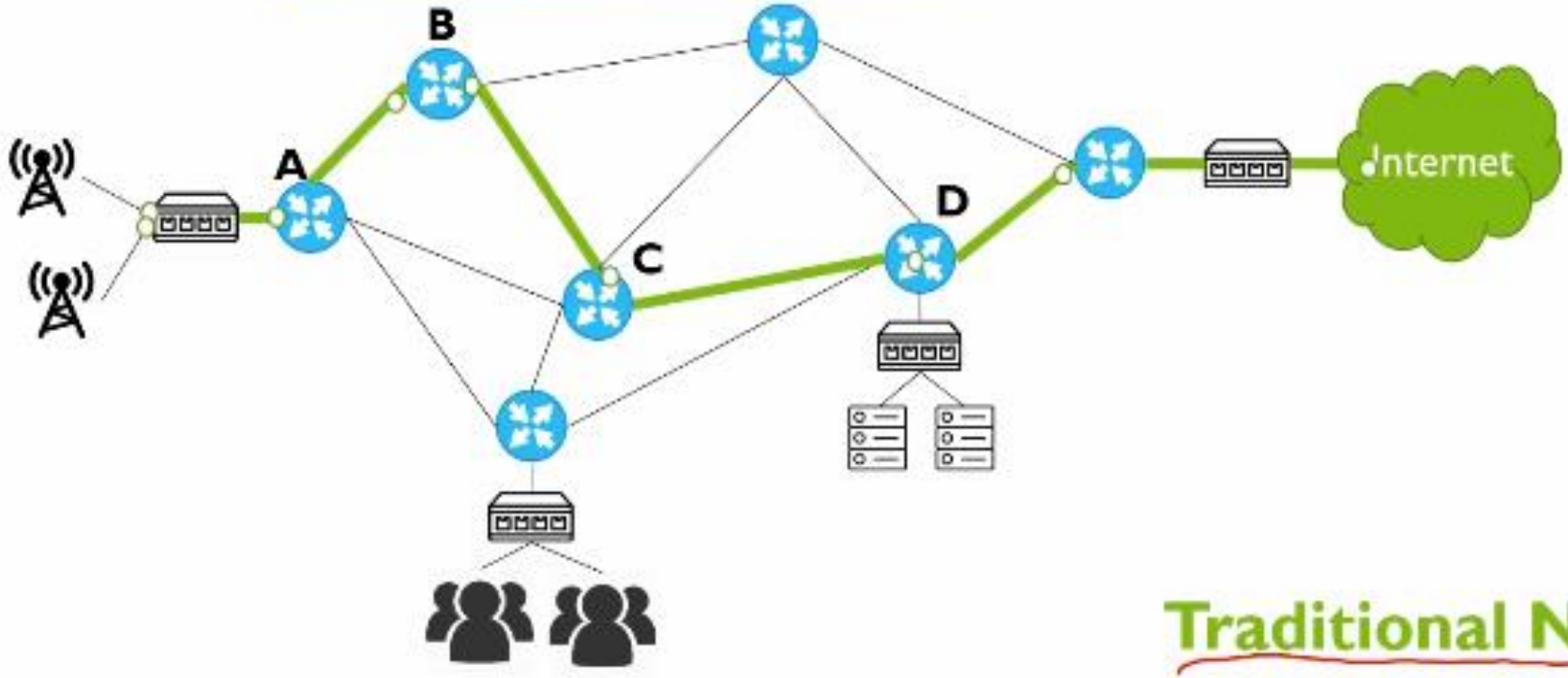


Traditional Network

Use of Integrated Hardware & Software

- Data or Forwarding Plane
- Control Plane
- Management Plane

DATA PLANE
(Forwarding Function)



