#. How bridge learn the mac address.

Suppose we want to send frame from host A which is in LAN 1 to a system C which is present in LAN 3, then what will happen.

- Firstly A will broadcast the frame in its LAN as well as to bridge, the bridge will store the mac address of A, kaise source address se, kya learn kiya ki A LAN 1 mein hai, now bridge kya karega jis incoming line se aaya hai usko chor k saare line par frame broadcast karega.
- Then LAN 3 par C hai C k pass frame pahuchega then C response mein acknowledgement send karega bridge learn karlega ki C, LAN 3 mein hai aur jab bhi C to data send karna hai woh port 1 par forward karega.
- In this way self-learning bridges maintain its mac-table updated.
- This algorithm is called backward learning.

→ Working of above algorithm in general -

i] If destination & source ek hi Lan mein hai toh discard the frame.

2. Agar destination aur source dono different LAN mein hai toh forward the frame.

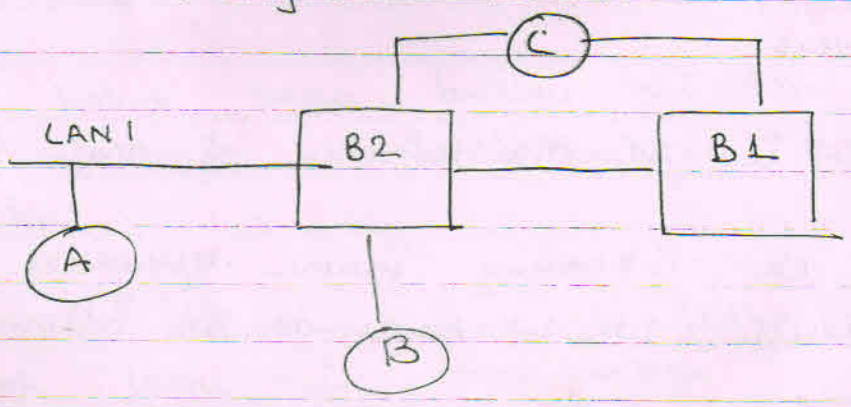
3. If the destination LAN is unknown ~~use flood~~ use flooding.

Advantages:-

- Agar LAN mein koi bhi change hua toh Self-Learning bridge maintain its mac-table updated itself.
- Hamra Lan 1 mein jo A host tha usko LAN 3 mein attach kardeya toh kyo hoga.
- Jo Self-Learning bridges mein kya hota hai, jaisehi koi System "on" hota hai LAN mein woh ek control frame send karta hai bridge ko for testing aur bridge apni table mein uska port number store karleta hai ki woh kis line se aaya hai.

Disadvantage :→

→ Infinite-Loop problem :→



(LN) Lan-nodes hogy

- Now we want to send A to Z toh kya hoga B2 broadcast karega B1 k pass aayega B1 bhi broadcast karega in this way a loop main pachu jayegi.

- Is situation ko resolve karne k liye Spanning tree ka use karta hai.

- Lan nodes hogey aur bridges unke bich ki edges

- Bridges together form the Spanning tree of complete Network.

- Spanning tree banana time-consuming hota hai.

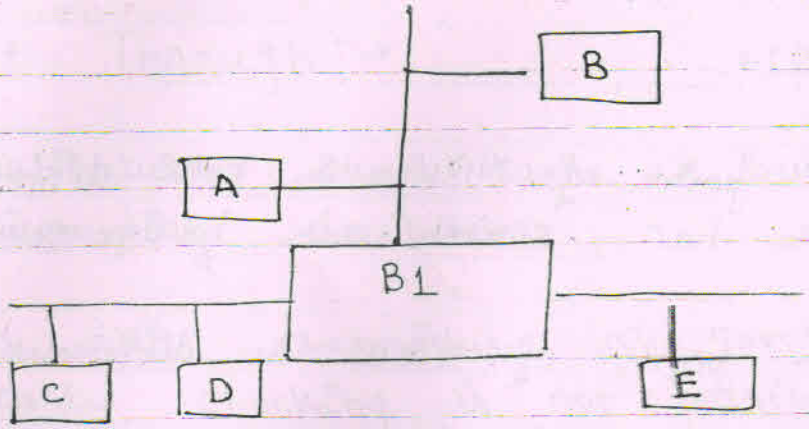
- Any change in network topology result in new Spanning tree which are very time consuming.

