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UNIT I SDN: INTRODUCTION **9**

Evolving Network Requirements - The SDN Approach - SDN architecture - SDN Data Plane, Control plane and Application Plane

UNIT II SDN DATA PLANE AND CONTROL PLANE **9**

Data Plane functions and protocols - Open Flow Protocol - Flow Table - Control Plane Functions - Southbound Interface, Northbound Interface - SDN Controllers - Ryu, Open Daylight, ONOS - Distributed Controllers

UNIT III SDN APPLICATIONS **9**

SDN Application Plane Architecture - Network Services Abstraction Layer - Traffic Engineering - Measurement and Monitoring - Security - Data Center Networking

UNIT IV NETWORK FUNCTION VIRTUALIZATION **9**

Network Virtualization - Virtual LANs - Open Flow VLAN Support - NFV Concepts - Benefits and Requirements - Reference Architecture

UNIT V NFV FUNCTIONALITY **9**

NFV Infrastructure - Virtualized Network Functions - NFV Management and Orchestration - NFV Use cases - SDN and NFV

TOTAL: 45 PERIODS

UNIT I

INTRODUCTION

PART - A				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Define Software-Defined Networking (SDN).	CO1	Remember	Low
2.	What are the key evolving network? requirements?	CO1	Understand	Low
3.	List any two benefits of SDN.	CO1	Remember	Low
4.	What are the three planes in SDN? architecture?	CO1	Understand	Low
5.	Define Control Plane in SDN.	CO1	Remember	Low
6.	What is the role of the SDN Application? Plane?	CO1	Understand	Low
7.	Mention any two differences between SDN and traditional networking.	CO1	Remember	Medium
8.	What is the function of the SDN Data Plane?	CO1	Understand	Low
9.	What is Open Flow in SDN?	CO1	Understand	Low
10.	State any two challenges of SDN.	CO1	Remember	Low

PART - B				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Explain the evolving network requirements that led to the development of SDN	CO1	Understand	Medium
2.	Illustrate the SDN architecture with a neat diagram and explain its components	CO1	Analyze	Medium
3.	Compare and contrast SDN with traditional networking architectures.	CO1	Evaluate	Medium
4.	Discuss the advantages and limitations of SDN. How does SDN improve network management?	CO1	Understand	Medium
5.	Design a basic SDN-based network and explain how it differs from a traditional network.	CO1	Create	High
6.	Describe the roles of Control Plane, Data Plane, and Application Plane in SDN.	CO1	Understand	Medium
7.	Analyze how the SDN Control Plane communicates with the Data Plane and Application Plane.	CO1	Analyze	Medium
8.	Justify the need for separating the Control Plane from the Data Plane in SDN.	CO1	Analyze	Medium
9.	Explain the Open Flow protocol and its importance in SDN implementation.	CO1	Understand	Medium
10.	Propose an SDN-based solution to enhance network security and efficiency in a data center.	CO1	Create	High

UNIT II

SDN DATA PLANE AND CONTROL PLANE

PART - A				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Define SDN Data Plane.	CO2	Remember	Low
2.	What are the functions of the Data Plane in SDN?	CO2	Understand	Low
3.	List any two protocols used in the Data Plane	CO2	Remember	Low
4.	What is the role of Open Flow protocol in SDN?	CO2	Understand	Low
5.	Define Flow Table in SDN.	CO2	Remember	Low
6.	What are the functions of the Control Plane in SDN?	CO2	Understand	Low
7.	Differentiate between Southbound Interface and Northbound Interface.	CO2	Understand	Low
8.	List any two SDN Controllers.	CO2	Remember	Low
9.	What is the purpose of Distributed Controllers? in SDN**?**	CO2	Understand	Low
10.	Mention any one feature of Ryu, Open Daylight, and ONOS SDN controllers.	CO2	Remember	Low

