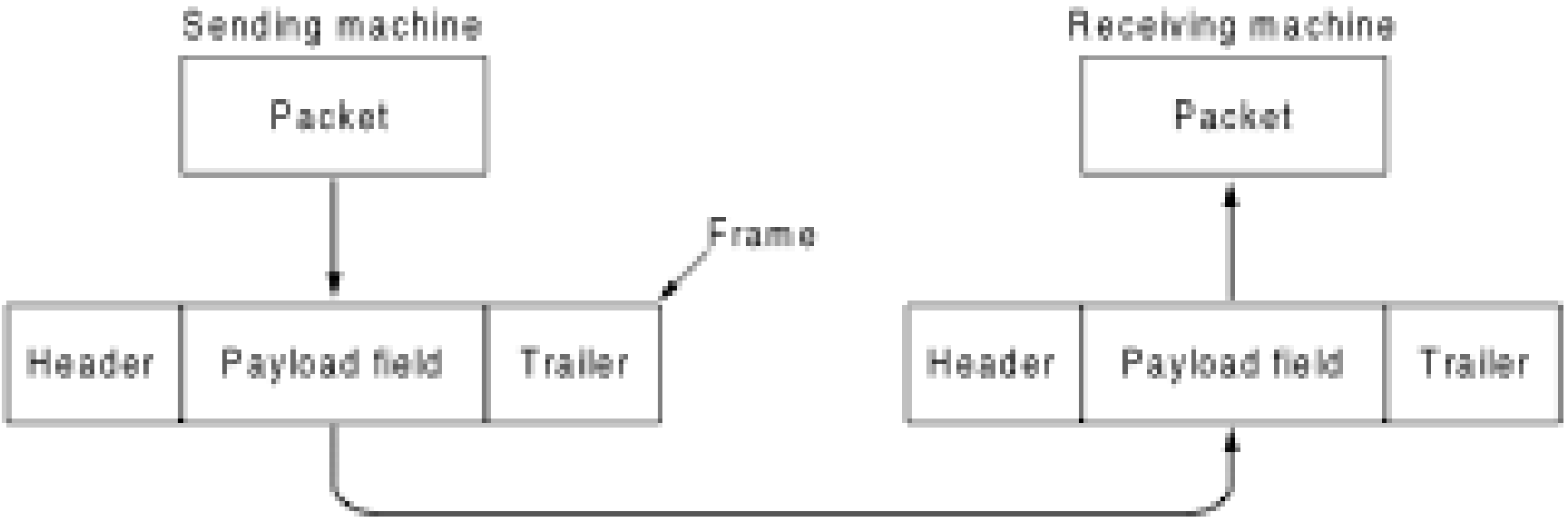
