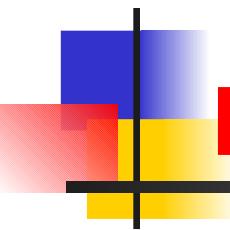
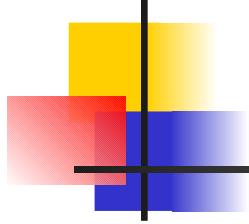


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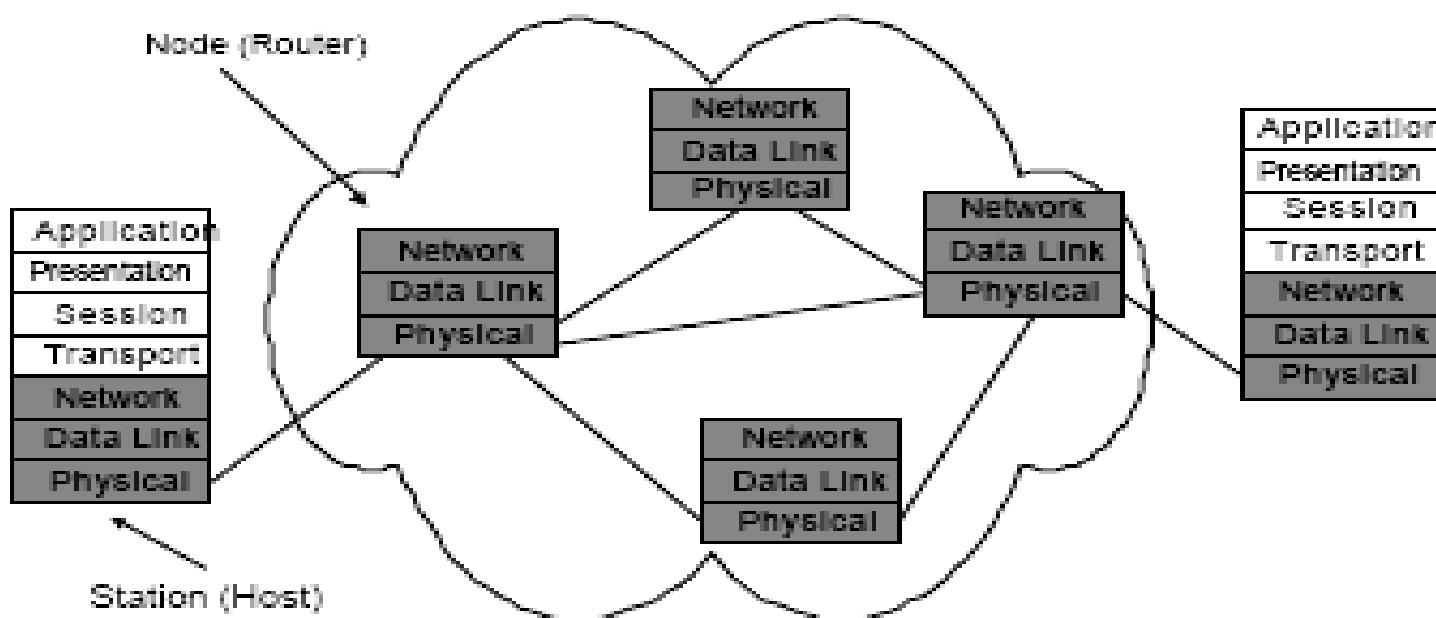


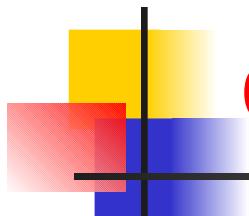
Network Layer Design Issues

- 
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- Implementation of Connectionless Service
 - Implementation of Connection-Oriented Service
 - Comparison of Virtual-Circuit and Datagram Subnets

