Lesson1

OSI model (Open System Interconnection)

Sender

Osi model was created by ISO(International Standardization Organization) in 1970

Hardware Layers

* P = Physical
* D = Data Link
  + MAC (Media acces Control)
  + LLC (Logical Link Control)
  + Protocols: HDLC (High Level Data Link Control), PPP (Point to Point Protocol)
* N = Network
  + Logical Addressing
  + Routing
  + Path Determination
    - RIP,EIGRP,OSPF,ISIS,BGP
  + IPv4,IPv6,ICMP

Heart of OSI

* T = Transport
  + TCP,UDP
  + Uses segmentation, flow control and error control
  + **Data is form of segments**

Software Layers

* S = Session
  + NFS,PAP,SQL,NetBIOS
  + Setting up,Maintaining,Tearing down sessions
  + This layer is responsible connection of two communication end devices
* P = Presentation
  + Data if formatted converted encry. Decrypted and presented to user
  + **Data is of form of characters or numbers**
  + Translation
  + Compression
  + SSL
* A = Application
  + HTTP,FTP,SMTP,Telnet,SSH,**DNS**

Receiver

**People Do Need To See Pamela Anderson**

TCP/IP model

* Application (DATA)
  + Application
  + Presentation
  + Session
* Transport (TCP/DATA => Segments)
* Network (IP/TCP/DATA => Packets)
* Data Link (E-Header/IP/TCP/DATA/E-Trailer => frames)
  + Header contains of source and destination MAC addresses
  + Trailer has FCS (Frame Check Sequence) field that is responsible for error detection
* Physical (11101001101 => Binary Digits)

Top down is called encapsulation vice versa is called de-encapsulation

Table

Description automatically generated

Lesson2

Class A: 0.0.0.0 - 126.255.255.255

Class B: 128.0.0.0 - 191.255.255.255

Class C: 192.0.0.0 - 223.255.255.255

Class D: 224.0.0.0 - 239.255.255.255 **Reserved for Multicasting**

Class E: 240.0.0.0 - 254.255.255.255 **Experimental**

127.0.0.0 - 127.255.255.255 this range is used to test computer’s networking functions

Private IP address range for ipv4 classles

Class A: 10.0.0.0 - 10.255.255.255

Class B: 172.16.0.0 - 172.31.255.255

Class C: 192.168.0.0 - 192.168.255.255

How to find network address:

How to find broadcast address:

ARP- is used to translate layer 3 addresses to layer 2 addresses.

Lesson 3

TCP (Transmission Control Protocol):

* Reliable protocol.
* Connection oriented
* Has sequencing
* Donwloads , File sharing, Printing

UPD (User Datagram Protocol)

* Unreable or best-effort protocol.
* Connectionless
* Has no sequencing
* VoIP,Video streaming

TCP 3 way handshake. 1)SYN 2)SYN,ACK 3)ACK

MAC (Media Acces Control): Is assigned to NICSs by the vendors and equals to 48-bit. MAC address is stored in CAM (Content Address Memory)

ICMP (Internet Control Message Protocol):

ICMP is a network protocol that is used for network diagnostic. An example for ICMP is a

PING utility. Ping uses ICMP (ICMP Request, ICMP Reply) for checking communication between network components.

TLL value(Time -to-live):

To ensure IP packets have a limited lifetime on the network all IP packets have an 8

bit Time to

Live (IPv4) or Hop Limit (IPv6) header field and value which specifies the maximum number of

layer three hops (typically routers) that can be traversed on the path to their destination. For each

traversal on the Layer 3 device the TTL is decreased by one. The max TTL value = 255.

DNS (Domain Name System):

Used to find IP addresses according to the hostnames. Humans cannot remember all ipv4 addresses so DNS comes to help us

Lesson 4

LAN (Local Area Network):

Known by IEEE(Institue of Electrical and Electronics Engineers)

Types of Ethernet:

T means – UTP (Un-Twisted Pain)

X means – Fiber Optic

UTP:

Has no protecting layer over twisted pairs

STP:

Has protecting layer over twisted pair

Text

Description automatically generated

Full and Half Duplex:

Full duplex meant that the device or NIC sends and receive frame at the same time.Half duplex (LAN CSMA/CD algorithm used) the device must wait to send if it is currently reveiving a frame- devices detect whether frame is in communication link using CSMA/CD algorithm

Lesson 5

Leased line refer to the fact the company using the leased line does not own the line and pays a monthly lease fee to use it . This lines are provided by telco (Telephone Company)

There are two Data-Link layer protocols that are used to control leased lines

HDLC – High Level Data Link Control Protocol

PPP – Point to Point Protocol

Terminology:

* Leased circuit (line) there is electrical circuit between sites.
* Serial line (link) bits flow serially and routers use serial interfaces.
* P2P there are more than two devices between sites.
* T1 1.544 Mbps line between sites, this is specific type of leased line.
* Private customer has its own physical line.