Source Routing bridges:-

- Source Routing matlab ki source will decide which route to be followed to send data to recievers.

- There is no maintainance of mac-table here

- Isme ek discovery frame generate hoti hai to decide which route to be followed.



- Suppose we want to send data from Host A to Host C if B1 is Source Routing bridge then first A will send discovery frame in which source address is there i.e A then go to B1 in B1 bridge A LAN B1 or A P1 B1 will be written then A P1 B1 C P2 D1. Now C will response to source of discovery frame. Now A will send frame with that path.

- Agar bahut bada network hai toh bahut saare discovery frame C K pass aayegey but woh sirf first wale ko hi rakhega aur baaki saab ko discard kar dega.

- First wale ko isliye rakega kyoki joh pahale aayegi woh shortest path follow karke hi aayi hai.

- Agar bahut saare bridges hai toh discovery frames K karan congestion hojayega, yeh iska disadvantage hai.

- Aur ek discovery frame se path pata kar k woh cache mein store karlega.

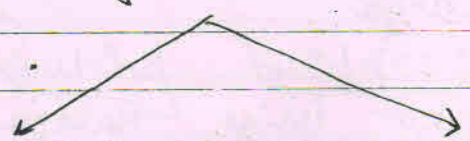
SWITCHES:→

- Software point of view se kohi difference nahi hota hai, switch aur bridge mein.
- Hardware point of view se difference hota hai.
- Multiport bridges are known as switches.

Difference between Switch and bridge??

Ans→ • Bridge mein limited port hote hai ~~aur switches aur~~

- Bridge forward frames slowly as compare to switches.
- Frame ko forward karne ki speed bahut fast hoti hai as compare to bridges.
- There are two ways in which switches are forwarding their frame.



- ~~First one~~

Store and forward Cut through

Store and forward:→

→ Jab tak puri frame read nahi karleta jab tak woh frame forward nahi kar sakta. In this forwarding scheme early-error-checking is possible but switches mein kuch memory buffer hona chahiye frame ko store karne k liye.

Cut Through :→

- Destination read karne k baad they make forwarding decision.
- In this technique late checking is possible early checking is not possible.

ALHO PROTOCOL :→

- This is access control protocol, but in practical this is not used.
- In this protocol, there are two varient –

Pure ALHO

- Kabhi bhi transmit kar sakte aur koi carry to sense karne ki jarurat nahi hai
- Collision is possible
- Yaha par ack send hota hai usse pata chalta hai ki frame collide hua hai ki nahi no need of collision detection mechism

Slotted ALHO

↓

Ek fixed slot mein hi send hoga packet, woh bhi us slot k starting point se hi, agar nahi hua toh next slot ka wait karega.

- Retransmission → Random amount time → Backoff.

Pure alcho

$\eta = G * e^{-2G}$

$(\eta_{max})_{at\ G=1/2} = 18.34\%$

Slotted alho

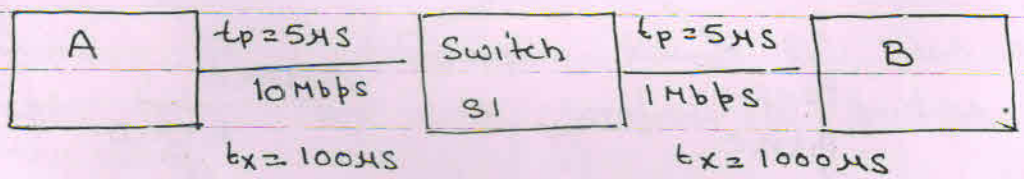
$\eta = G \times e^{-G}$

$[(\eta)_{max}]_{at\ G=1} = 36.8\%$

Where G = No. of station who wants to transmit data in particular that slot.