Main objective

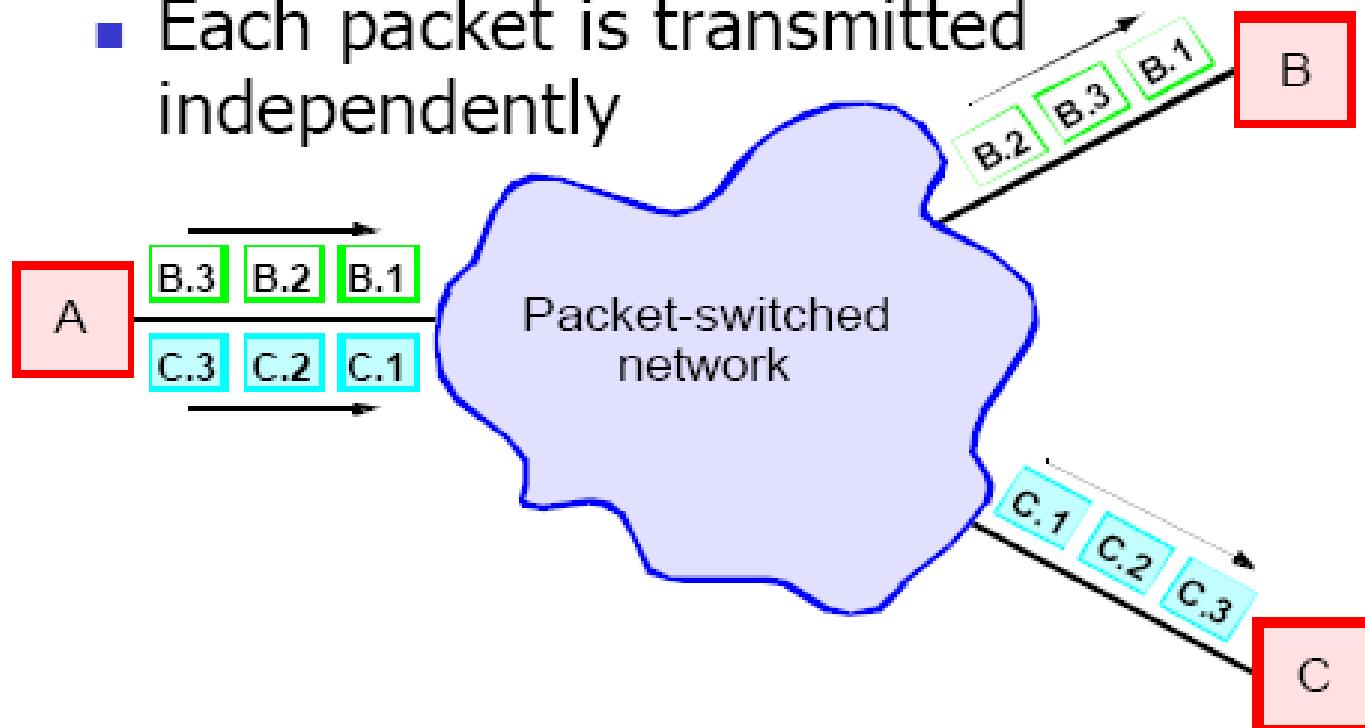
- Data delivery from source to destination





