

Chapter 5

Network Layer Design Issues

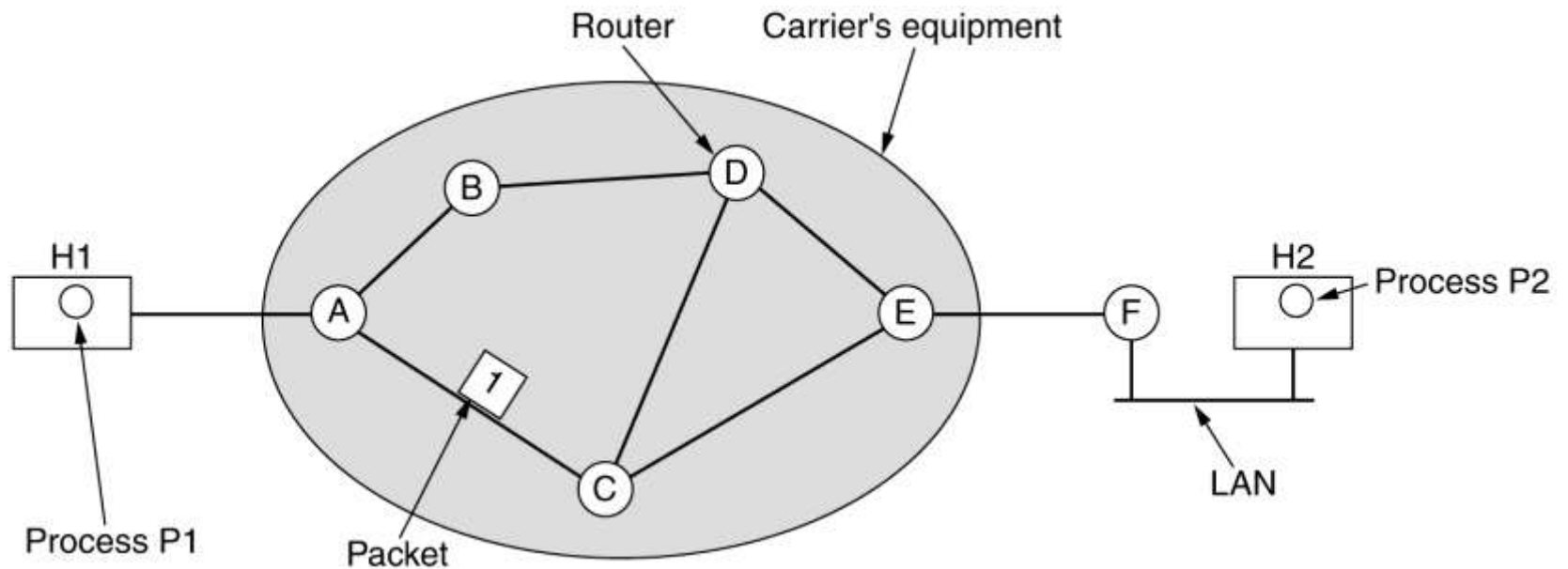
Lecture No 1

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Network Layer Design Issues

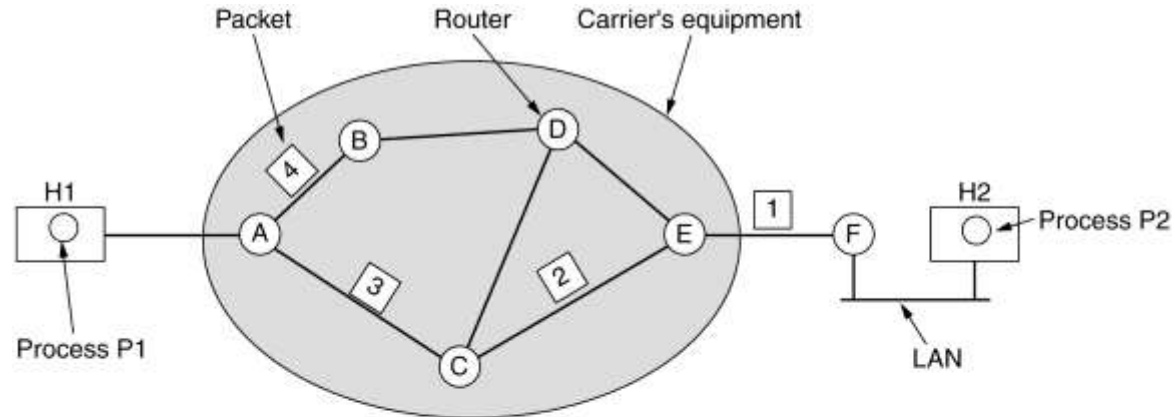
- Store-and-Forward Packet Switching
- Services Provided to the Transport Layer
- Implementation of Connectionless Service
- Implementation of Connection-Oriented Service
- Comparison of Virtual-Circuit and Datagram Subnets

