Lecture #

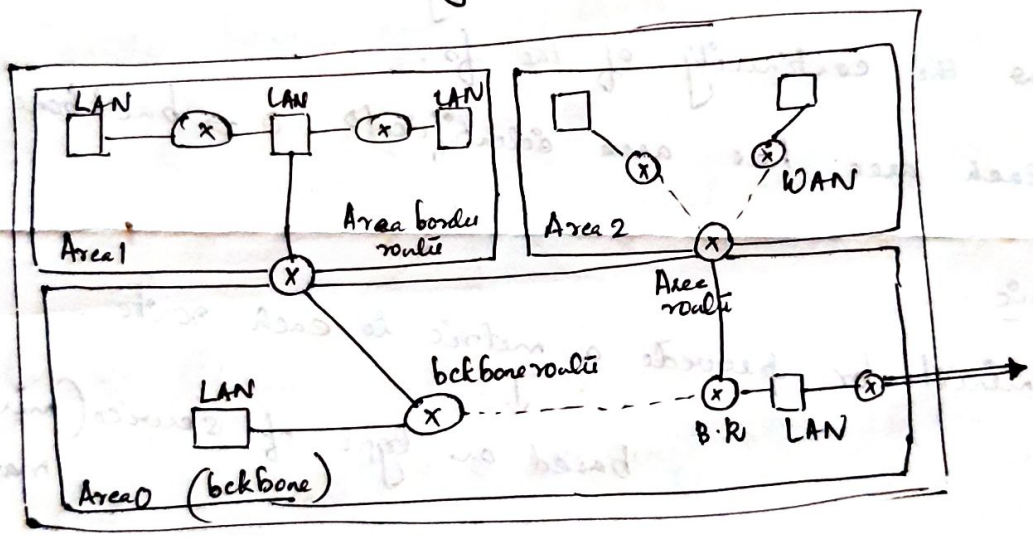
Introduction

This section deals with Open Shortest Path First (OSPF)

Concept

OSPF -

- Intra domain routing protocol
- based on link state routing



- OSPF divides autonomous s/m into diff areas
  ↓
  collⁿ of n/w's, hosts, routers
- AS ÷ many areas.
- n/w's inside an area are connected.
- routers inside the area flood that area with routing info
- Special routers area border routers
  ↓
  Summarize the info abt the area and pass it other areas.

- among the areas - special area → backbone

all the areas inside AS or connected to backbone (i area)

routers r called backbone routers

also called b as area boarder router.

- If the connection to backbone is broken, then virtual link

H/w routers must b created by administrator ~~and the~~ to allow the continuity of the fp.

- each area has area identifier 0 → backbone.

Metric.

- administrator provide a metric to each route.

based on type of service (min. of delay, max. throughput)

Types of Links -

- a connection is called link

- 4 types of link — transient, point 2 point, stub, virtual.

Point 2 Point Link.

- connects 2 routers without any host / routers in b/w.

eg:- Telephone line

- among the areas - special area → backbone

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Point2Point link.

- connects 2 routers without any host / routers in b/w.

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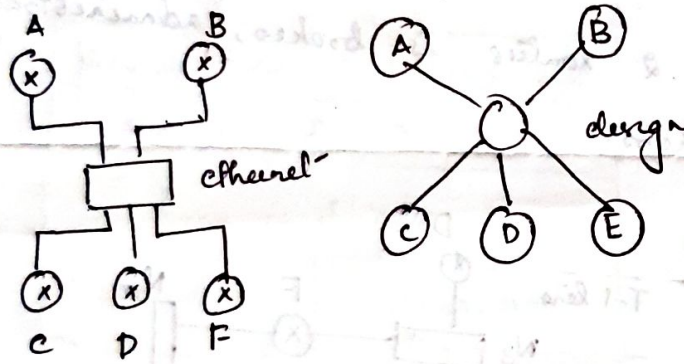
- graphical repⁿ - routers r repⁿd by nodes and link as bidirectional edge connecting these nodes.

Transient Link.

- is n/w with several routers attached to it.
- data enters/leaves thru any of routers.
- each router have many neighbours.



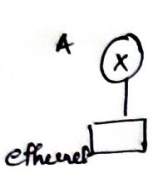
- each router is connected to all every other router thru one single n/w.
  - this is not a n/c.
  - is a n/w itself.
  - but cannot fn as router.
- One of the routers takes this responsibility
  - ↓
  - designated router (fig 2)

So each router has 1 neighbor → designated router

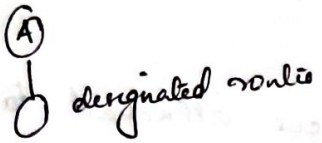
designated router 5 neighbors.

Stub Link.

- is a n/w that is connected to only one router.
- data pkts enter the n/w thru this single router.



