

* Multimedia Streaming Protocols

We use the term multimedia to refer to data that contains audio or video, or may include text. The phrase real-time multimedia refers to multimedia data that must be reproduced at exactly the same rate that it was captured. Eg: a television news program.

Stream Control Transmission Protocol (SCTP)

SCTP is a connection-oriented protocol in computer networks which provides a full-duplex association i.e. transmitting multiple streams of data between two end points at the same time that have established a connection on network. SCTP provides some of the features of both UDP and TCP; it is message-oriented like UDP and ensures reliable, in-sequence transport of messages like TCP. SCTP is also intended to make it easier to establish connection over wireless network and managing transmission of multimedia data.

Features/characteristics of SCTP:

- Multihoming support in which it can establish multiple connection paths between two end points & does not need to rely on IP layer for resilience.
- Path selection & monitoring to select a primary transmission path & test the connectivity of the transmission path.

Validation & acknowledgement mechanisms protect against flooding attacks & provide notification of duplicated or missing data chunks.

* Overview of SDN and its Features

Software-Defined Networking (SDN) is an emerging architecture that is dynamic, manageable, cost effective, and adaptable, making it ideal for high bandwidth, dynamic nature of today's applications.

In a SDN, a network engineer or administrator can shape traffic from a centralized control console without having to touch individual switches in the network.

This process is a moveaway from traditional network architecture, in which individual network devices make traffic decisions based on their configured routing tables.

SDN Architecture:

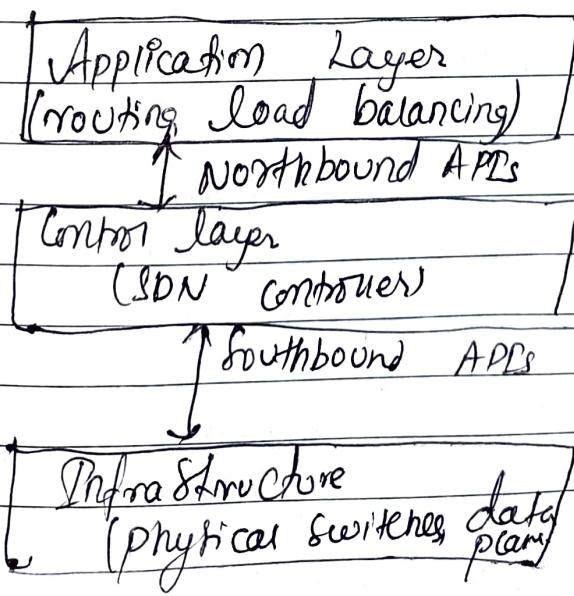


fig: SDN architecture

- Application layer: It contains the typical network applications like intrusion detection, firewall and load balancing
- Control layer: It consists of the SDN controllers which acts as the brain of the network. It also allows hardware abstraction to the applications written on top of it.
- Infrastructure layer: This consists of physical switches which forms the data plane and carries out actual movement of data packets

These layers communicate via a set of interfaces called the northbound APIs (between application and control layer) and southbound APIs (between control and infrastructure layer).

Features of SDN

- Directly programmable: Network control is directly programmable because it is decoupled from forwarding functions
- AGILE: Abstracting control from forwarding lets administrators dynamically adjust network-wide traffic flow to meet changing needs
- Centrally Managed Network: Intelligence is logically centralized in software-based SDN controllers that maintain a global view of the network, which appears to applications & policy engines as a single, logical switch.

* Control plane and data plane.

Control plane

i) Control plane refers to the all functions & processes that determine which path to use to send the packet or frame.

ii) It is responsible for building and maintaining the IP routing table.

iii) It takes care of how packets should be forwarded.

iv) Control plane performs its tasks independently.

v) It includes STP, ARP, RIP, DHCP etc.

Data plane

vi) Data plane refers to all the functions & processes that forward packets/frames from one interface to another based on control plane logic.

vii) It is responsible for forwarding actual IP packet.

viii) It takes care for moving packets from source to destination.

ix) Data plane performs its task on data plane.

x) It includes TTL, IP header, Checksum etc.

* Network Function Virtualization (NFV):

NFV is a network architecture that allows network operators to manage and expand their network capabilities on demand using virtual, software based applications where physical boxes once stood in the network architecture.

It provides a new way to create, distribute, & operate networking services. It is the process of decoupling the network functions from proprietary networking services hardware appliances so they can run in software on standardized hardware. NFV is designed to combine and deliver the networking components needed to support an infrastructure totally independent from hardware.

Benefits of NFV:

- Reduce costs in purchasing network equipment via migration to software on standard servers.
- Efficiencies in space, power and cooling.
- Faster time to deployment.
- Flexibility - elastic scale up and scale down capacity.
- Access to broad independent software community including open source.

X Overview of Next Generation Network (NGN)

NGN refers to a packet-based network and it can be used for both telecommunication services as well as data and it supports mobility. It is able to make use of multiple broadband capabilities, especially Quality of Service (QoS) enabled transport technologies where the service-related functions are independent of the underlying transport-related technologies.

The main goal of NGN is to work as a replacement of Public Switched Telephone Network (PSTN) and Integrated Services Digital Network (ISDN). The concept of this network will not only bring wide range of possibilities to introduce new and existing technologies in the field of information transmission & processing, but also many possibilities especially in the branch of network services.

Features of NGN:

- NGN works on Packet based transferring.
- It supports a wide range of services, applications and mechanisms based on service building blocks.
- It provides the advantage of general mobility.
- It provides unrestricted access by users to different service providers.
- It has broadband capabilities with end-to-end QoS and transparency.

Applications of NGN:

- Voice Telephone Services
- Multimedia services
- Data services
- Push to talk over NGN
- Content delivery services
- Global mobility services

Advantages of NGN:

- It generates additional revenue streams for new IP/Ethernet services
- It fulfills customers demand for high bandwidth Ethernet/IP solutions.
- It diminishes expertise on legacy
- It gives End of life / End of service vendor notification

Questions asked from this Chapter

- Q What are the different approaches of multimedia streaming? Explain. (8 marks - 2028)
- Q Explain about SDN & its features. (8mp)
- Q Difference between Control plane & data plane. (imp)
- Q Explain about NFV. (8mp)
- Q Explain about NGN (8mp).