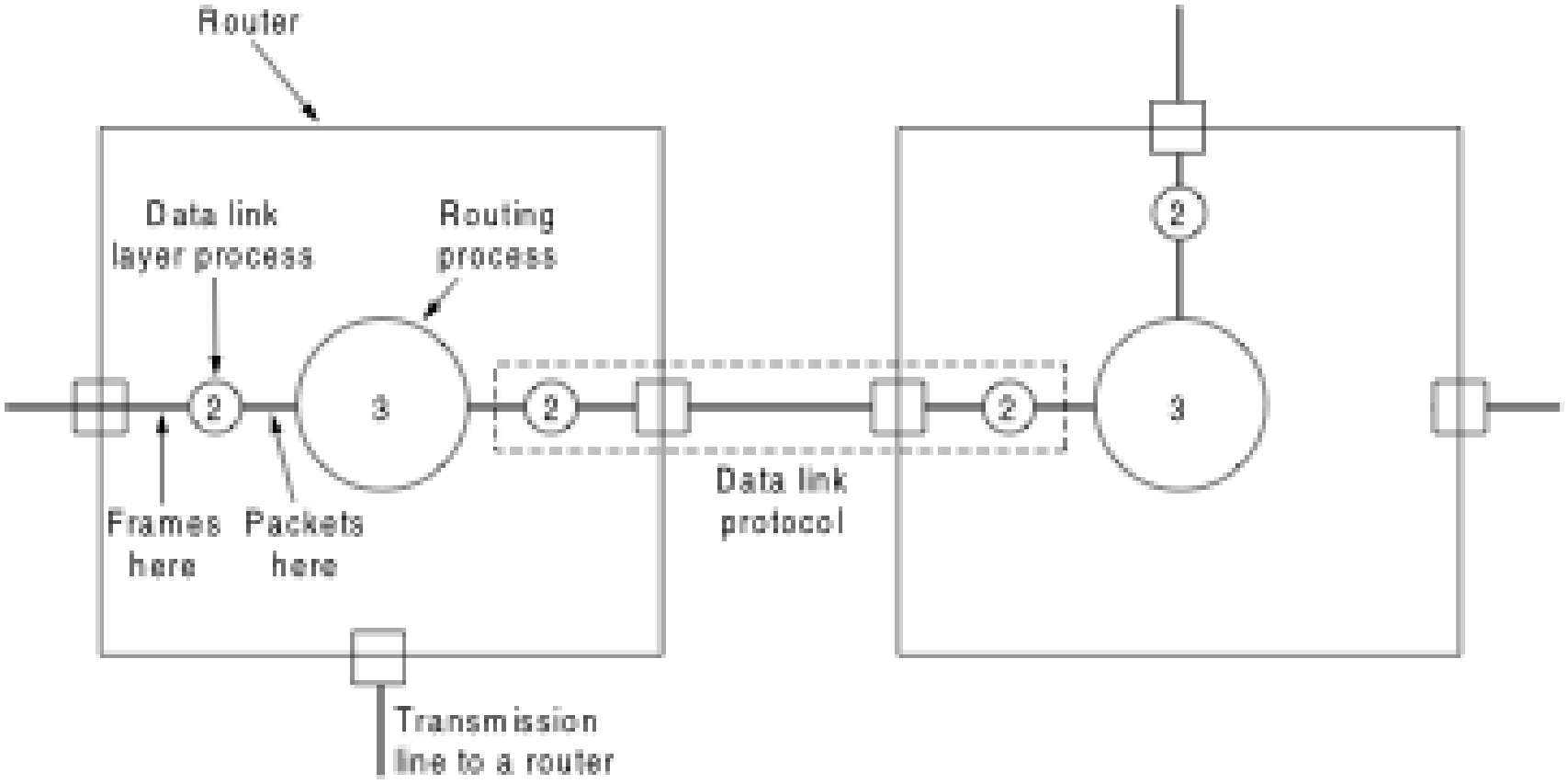
Lecture 17