IP Routing:

Responsible of sending IP packet from one network to another

Text

Description automatically generated

Text

Description automatically generated

Lesson 6

It is possible to connect to cisco switches using one of three methods:

* Console
* Telnet
* SSH (More secure)

Types of Rams:

* RAM (Read Access Memory) the running configuration is stored in RAM
* ROM (Read Only Memory) bootstrap or boothelper program that is loaded

when switches first power on is stored in ROM

* Flash Memory where the switches get their IOS from
* NVRAM (Non Volatile RAM) stores the initial or startup configuration

Lesson 7

Leased line

Lesson 8

**Autonegation:**

Autonegotiation is an optional function of the IEEE 802 3 u Fast Ethernet standard that enables devices to automatically exchange information over a link about speed and duplex abilities

If autonegotiation is failed, IEEE has three default rules for speed and duplex

* Speed Use your slowest

supported speed (often

10 Mbps)

* Duplex If your speed

10 or 100 use half

duplex otherwise, use

full duplex

Text

Description automatically generated

Lesson 9

VLAN (Virtual Local Area Network):

Using VLAN we create multiple broadcast domain. As a result, we divide a broadcast domain into small broadcast domains.Each VLAN is one broadcast domain.

VLAN Tagging:

VLAN trunking creates one link between switches that supports as many VLANs as you need As a VLAN trunk, the switches treat the link as if it were a part of all the VLANs

Cisco has supported two different trunking protocols over the years:

1)ISL(Inter-Switch Link)

2)802.1Q

Lesson 10

VTP (VLAN Trunking Protocol) - VTP is a Cisco proprietary tool (protocol) on Cisco switches that advertises each VLAN configured in one switch (with the vlan number command) so that all the other switches in the campus learn about that VLAN. İn this concept, there is one master switch.

VTP has three modes:

1)Server: create, delete, modify

2)Client: nothing related to VLANs

3)Trasnparent: we are free to make change VLAN database

Lesson 11

STP (Spanning tree protocol)

The IEEE first standardized STP as part of the IEEE 802 1 D standard back in 1990 Over time, the

industry and IEEE improved STP, with the eventual replacement of STP with an improved protocol

Rapid Spanning Tree Protocol

STP/RSTP prevents loops by placing each switch port in either a forwarding state or a blocking state Interfaces

Lesson 15



Lesson 16

Administrative distance



Lesson 17

ROAS (Router on a stick)

Lesson 20

Routers add IP routes to their routing tables using three methods connected routes, staticroutes and routes learned by using dynamic routing protocols it

•Routing protocol A set of messages, rules, and algorithms used by

routers for the overall purpose of learning routes This process includes

the exchange and analysis of routing information Examples include RIP,

EIGRP, OSPF, and BGP

•Routed protocol and routable protocol Both terms refer to a protocol

that defines a packet structure and logical addressing, allowing routers

to forward or route the packets Routers forward packets defined by

routed and routable protocols Examples include IP Version 4 (IPv 4 and

IP Version 6 (IPv 6)

IP routing protocols fall into one of two major categories interior gateway protocols **(IGP)** or exterior gateway protocols **(EGP)**

■ IGP A routing protocol that was designed and intended for use inside a single autonomous system ( AS)..(OSPF,EIGRP, ISIS)

Distance vector

Adnvace distance vector

Link-state

■EGP A routing protocol that was designed and intended for use between different autonomous systems ..(

Autonomous system ( An AS is a network under the administrative control of a single organization

OSPF

* Becoming neighbors: A relationship between two routers that connect to the same data link, created so that the neighboring routers have a means to exchange their LSDBs
* Exchanging databases
* Adding the best routes

Lesson 21

Diagram

Description automatically generated with medium confidence

Graphical user interface, text

Description automatically generated with medium confidence

Lesson 9

VLAN (Virtual Local Area Network):

**ss A:** 0.0.0.0 –126.255.255.255

Class B: 128.0.0.0 –191.255.255.255

Class C: 192.0.0.0 –223.255.255.255

Class D: 224.0.0.0 –239.255.255.255 Reserved for Multicasting

Class E: 240.0.0.0 –254.255.255.255 Experimental