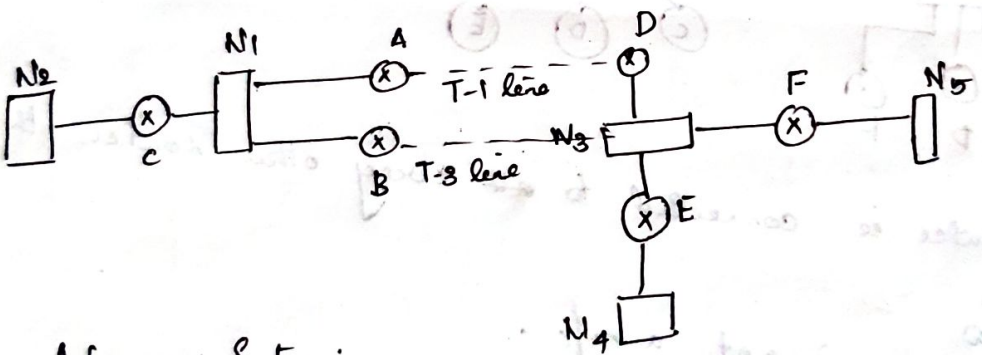
(a) stub n/w



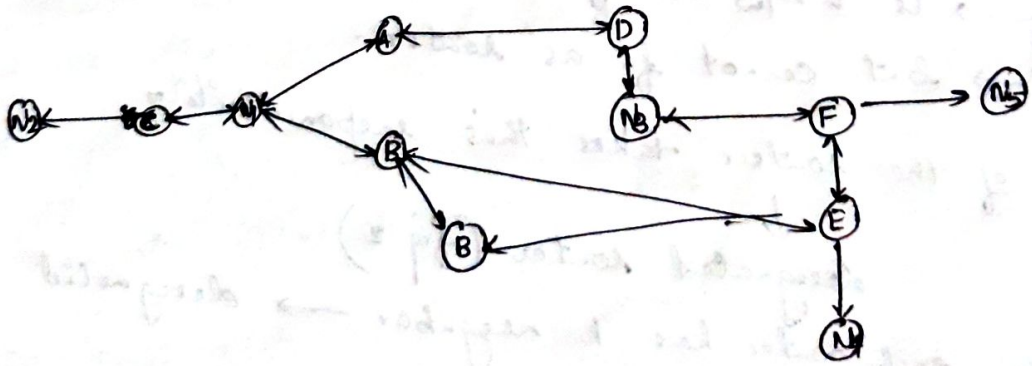
(b) rep^n

Virtual link

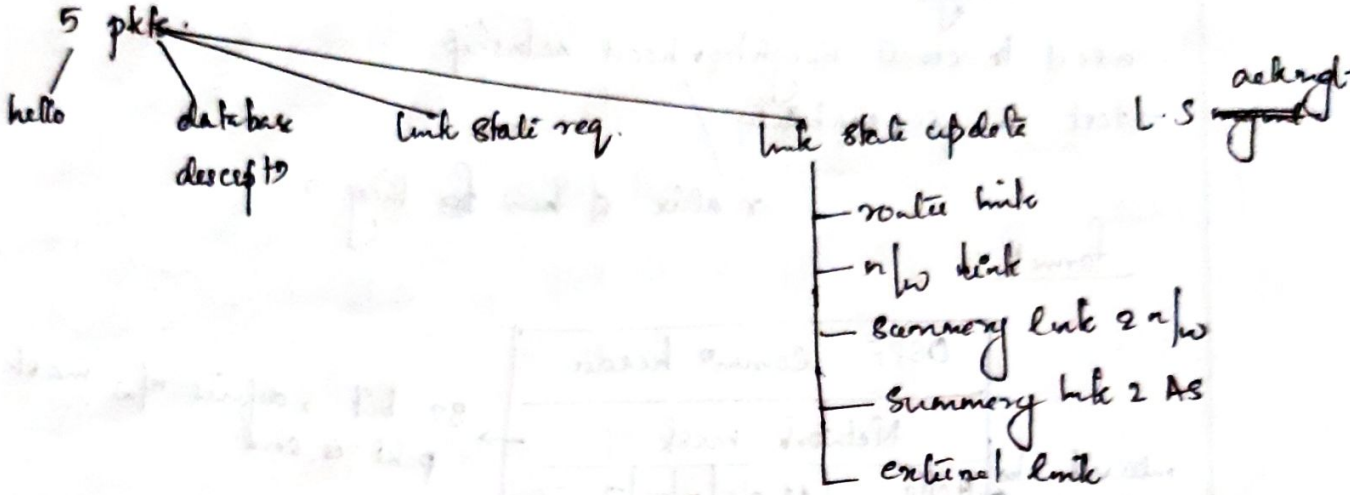
- when the link b/w 2 routers is broken, administrator creates a virtual link b/w them.



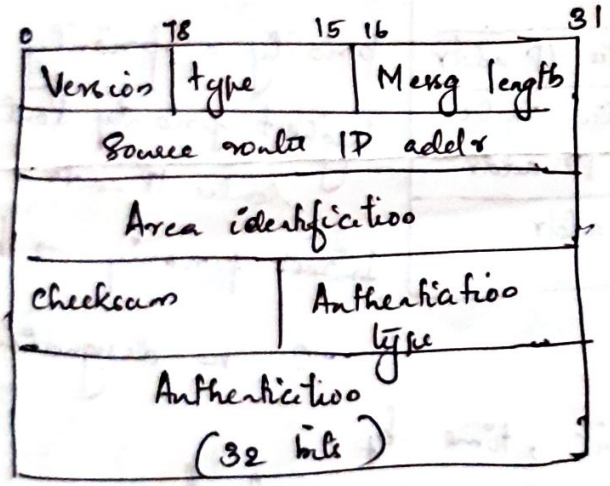
Autonomous System.