Traditional Network

Use of Integrated Hardware & Software

- Data or Forwarding Plane ✓
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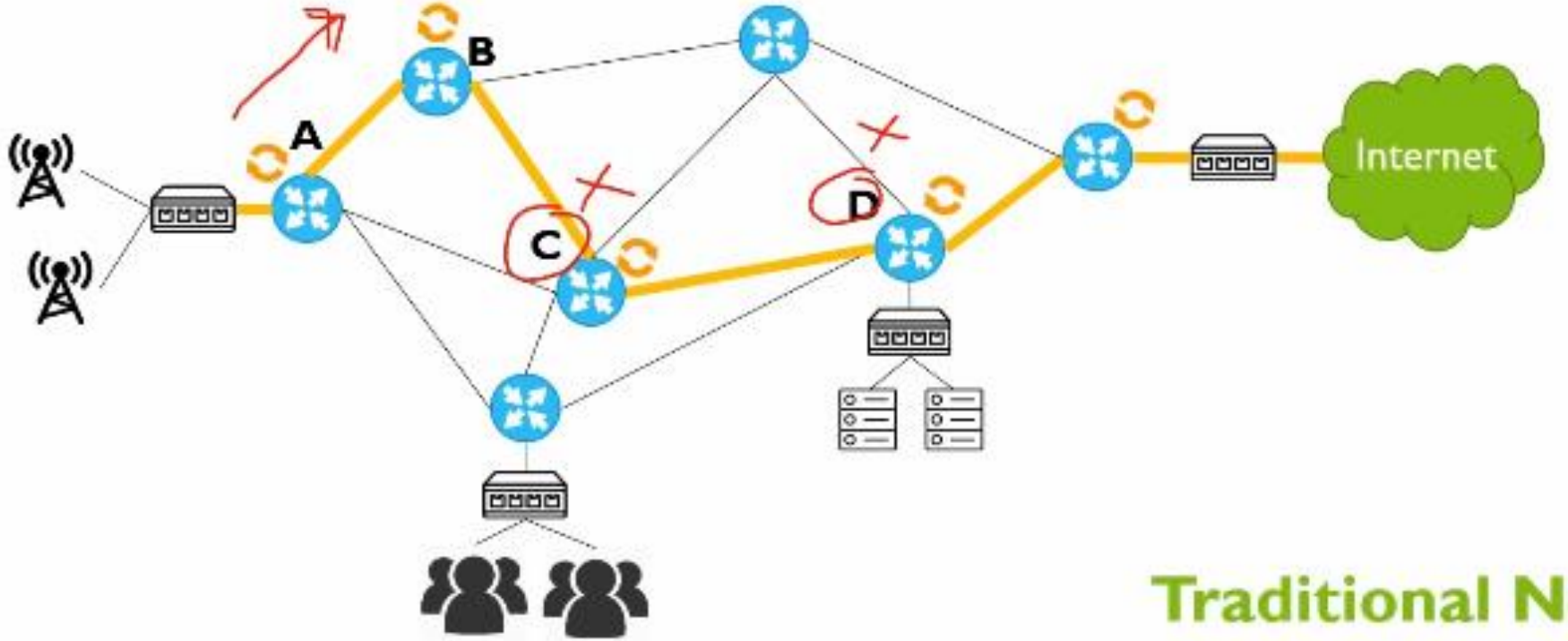
CONTROL PLANE