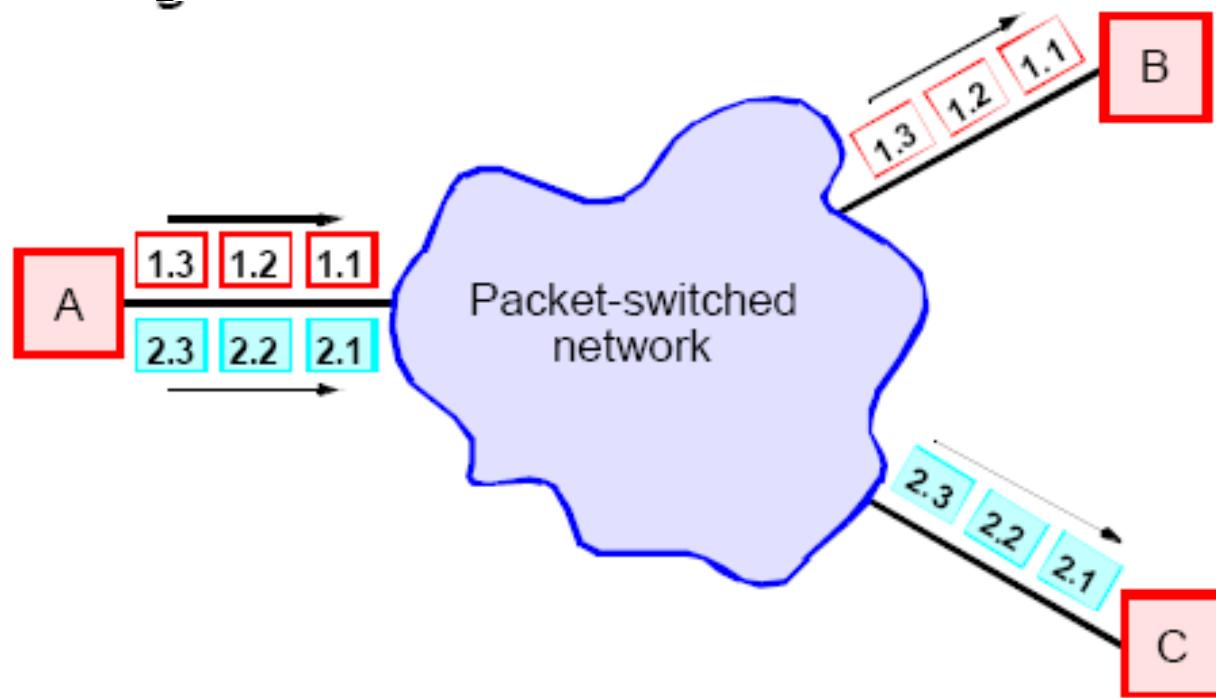
Connectionless services

- Each packet is transmitted independently



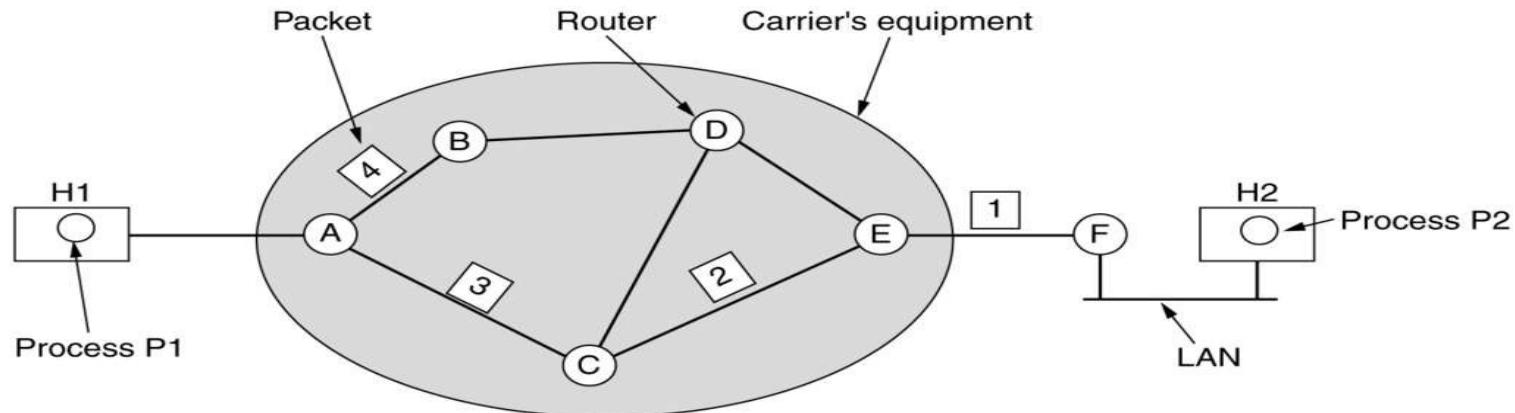
Connectionless-Oriented services

- Logical connection is established



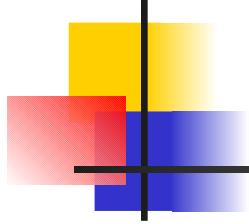
Implementation of Connectionless Service

Routing within a datagram subnet. (destined for, outgoing line)



A's table		C's table		E's table	
initially	later	initially	later	initially	later
A -	A -	A A	A C	A -	A -
B B	B B	B A	B D	B D	B D
C C	C C	C -	C C	C C	C C
D B	D B	D D	D D	D D	D D
E C	E B	E E	E -	E -	E -
F C	F B	F E	F F	F F	F F

