

UNIT - IV: Networking for Cloud Computing & Providers

Syllabus: Networking for Cloud Computing: Introduction, Overview of Data Center Environment, Networking Issues in Data Centers, Transport Layer Issues in DCNs, Cloud Service Providers.

Multiple Choice Questions (MCQs)

1. Which layer of the standard networking model faces unique bottlenecks like "TCP Incast" when deployed inside high-density Data Center Networks (DCNs)?
 - a) Physical Layer
 - b) Network Layer
 - c) Transport Layer
 - d) Application Layer
 - **Answer:** c) Transport Layer
2. What is the root cause of the "TCP Incast" problem inside Data Center Networks?
 - a) A complete failure of fiber optic lines between continents
 - b) Synchronized, parallel many-to-one communication overwhelming the buffer memory of a switch
 - c) Using Web 3.0 protocols on a Web 2.0 network infrastructure
 - d) Running code written exclusively in Cloud Haskell
 - **Answer:** b) Synchronized, parallel many-to-one communication overwhelming the buffer memory of a switch
3. Which topological structure is common in Data Center Environments to provide multiple redundant paths and massive bisection bandwidth between thousands of worker nodes?
 - a) Simple Bus Topology
 - b) Fat-Tree / Clos Network Architecture
 - c) Single Ring Topology
 - d) Star Topology with one central hub
 - **Answer:** b) Fat-Tree / Clos Network Architecture
4. What network issue involves packets taking drastically different paths and arriving out-of-order, forcing massive memory reassembly overhead on a cloud server?

- a) Packet Jitter and Reordering
- b) BGP Route Leakage
- c) Incast Congestion
- d) Multi-tenant Hardware Sprawl

○ **Answer:** a) Packet Jitter and Reordering

5. Which of the following is an industry-recognized global public Cloud Service Provider?

- a) Apache MapReduce Corp
- b) Microsoft Azure
- c) Hypervisor Linux Foundation
- d) Clos Systems Ltd

○ **Answer:** b) Microsoft Azure

6. In cloud networking, what does SDN stand for?

- a) Software Deployment Node
- b) Software-Defined Networking
- c) Symmetric Data Network
- d) Service Delivery Network

○ **Answer:** b) Software-Defined Networking

7. Software-Defined Networking (SDN) assists cloud data centers by:

- a) Separating the network control plane from the physical forwarding data plane
- b) Forcing all traffic onto a single physical transport layer protocol
- c) Disabling virtual machine network interfaces
- d) Eliminating multi-tenancy requirements

○ **Answer:** a) Separating the network control plane from the physical forwarding data plane

8. When cloud data centers suffer from "Oversubscription" in their network links, it means:

- a) Customers are paying too much for their subscriptions

- b) The worst-case aggregate bandwidth demand of all connected servers exceeds the actual capacity of the core network links
 - c) There are too many IP addresses allocated to a single VM
 - d) Hypervisors have disabled physical network cards
 - o **Answer:** b) The worst-case aggregate bandwidth demand of all connected servers exceeds the actual capacity of the core network links
9. Which Amazon Web Services (AWS) networking component lets users provision a logically isolated section of the AWS Cloud to launch resources in a virtual network?
- a) Amazon MapReduce Node
 - b) Amazon Virtual Private Cloud (VPC)
 - c) AWS Bare-Metal Hypervisor
 - d) AWS Web 3.0 Gateway
 - o **Answer:** b) Amazon Virtual Private Cloud (VPC)
10. Which protocol is typically modified or optimized (e.g., DCTCP) to fix latency anomalies inside specialized cloud data center networks?
- a) HTTP
 - b) TCP
 - c) DNS
 - d) SMTP
 - o **Answer:** b) TCP

Fill in the Blanks

1. The specialized system of switches, routers, and high-speed cabling that links computing clusters together is termed _____.
 - o **Answer:** Networking for Cloud Computing (or Cloud Networking)
2. A high-density facility containing thousands of clustered servers, cooling infrastructures, and power grids is a _____.
 - o **Answer:** Data Center Environment
3. When synchronized worker nodes flood a single aggregator switch simultaneously, it causes _____ congestion at the transport layer.
 - o **Answer:** TCP Incast

4. Standard TCP suffers in cloud networks because its default timeout mechanisms are too slow for ultra-low latency _____ Environments.
 - **Answer:** Data Center Network (or DCN)
5. Amazon Web Services (AWS), Google Cloud Platform (GCP), and Microsoft Azure are categorized as major public _____.
 - **Answer:** Cloud Service Providers
6. _____ separates the logic that routes packets (control plane) from the underlying switches that forward them (data plane).
 - **Answer:** Software-Defined Networking (or SDN)
7. High _____ refers to the unwanted delay or lag that occurs during data packet transmission across cloud servers.
 - **Answer:** Latency
8. To avoid bottleneck links, data centers deploy _____ topologies to provide equal bisection bandwidth across all node groupings.
 - **Answer:** Fat-tree (or Clos)
9. Traditional networks handle wide-area traffic, whereas cloud data center networks face massive internal _____ (East-West) traffic flows.
 - **Answer:** Server-to-server
10. _____ virtualization allows multiple isolated virtual networks to safely run across the exact same physical wire fabric without data leaks.
 - **Answer:** Network