PART - B				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Explain the functions of the SDN Data Plane with examples.	CO2	Understand	Medium
2.	Describe the Open Flow protocol in detail and explain its role in SDN.	CO2	Understand	Medium
3.	Analyze the structure and working of Flow Tables in SDN with a suitable diagram	CO2	Analyze	Medium
4.	Discuss the Control Plane functions and explain its interaction with the Data Plane.	CO2	Understand	Medium
5.	Compare and contrast the Southbound and Northbound Interfaces in SDN with examples	CO2	Evaluate	Medium
6.	Explain the architecture and key features of SDN Controllers (Ryu, Open Daylight, ONOS).	CO2	Understand	Medium
7.	Justify the need for Distributed SDN Controllers and their advantages over centralized controllers.	CO2	Analyze	Medium
8.	Explain the role of SDN Controllers in managing network policies and automation.	CO2	Understand	Medium
9.	Design an SDN-based architecture using Open Flow and explain how traffic is managed.	CO2	Create	High
10.	Discuss the challenges and future scope of SDN Controllers in large-scale networks.	CO2	Understand	Medium

UNIT III

SDN APPLICATIONS

PART - A				
Q. No	Questions	CO Mapping	BT Level	Complexity
1.	Define the SDN Application Plane Architecture.	CO3	Remember	Low
2.	What is the role of the Network Services? Abstraction Layer (NSAL) in SDN?	CO3	Understand	Low
3.	Mention two functions of the SDN Application Plane	CO3	Remember	Low
4.	Define Traffic Engineering in SDN..	CO3	Remember	Low
5.	What is the importance of Measurement and? Monitoring in SDN?	CO3	Understand	Low
6.	List two security challenges in SDN.	CO3	Understand	Low
7.	What is Data Center Networking in the context? of SDN?	CO3	Understand	Low
8.	Mention two benefits of using SDN in Data Centers.	CO3	Remember	Low
9.	How does SDN improve network security?	CO3	Understand	Low
10.	Name two SDN-based traffic management techniques**.**	CO3	Remember	Low

PART - B				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Explain the SDN Application Plane Architecture with a neat diagram	CO3	Understand	Medium
2.	Describe the Network Services Abstraction Layer (NSAL) and its role in SDN.	CO3	Understand	Medium
3.	Discuss Traffic Engineering in SDN and explain how it improves network efficiency.	CO3	Understand	Medium
4.	Explain the techniques used for Measurement and Monitoring in SDN**.**	CO3	Understand	Medium
5.	Analyze the security threats in SDN and suggest countermeasures.	CO3	Analyze	Medium
6.	Compare traditional Data Center Networking with SDN-based Data Center Networking**.**	CO3	Evaluate	Medium
7.	Discuss the role of SDN in network automation and orchestration.	CO3	Understand	Medium
8.	Justify how SDN-based security mechanisms improve protection against cyber threats.	CO3	Analyze	Medium
9.	Design a Traffic Engineering strategy using SDN and explain its working.	CO3	Create	High
10.	Discuss the advantages and challenges of SDN in Data Center Networking.	CO3	Understand	Medium

UNIT IV

NETWORK FUNCTION VIRTUALIZATION

PART - A				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Define Network Virtualization.	CO4	Remember	Low
2.	What is a Virtual LAN (VLAN)?	CO4	Understand	Low
3.	List any two benefits of VLANs.	CO4	Remember	Low
4.	What is the role of Open Flow in VLAN support?	CO4	Understand	Low
5.	Define Network Functions Virtualization (NFV).	CO4	Remember	Low
6.	Mention any two benefits of NFV.	CO4	Remember	Low
7.	What are the basic requirements for NFV? implementation?	CO4	Understand	Medium
8.	What are the key components of NFV? Reference Architecture?	CO4	Understand	Medium
9.	Differentiate between SDN and NFV.	CO4	Understand	Medium
10.	What is the role of NFV in modern networking?	CO4	Understand	Medium

PART - B				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Explain the concept of Network Virtualization and its significance.	CO4	Understand	Medium
2.	Describe VLANs, their benefits, and how they work in a network.	CO4	Understand	Medium
3.	Explain how Open Flow supports VLANs with a detailed architecture.	CO4	Understand	Medium
4.	Discuss the concept of Network Functions Virtualization (NFV) and its impact on networking.	CO4	Understand	Medium
5.	Evaluate the benefits and challenges of NFV in enterprise networks.	CO4	Evaluate	High
6.	Compare and contrast SDN and NFV in terms of functionality and use cases.	CO4	Evaluate	High
7.	Explain the NFV Reference Architecture with a neat diagram.	CO4	Understand	Medium
8.	Justify how NFV improves network flexibility and scalability.	CO4	Analyze	Medium
9.	Design an NFV-based network architecture and explain its working.	CO4	Create	High
10.	Discuss the future trends and applications of NFV in cloud computing.	CO4	Understand	Medium