Network Layer

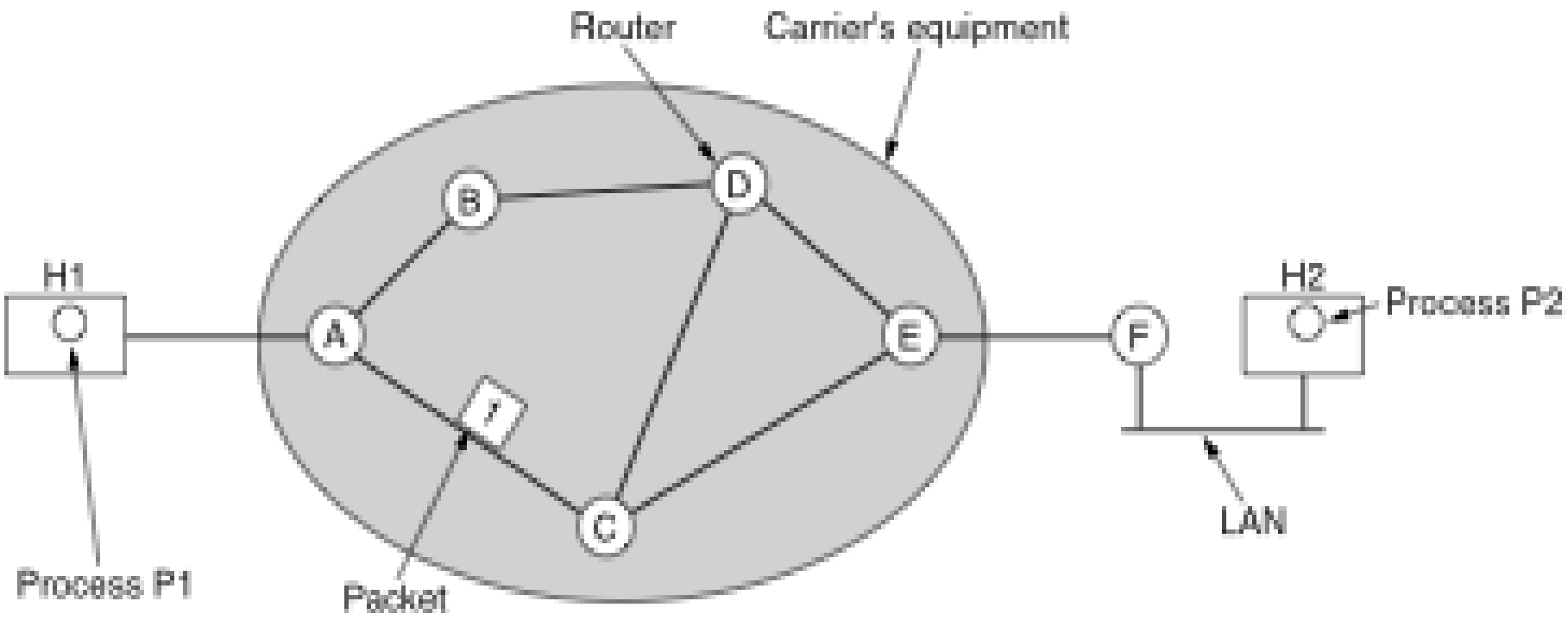
Frames vs Packets



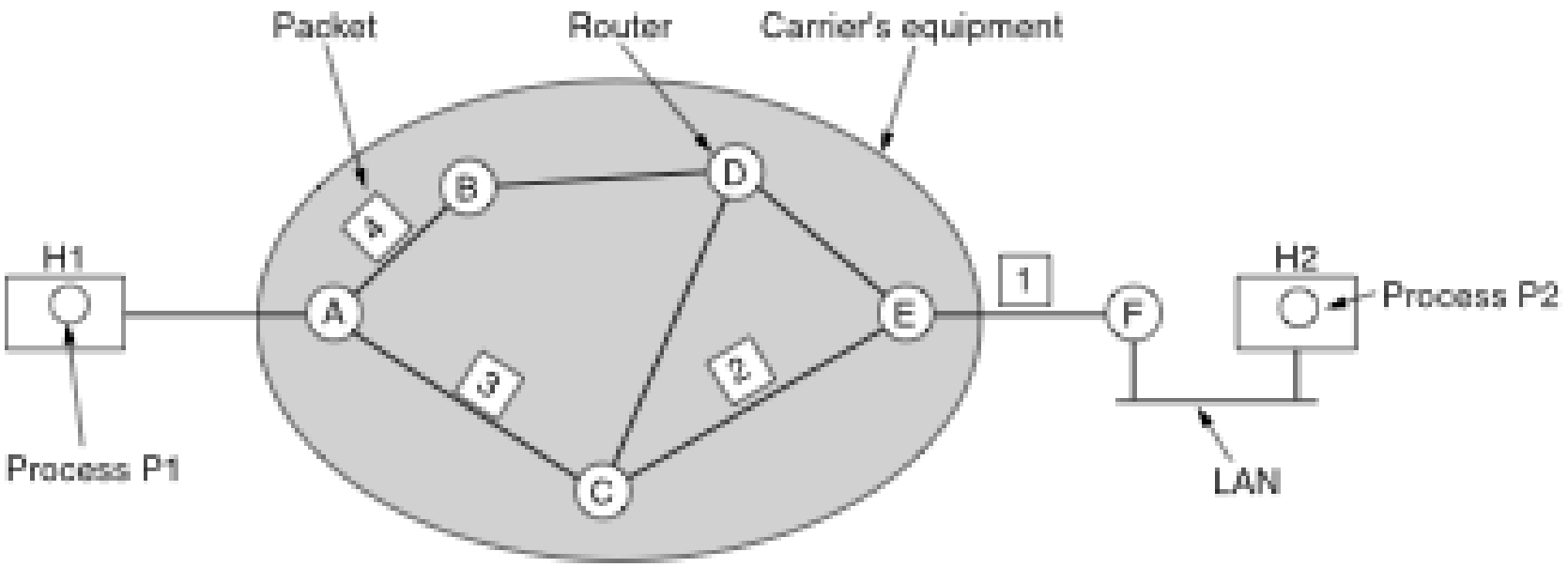
Router


Router
Data link layer process
Routing process
2
3
2
2
3
Frames here
Packets here
Data link protocol
Transmission line to a router