Dest. Line

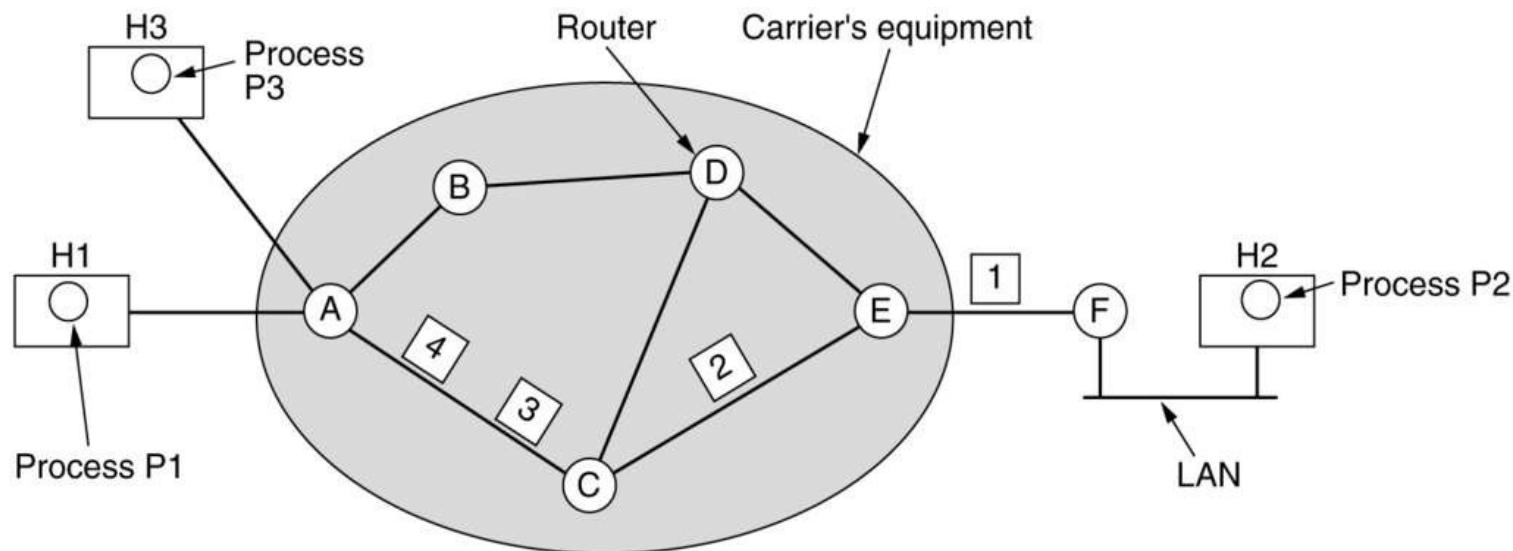


Datagram:

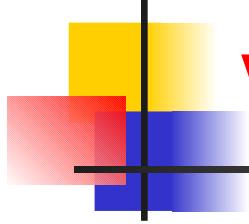
- With a datagram, the router from source to destination are not worked out in advance .
- Each packet sent is routed independently.
- Successive packets can follow different routes.
- The datagram subnet have to do more work but they are more robust and deal with failures and congestion.

Implementation of Connection-Oriented Service

Routing within a VC subnet (incoming, connection id) (outgoing, connection id)

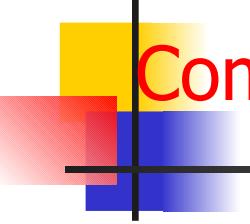


A's table		C's table		E's table	
H1	1	C	1	A	1
H3	1	C	2	E	2
In		Out			



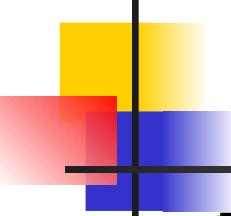
Virtual Circuits:

- The principal behind the virtual circuits is to choose only one route from source to destination.
- When a connection is established, it is used for all the traffic flowing over the connection.
- When the connection is released , the virtual circuits is terminated.



Comparison of Datagram Subnets and Virtual-Circuit

Issue	Datagram Subnets	Virtual-Circuit Subnet
Circuit set up	Not required	Required
Addressing	Each packet contains the source as well as destination address	Each packet contains a short VC number
State information	Subnet does not hold state information	A table is needed to hold the state information
Routing	Each packet is routed independently	Route chosen when VC is setup; all packets follow this route



Comparison of Datagram Subnets and Virtual-Circuit

Issue	Datagram Subnets	Virtual-Circuit Subnet
Congestion control	Easy if enough resources can be allocated in advance for each VC.	Difficult
Quality of service	Easy if enough resources can be allocated in advance for each VC.	Difficult
Effect of router failure	No other effect except for the packets lost at the time of crash	All VCs which passed through failed router are terminated.