UNIT V

NFV FUNCTIONALITY

PART - A				
Q. No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Define NFV Infrastructure (NFVI).	CO5	Remember	Low
2.	What are Virtualized Network Functions (VNFs)**?**	CO5	Understand	Low
3.	List two components of NFV Infrastructure (NFVI)**.**	CO5	Remember	Low
4.	What is the role of NFV Management and? Orchestration (NFV-MANO)**?**	CO5	Understand	Low
5.	Mention two use cases of NFV in modern networking.	CO5	Remember	Low
6.	Differentiate between SDN and NFV**.**	CO5	Understand	Medium
7.	What is the importance of orchestration in? NFV**?**	CO5	Understand	Low
8.	Name two challenges in NFV deployment.	CO5	Remember	Low
9.	How does NFV improve network? scalability?	CO5	Understand	Low
10.	What is the relationship between SDN and? NFV**?**	CO5	Understand	Low

PART - B				
Q.No	**Questions**	**CO Mapping**	**BT Level**	**Complexity**
1.	Explain the NFV Infrastructure (NFVI) with a detailed diagram.	CO5	Understand	Medium
2.	Describe the concept of Virtualized Network Functions (VNFs) and how they work.	CO5	Understand	Medium
3.	Analyze the role of NFV Management and Orchestration (NFV-MANO) in NFV architecture.	CO5	Analyze	Medium
4.	Discuss various NFV use cases in real-world networking scenarios.	CO5	Understand	Medium
5.	Compare and contrast SDN and NFV in terms of architecture, benefits, and applications.	CO5	Evaluate	Medium
6.	Evaluate the advantages and challenges of NFV adoption in enterprises.	CO5	Evaluate	Medium
7.	Explain how NFV improves network flexibility and service deployment.	CO5	Understand	Medium
8.	Justify the need for NFV orchestration in large-scale network environments.	CO5	Analyze	Medium
9.	Design an NFV-based architecture for cloud computing and discuss its working.	CO5	Create	High
10.	Discuss the integration of SDN and NFV and how they complement each other.	CO5	Understand	Medium

UNIT I SDN: INTRODUCTION

Part A

1. What is software-defined networking?

Software-defined networking (SDN) is a network architecture that uses software to manage and control a network. SDN allows network operators to manage the network as a whole, regardless of the underlying network technology. SDN uses software-based controllers or APIs to communicate with the underlying hardware. SDN centralizes management by separating the control plane from the data forwarding function SDN makes packet forwarding decisions based on network topology, network policies, and routing protocols.

2. What is control plane?

Control plane is a component for network in SDN which it can carry traffics and it can focus on how individual package will interacts with its neighbors during state exchange.

3. What is SDN device?

An SDN device is composed of an API for communication with the controller, an abstraction layer and a packet-processing function.

4. What is south-bound interface?

The southbound interface is a collection of drivers that handles communication to all data-plane elements in the network.

5. What is northbound interface?

A northbound interface is an interface that allows a particular component of a network to communicate with a higher- level component.

6. **Define data plane**.

Data plane refers to the tasks that a networking device does to forward a message. The data plane handles incoming datagrams through a series of link-level operations that collect the datagram and perform basic checks.

7. List the components of SDN.

SDN components are: Data plane, control plane, sound bound interface, northbound interface and application plane.

8. List the functions of control plane.

Control plane functions are :(a) Topology discovery and maintenance(b) Packet route selection and instantiation(c) Path failover mechanism

9. **What is network device**?

network device is an entity that receives packets on its ports and performs one or more network functions on them. Network devices can be implemented in hardware or software and can be either a physical or virtual network element.