Network Layer Environment



Datagram Routing



A's table

Initially		later	
A	–	A	–
B	B	B	B
C	C	C	C
D	B	D	B
E	C	E	B
F	C	F	B

Dest. Line

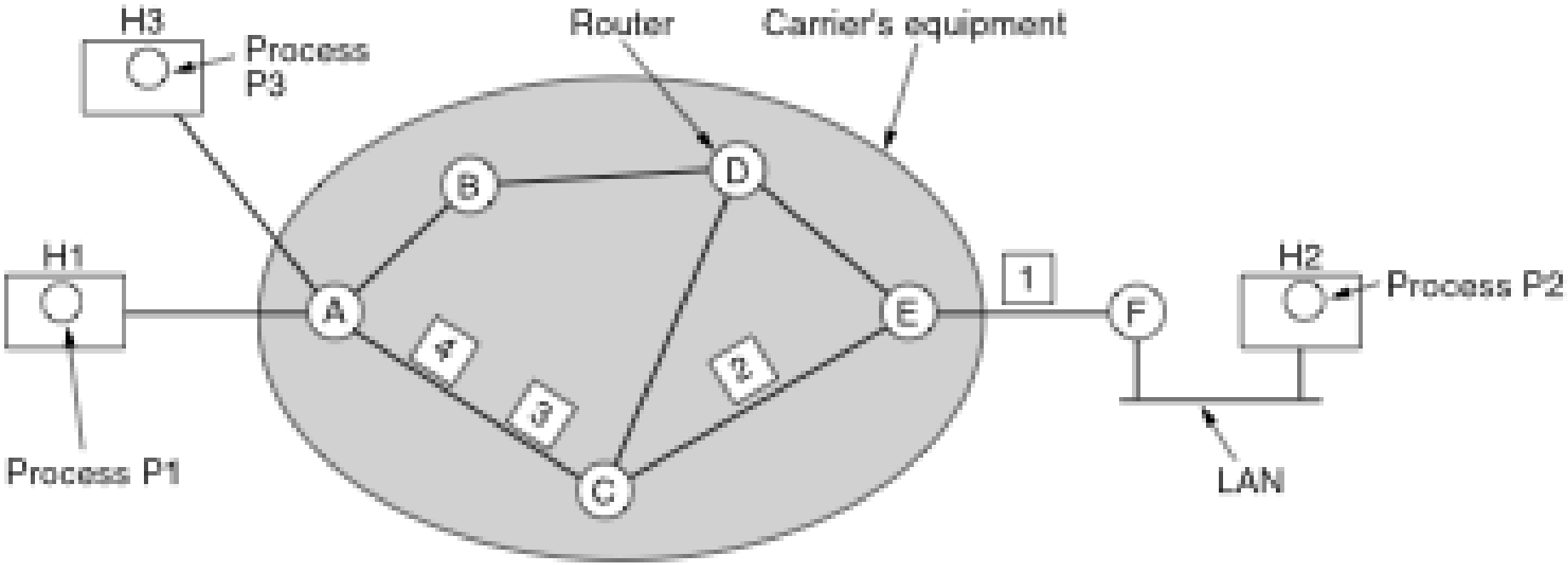
C's table

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

VC Routing



A's table

H1	1	C	1
H3	1	C	2

In Out

C's table

A	1	E	1
A	2	E	2

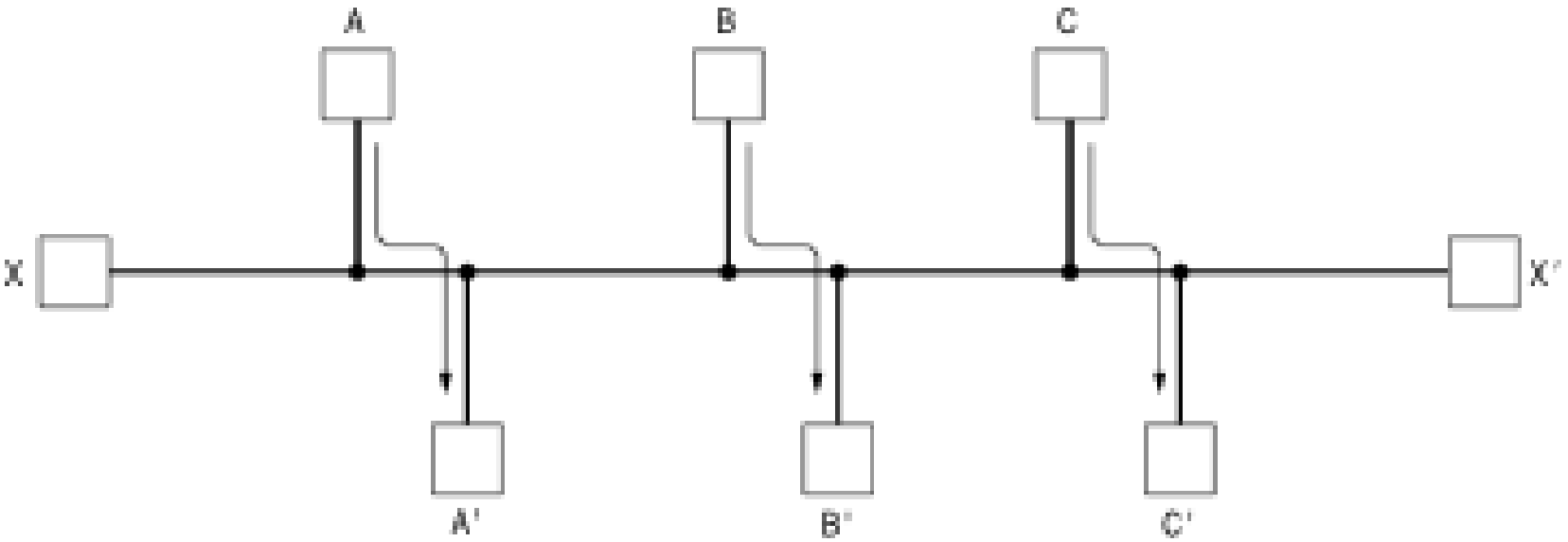
E's table

C	1	F	1
C	2	F	2

Connection vs Connectionless

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

Evaluation Goals Conflict



Dijkstra's algorithm