Store-and-Forward Packet Switching



The environment of the network layer protocols.

Implementation of Connectionless Service



A's table

	initially	later
A	-	-
B	B	B
C	C	C
D	B	B
E	C	B
F	C	B

C's table

A	A
B	A
C	-
D	D
E	E
F	E

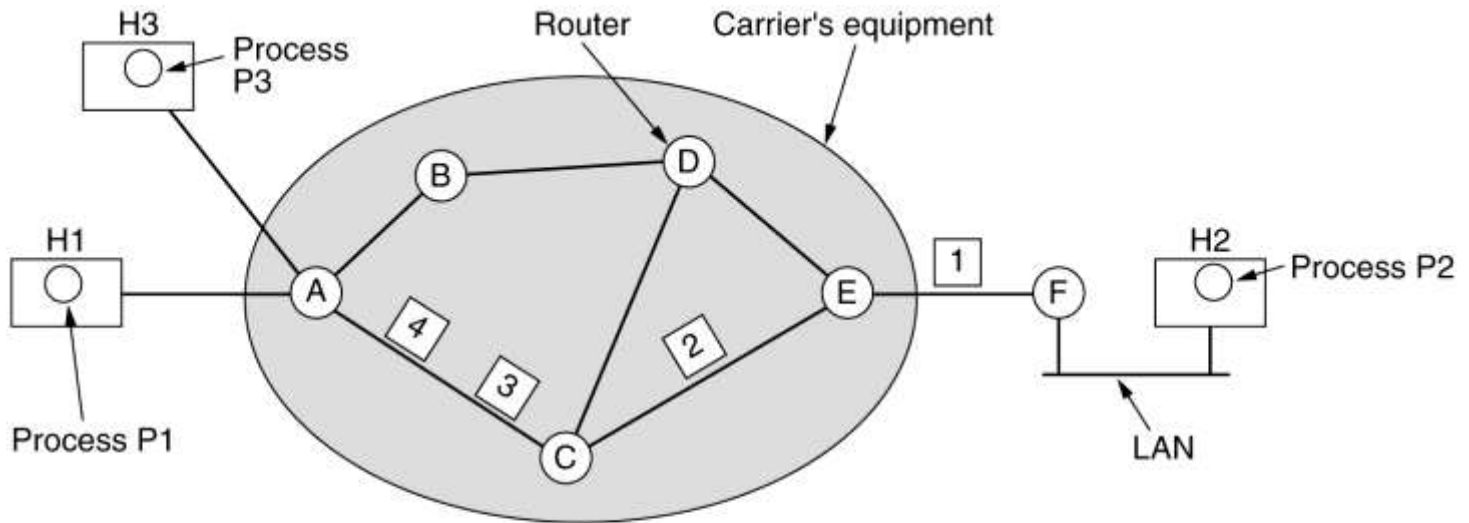
E's table

A	C
B	D
C	C
D	D
E	-
F	F

Dest. Line

Routing within a diagram subnet.

Implementation of Connection-Oriented Service



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

Routing within a virtual-circuit subnet.

Comparison of Virtual-Circuit and Datagram Subnets

Issue	Datagram subnet	Virtual-circuit subnet
Circuit setup	Not needed	Required
Addressing	Each packet contains the full source and destination address	Each packet contains a short VC number
State information	Routers do not hold state information about connections	Each VC requires router table space per connection
Routing	Each packet is routed independently	Route chosen when VC is set up; all packets follow it
Effect of router failures	None, except for packets lost during the crash	All VCs that passed through the failed router are terminated
Quality of service	Difficult	Easy if enough resources can be allocated in advance for each VC
Congestion control	Difficult	Easy if enough resources can be allocated in advance for each VC