10. What are the trends that used to evolve network requirements?

- Demand Is Increasing
- Supply Is Increasing
- Traffic Patterns Are More Complex

11. Difference between SDN and Traditional Networking.

Software Defined Networking	Traditional Networking
Software Defined Network is a virtual networking approach.	A traditional network is the old conventional networking approach.
Software Defined Network is centralized control.	Traditional Network is distributed control.
This network is programmable.	This network is nonprogrammable.
Software Defined Network is the open interface.	A traditional network is a closed interface.
In Software Defined Network data plane and control, the plane is decoupled by software.	In a traditional network data plane and control plane are mounted on the same plane.

12. List the types of plane in SDN.

- Data plane
- Control plane
- Application Plane

13. What are the functions of data plane?

- Forwarding of packets.
- Segmentation and reassembly of data.
- Replication of packets for multicasting.

- List of requirements suggested by ODCA
- Draw the SDN architecture diagram.
- What are the functions of data plane?
- Define Open flow.
- Define RFC and I2RS

Part B &C-16 marks & 8 marks

1. Define Network, Switch, Router Repeater, Bridge and Hub with diagram.
2. Definition, diagram of Network, Switch, Router Repeater, Bridge and Hub
3. List the requirements suggested by ODCA.
4. Discuss about SDN approach and architecture with neat diagram in detail.
5. Explain about different models of SDN.
6. Explain the process of Evolving Network Requirements.

UNIT-II SDN DATA PLANE AND CONTROL PLANE

1. What is SDN controller?

An SDN controller is an application in a software-defined networking architecture that manages flow control for improved network management and application performance.

1 Define overlay networking.

Overlay networking is a method of using software to create layers of network abstraction that can be used to run multiple separate, discrete virtualized network layers on top of the physical network, often providing new applications or security benefits.

2 What is logical ports?

Logical ports are switch-defined ports that do not correspond directly to hardware interfaces on the switch.

3 What is asynchronous communication?

Asynchronous communication is initiated by the Open Flow-compliant switch without any solicitation from the controller. It is used to inform the controller about packet arrivals, state changes at the switch and errors.

4 Define Open Flow.

Open Flow is a control protocol. It is used to communicate policies and traffic management information between a controller and a switch.

6. Explain proactive rules.

Proactive rules are relatively static, controller places rules in switch before they are required. The controller can populate the flow tables ahead of time, similar to typical routing. By pre-defining all of your flows and actions ahead of time in the switches flow tables, the packet-in event never occurs. The result is all packets forwarded at line rate

7. Explain reactive rules.

Reactive rules are dynamic. Packets which have no match are sent to the controller (packet in). Controller creates appropriate rule and sends packet back to switch (packet out) for processing. The problem with this approach is that there can many CPU hits.

8. What is use of SDN API?

SDN Application Program Interfaces (APIs) provide both open and proprietary communication between the SDN controller and the routers of the network.

9. What are the functions offered by control plane?

- Shortest Path forwarding
- Notification Manager
- Security Mechanisms
- Topology Manager
- Statistics

10. Define Ryu and Open Daylight

Ryu Controller is an open, software-defined networking (SDN) Controller designed to increase the agility of the network by making it easy to manage and adapt how traffic is handled. The Open Daylight project is an open source platform for Software Defined Networking (SDN) that uses open protocols to provide centralized, programmatic control and network device monitoring.

11. List the constraints in REST.

- Client-Server
- Stateless
- Cacheable
- Uniform Interface
- Layered System
- Code On Demand (Optional)

12. Define flow table and meter table

A data structure within Open Flow switches that contains entries for managing packets based on defined rules or flows. Meter tables are data structures used in Open Flow to manage and store metering information for network flows.

13. What is egress and ingress processing

The data egress and ingress is the direction of data flow and ingress refers to data entering a system or network, while egress refers to data leaving a system or network.

14. What is meant by High Availability Cluster?

High-availability clusters (also known as HA clusters, fail-over clusters) are groups of computers that support server applications that can be reliably utilized with a minimum amount of down-time. They operate by using high availability software to harness redundant computers in groups or clusters that provide continued service when system components fail. Without clustering, if a server running a particular application crashes, the application will be unavailable until the crashed server is fixed.