OSPF Packets.



Common Header.



Version → 8 bits - current version 2.

type - 5 types 1-5 r the values.

Msg length - 16 bit

Source router - 32 bit

area identification - 32-bit defines to which area the router belongs to.

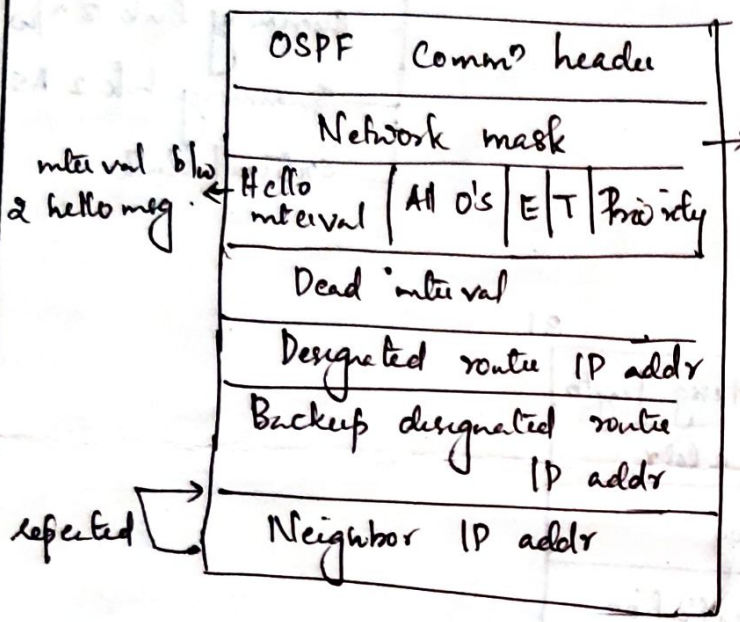
Authenticate type = 16 bit, authentication protocol used

Authentication = 32 bits 0 = if none
1 = then field carries 8-char password.

Hello message.

- used to create neighborhood relnship
- test the reachability / r alive & how fast they r.

format:



32 bit, defines nfw mask over which pckt is send.

E=1 → stub area

T=1 → router x^le metrics

priority = priority of router.

highest priority Router → designated router IP addr.

2nd highest priority → backup "

=0 no designated router / backup.

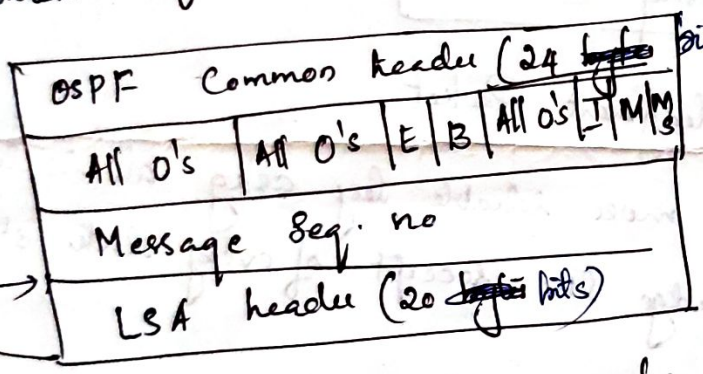
dead interval = 32 bit, time bf router understands that its neighbor is dead.

- neighbor IP addr - repeated 32 bit ~~addr~~ adjs.
  - defines the router that agrees to b the neighbor of sending router.

Database Description Message.

- when a router is 1st connected to nw or connected after a failure, it needs link state update all at once.

- it cannot wait to get it from other routers
- so it send hello pkts.
- on receiving this neighbour give only an outline of each line in DB.
- looking at this router finds the missing info and it sends one more link state req pkts to get full info abt that particular link.
- when 2 routers exchange DB info 1 acts as master and other acts as slave
- Contents of DB ÷ several msgs.



E - external = 1 if advertising router is an autonomous boundary router.

B = 1 if router is area broader router.

I = initialization flag. if msg is 1st msg.

M - more flag = 0 last msg.

M/S = master/slave ; origin of the pkt

m/s = 1 → master m/s = 0 → slave.

msg. seq. no = 32 bit → seq. no: of msg.

LSA header = 20 byte [used in each LSA.
→ gives outline of each link.

Link State Request Packet :

- ~~router link~~
- Packet send by router that needs info abt specific router/routes.
- get reply by link state update pkt.
- used by newly connected router to get details abt other rules.

OSPF Comm^n header (24 B
link state type
link state ID
Advertising router

Link State Acknowledgment Packet

OSPF makes routg more reliable by asking all routers to ~~acktedge~~ acknowledge the receipt of every link state update packet

OSPF Comm^n header
LSA general header
20 B corresponding type