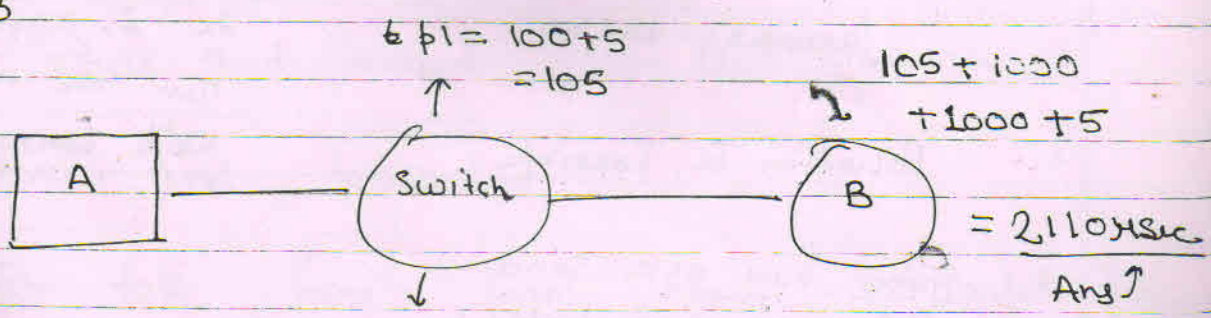
Ques:→ 2. Consider the following problem :-

Ans ↳



A will send two frames to B each of 1000 bits. Find out how much time will be required to traverse second frame to system B

Ans →



ICMP v4 :→

- Internet Control Message Protocol version 4. It is a network layer protocol.
- Since IP layer jo hoti hai unreliable and connectionless hoti hai, toh error ko handle karne k liye ICMP protocol ko design kiya gaya tha.
- ICMP k message ko hum do parts mein divide kar sakte hai

Error-Reporting message — Query message

- Toh indono mein basically difference kya hota hai ??

Ans Error Reporting message mein hum agar router ya host par packet se related koi error cati hai toh ICMP sirf source host/router ko message report karta hai

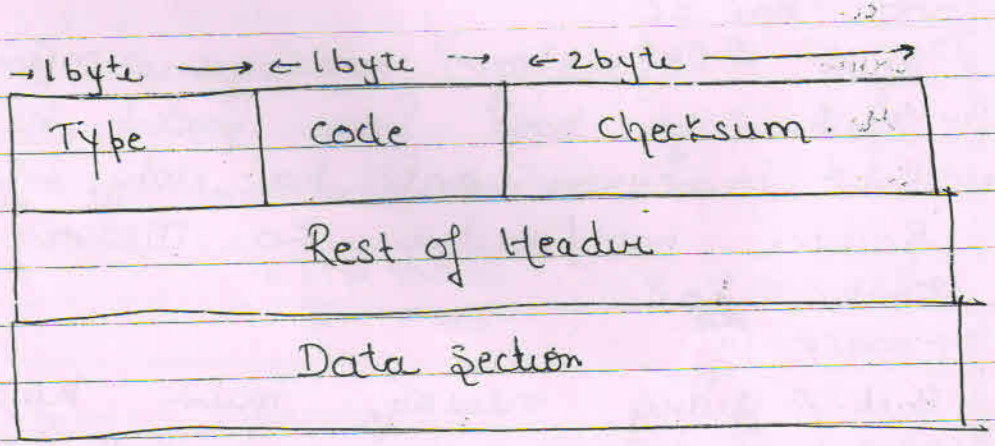
- But Query message mein hum kuch information gather karte hai ICMP protocol k through.

ICMP Message

- Error-Reporting message
  1. Destination unreachable
  2. Source quench
  3. Time exceeded
  4. Parameter problem
  5. Redirection
- Query Message
  1. Echo request or reply
  2. Timestamp request or reply

ICMP- Header Format :-

- ICMP ka 8 byte ka header hota hai aur variable Length ka data section



- Starting ki 4 byte sabhi ICMP message mein same hoti hai but last ki 4 byte error-message to error-message vary karti hai.

Type field, hamne yeh batati hai ki konse type ki error hai aur code hamne yeh batata us error ka reason kya hai aur detail mein.

For example agar Type field = 3 hai matlab destination unreachable, now unme further kya problem hai, kyoki bahut saari problem destination unreachable error reflect karte hai.

* ICMP only detect error but it does not correct errors, it simply report them.

- ICMP hamesa original source ie jaha se packet send hua hai initially usko hi send karta hai.

Important:-

- Agar ICMP packet mein hi error aagayi toh us packet k liye ICMP nahi generate hoga.

- Agar multicast address hai toh bhi ICMP error packet generate nahi hoga.

- Aur agar packet k further fragment horaha hai toh sirf first fragment wale k liye hi ICMP packet generate hota hai bich walo k liye nahi hota hai.