Traditional Network

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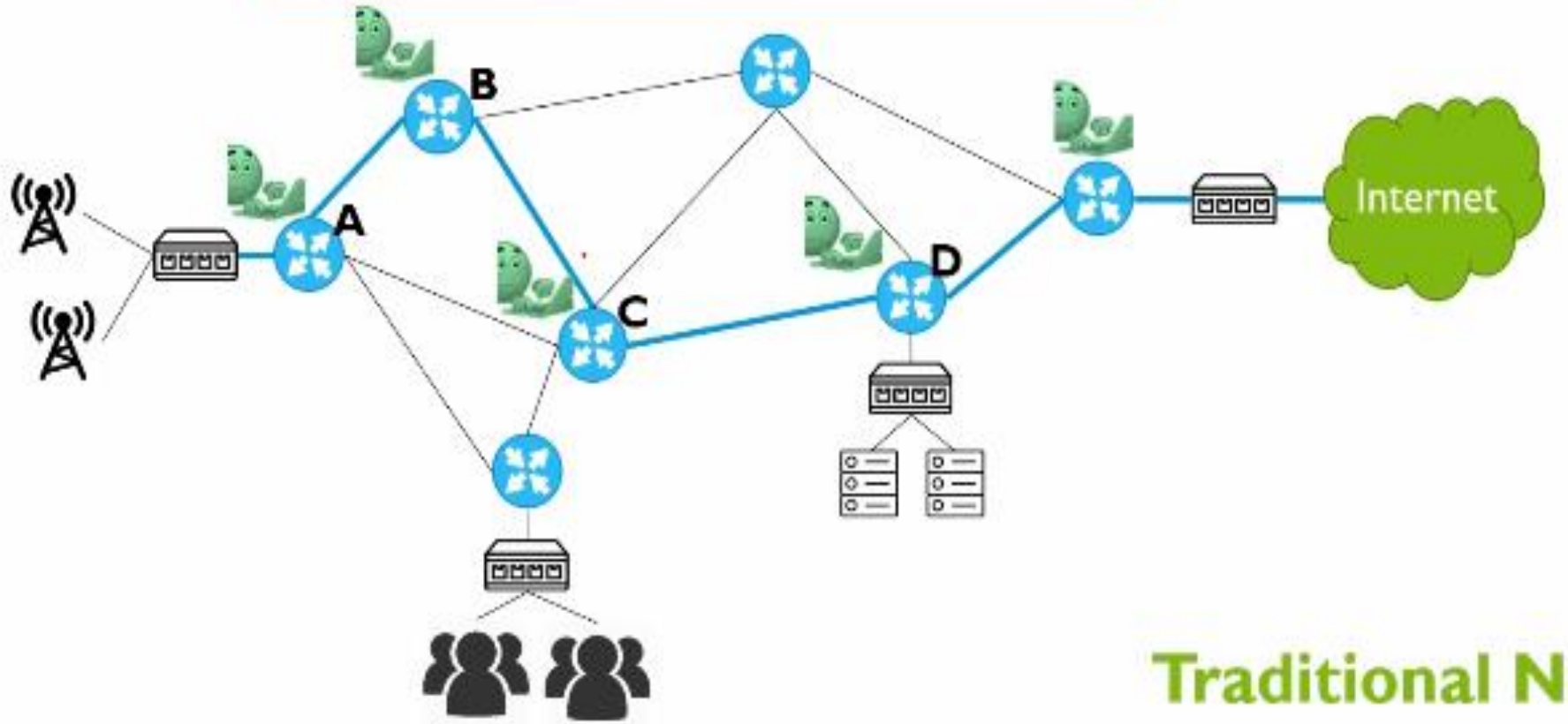
Management PLANE