Part B & C (16 marks & 8 marks)

1. Explain about Data plane with its functions
2. Discuss about Open Flow Protocol
3. Elaborate flow table structure with neat diagram
4. Discuss about Control Plane Functions
5. Differentiate Southbound Interface and Northbound Interface
6. Define SDN Controllers and explain about Ryu, Open Daylight,
7. What is ONOS? Explain about Distributed Controllers in detail

UNIT III SDN APPLICATIONS

Part A

1 What is data center orchestration?

Data center orchestration is a process-driven workflow that helps make datacenters more efficient. Repetitive, slow and error-prone manual tasks are replaced by the automation of tasks and the orchestration of processes.

2. List the functions of data center orchestration.

1. Scheduling and coordination of data services.
2. Leveraging of distributed data repository for large data sets.
3. Tracking and publishing APIs for automatic updates of metadata management.
4. Updating policy enforcement and providing alerts for corrupted data.
5. Integrating data services with cloud services

3. What is data Center?

A data center is any location, accessible by members of an enterprise, that houses collected hardware and ancillary devices that can run internal networks, host digital systems and applications, or store data.

4. **List core elements of data center**.

Data center uses five core elements for processing. These elements are application, database, network, storage array, operating system and server.

5. **Define Abstraction and it types.**

Abstraction refers to the amount detail about lower levels of the model that is visible to higher levels. More abstraction means less detail and Less abstraction means more detail. The types of abstraction are 1. 1.forwarding abstraction
2.distribution abstraction 3. specification abstraction

6. What is Policy Cop? List its services.

Policy cop is an automated QoS Policy enforcement framework. It leverages the programmability offered by SDN and open flow for

- Dynamic traffic steering
- Flexible flow level control
- Dynamic traffic classes
- Custom flow aggregation levels

7. What is Frenetic?

Frenetic is a domain-specific language for programming Open Flow networks. This domain-specific programming language allows network operators, rather than manually configuring each connected network device, to program the network as a whole.

Part B & C (16 marks & 8 marks)

1. Discuss about SDN Application Plane Architecture
2. Define Network Services Abstraction Layer and explain in detail
3. What is Traffic Engineering and explain how traffic is handled in SDN with an example
4. What is Measurement and Monitoring and explain Security concepts by incorporating defense4all.
5. Discuss about Data Center Networking
6. Explain about frenetic.
7. 7. Discuss about defense4all software architecture in detail.

UNIT-IV NETWORK FUNCTION VIRTUALIZATION

1 What is Network Functions Virtualization?

1.Network Functions Virtualization (NFV) abstracts network functions, allowing them to be installed, controlled and manipulated by software running on standardized compute nodes. NFV incorporates cloud and virtualization technologies to drive rapid development of new network services with elastic scale and automation. These technologies are often grouped as NFV and SDN.

2**. Define Virtual Machine.**

Virtual machine (VM) is a computing environment that functions as an isolated system with its own CPU, memory, network interface, and storage, created from a pool of hardware resources. Software called a hypervisor isolates the necessary computing resources and enables the creation and management of VMs.

3 What is Northbound API?

Northbound API presents a network abstraction interface to the applications and the management systems at the top of the SDN stack.

4 Explain Management Interface.

Management interfaces allow network operators to manage network devices in their networks. These interfaces generally provide the operator with a consistent operational view of a device, including its configuration and operational status.

5 What do you mean network Orchestration?

Network Orchestration, also known as Software-defined networking Orchestration is the process of automatically programming the behavior of the network, so that the network smoothly coordinates with the hardware and the software elements to further support applications and services.

6 What are the difference between automation and orchestration?

Automation refers to a single task; orchestration arranges tasks to optimize a Workflow

7 What are the goals of NFV?

NFV goals are to define requirements, identify best practices, identify gaps in current standards and make recommendations on how to fill those gaps. NFV has a main organizational body, a Technical Steering Committee (TSC) and several subgroups with specific areas of focus

8 What are functions of management and Orchestration?

Management and Orchestration (MANO) defines a framework that can be used for the provisioning, configuration and operation of virtualized network functions essentially defining an orchestrator that controls all the VNFs.

9 What is Data Plane Development Kit (DPDK) ?

DPDK is open source software that provides libraries and drivers for fast packet processing. It allows an application to bypass the kernel and Linux network stack and directly access packets on the NIC.