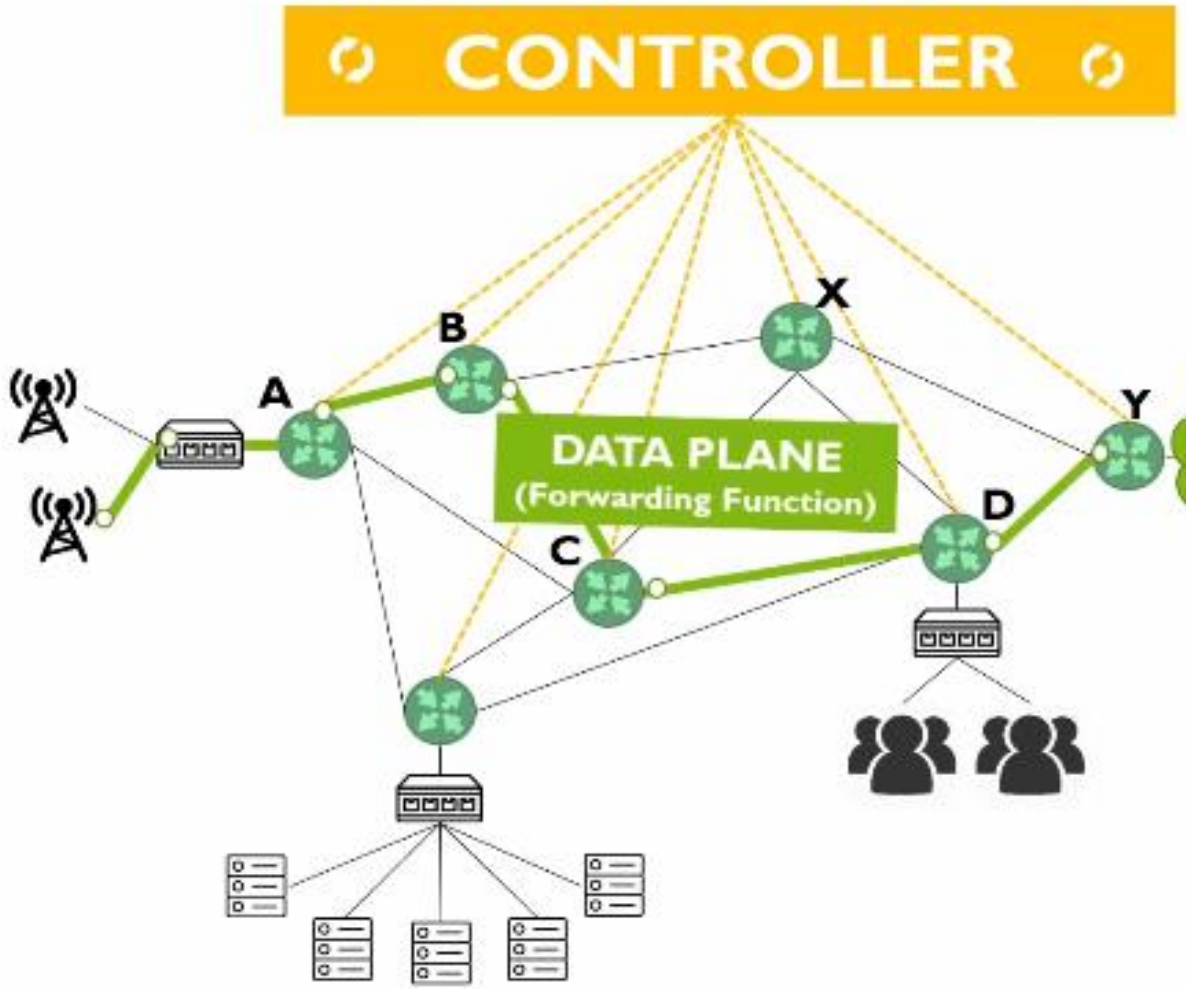


Traditional Network

Use of Integrated Hardware & Software

- Data or Forwarding Plane ✓
- Control Plane ✓
- Management Plane ✓

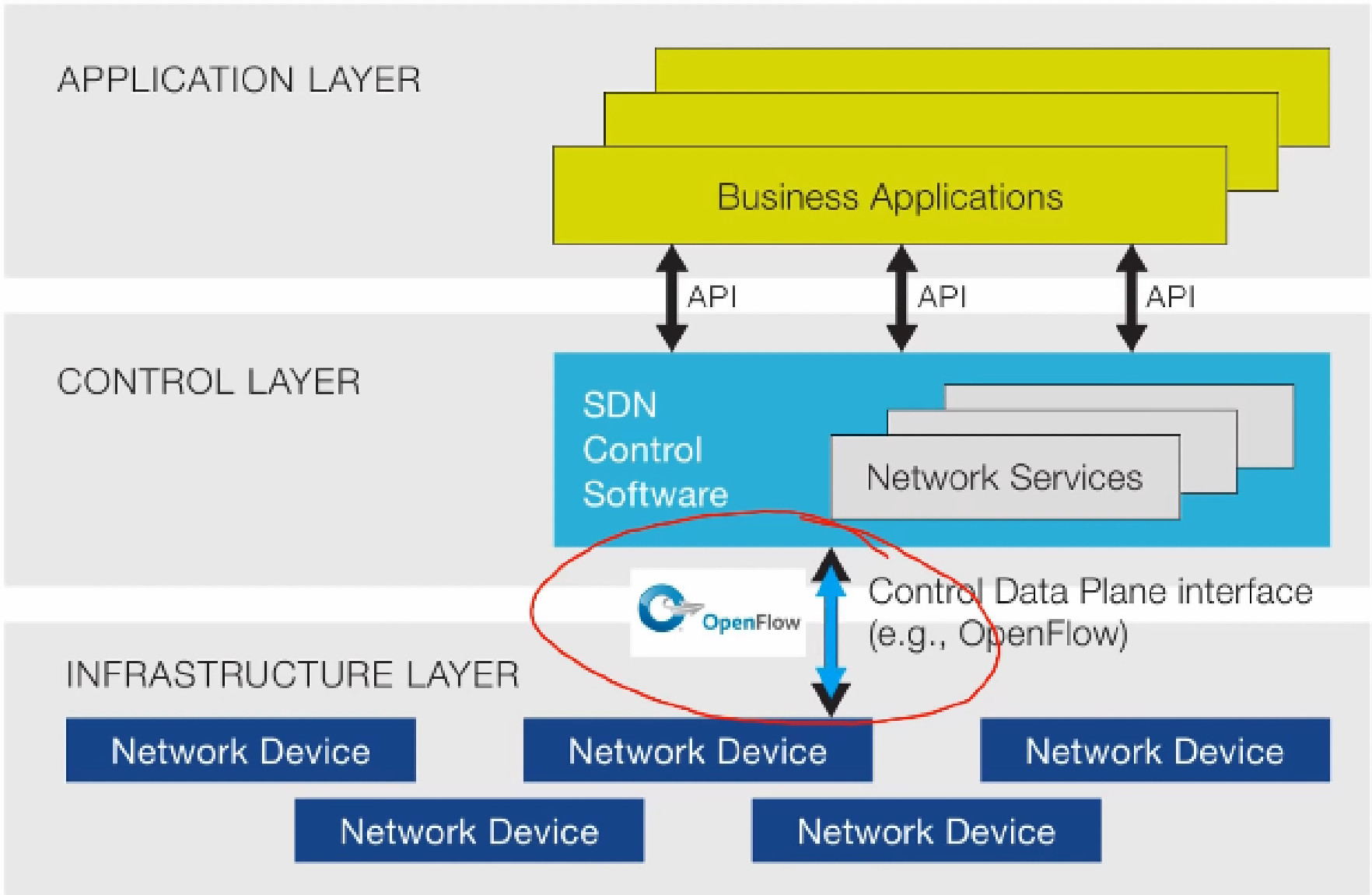
SDN : Separation of Control & Data layer