10 Explain Representational State Transfer APIs.

Representational State Transfer (REST) Application Programming Interfaces(APIs) enable you to securely connect to systems, execute remote procedure calls (RPCs)and use a variety of formatting and display options, including JavaScript Object Notation(JSON)

11 What is virtualization?

Virtualization is an abstraction layer that decouples the physical hardware from the operating system to deliver greater IT resource utilization and flexibility. It allows multiple virtual machines, with heterogeneous operating systems to run in isolation, side-by-side on the same physical machine. Virtualization means running multiple machines on a single hardware.

12. What are key capabilities of NVGRE?

Key capabilities of the NVGRE standard include identifying a 24-bit Tenant Network Identifier (TNI) to address problems associated with the multi - tenant network

13. List functions supported by data centers.

Data centers support the following things
1. Processing of user's business transactions
2. Hosting of company website
3. Process and store intellectual property
4. Maintain financial records
5. Route electronic mails.

14. What is VLAN?

A VLAN is a switched network that is logically segmented on an organizational basis, by function, project teams or applications rather than on a physical or geographical basis.

15. **What is VxLAN**?

VxLAN is an encapsulation protocol that provides data center connectivity using tunneling to stretch Layer 2 connections over an underlying Layer 3 network.

16. Explain EVPN.

An Ethernet VPN (EVPN) enables you to connect dispersed customer sites using a Layer 2 virtual bridge. EVPN augments the data plane MAC learning paradigm with a control plane solution for automated MAC learning between data centers. EVPN creates a new address family for BGP by converting MAC addresses into routable addresses and

then uses this to distribute MAC learning information between PEs in the network.

17.List the applications of SDN

- Data Centers
- Cloud Environments
- Enterprise Networks
- Service Provider Networks

Part B & C (16 marks & 8 marks)

1. Discuss about Network Virtualization
2. What is Virtual LANs and explain in detail
3. How Open Flow VLAN Support in established
4. Explain about NFV Concepts
5. Discuss about NFV Benefits and Requirements
6. 7.Explain about NFV Reference Architecture in detail.

UNIT V NFV FUNCTIONALITY

Part A

1 what is data center orchestration?

Data center orchestration is a process-driven workflow that helps make data Centers more efficient. Repetitive, slow and error-prone manual tasks are replaced by the Automation of tasks and the orchestration of processes

2 **Explain bandwidth calendaring**.

Bandwidth calendaring allows network operators to reserve resources up-front or for a dedicated period of time. It enables highly accurate usage-based charging for Bandwidth. Reduces the need for on-side configuration at customer premises, for example When upgrading bandwidth

3 what is service abstraction layer?

A Service Abstraction Layer (SAL) maps both internal and external service Requests to the appropriate southbound plug-in and provides basic service abstractions that Higher-level services are built upon, depending on the capabilities of the plug-in(s).

4 Explain about Juniper network.

Juniper Networks is an open-source software-defined networking solution that automates and orchestrates the creation of highly scalable virtual networks.

Juniper Networks demonstrated a Java-based framework with a RESTful API that served as a rapid prototyping environment to aid in the development of new and useful network applications

5 **What is Qfabric?**

Juniper Networks produces switches using a proprietary multipath Layer 2/3architecture and encapsulation protocol called Qfabric. It allows multiple distributed physical devices in the network to share a common control plane and a separate, common management plane, thereby behaving as if they were a single large switch entity.

6 Explain about Floodlight.

Floodlight is based on Beacon from Stanford University. Floodlight is an Apache licensed, Java-based Open Flow controller

Additional Questions

1. Define Container Interface.
2. What is the role of virtual function manager?

3. Expand and define NFV IaaS.
4. What are the architectural use cases?
5. Draw the logical structure of NFVI Domains.
6. Difference between L2 versus L3 virtual Networks.
7. Define VNF.
8. List the components in NFV Management and Orchestration
9. What is VNF Scaling?

Part B & C (16 marks & 8 marks)

1. Elaborate the NFV Infrastructure in detail.
2. Virtualized Network Functions
3. Discuss about NFV Management and Orchestration
4. Explain about NFV Use cases in detail with diagrams.
5. Elaborate the process of mapping SDN components with NFV architecture
6. Draw the diagrams for VNFC to VNFC communication for various scenarios.