Features of SDN

- Makes Networking & IP Routing flexible
- Decoupling control & Data plane
- Offloads brain to centralized controller
- Central View of Resources
- Programmable Network , Centrally Managed , Agile for any Need

SDN Framework



SDN Layers

Governing Specs

2011
Open Networking Foundation

IETF

Why SDN ?

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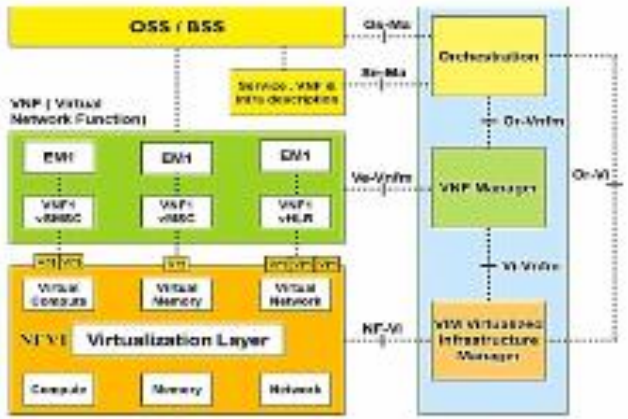
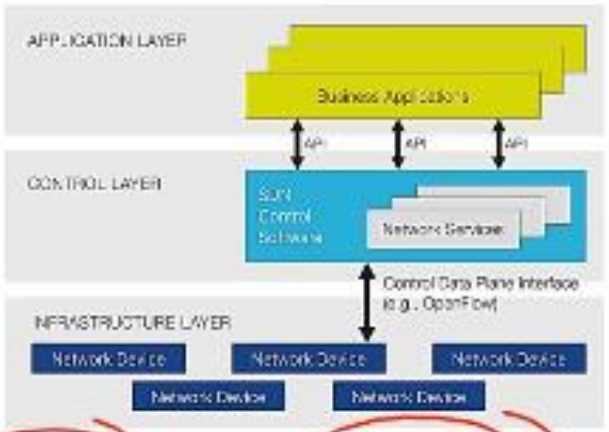
Virtual Compute

Network Reachability

NFV



SDN



Few Seconds

Few Seconds

- Directly Programed
- Flexible , Dynamic & Agile
- Centrally Managed
- Abstracts Network
- Control & Data Plane Separation
- Open Standards & Vendor