Introduction to Computer Networks

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mobile network

global ISP

home network

regional ISP

institutional network

Access net: home network

wireless devices

often combined in single box

wireless access point (54 Mbps)
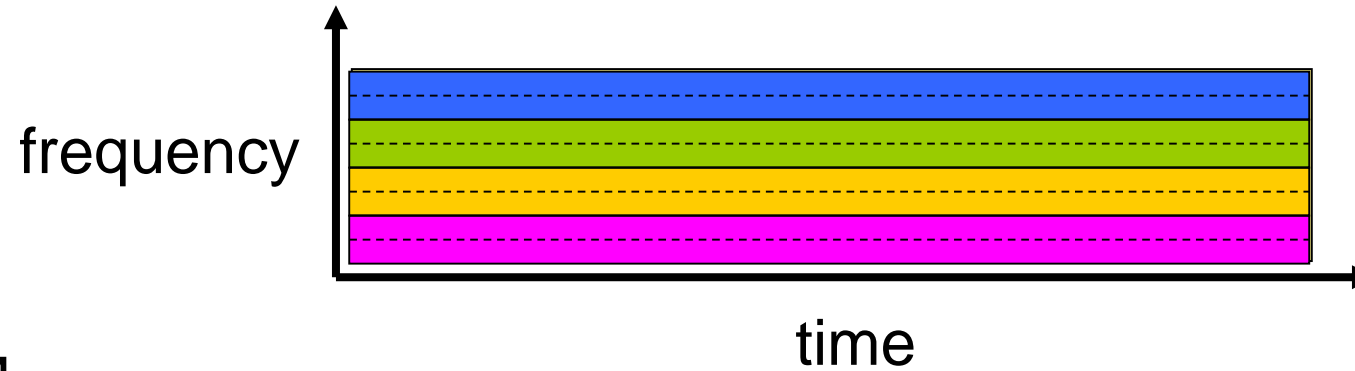
router, firewall, NAT

wired Ethernet (100 Mbps)

cable or DSL modem
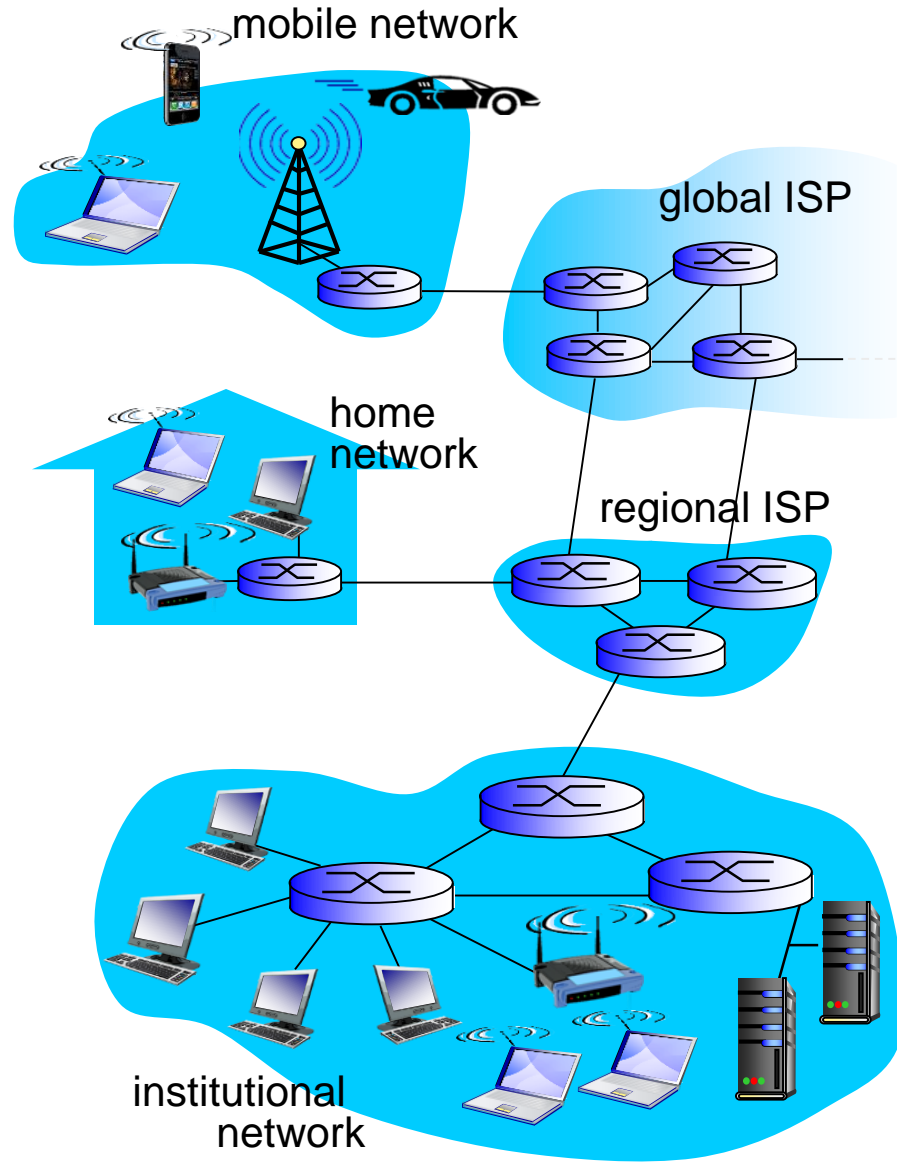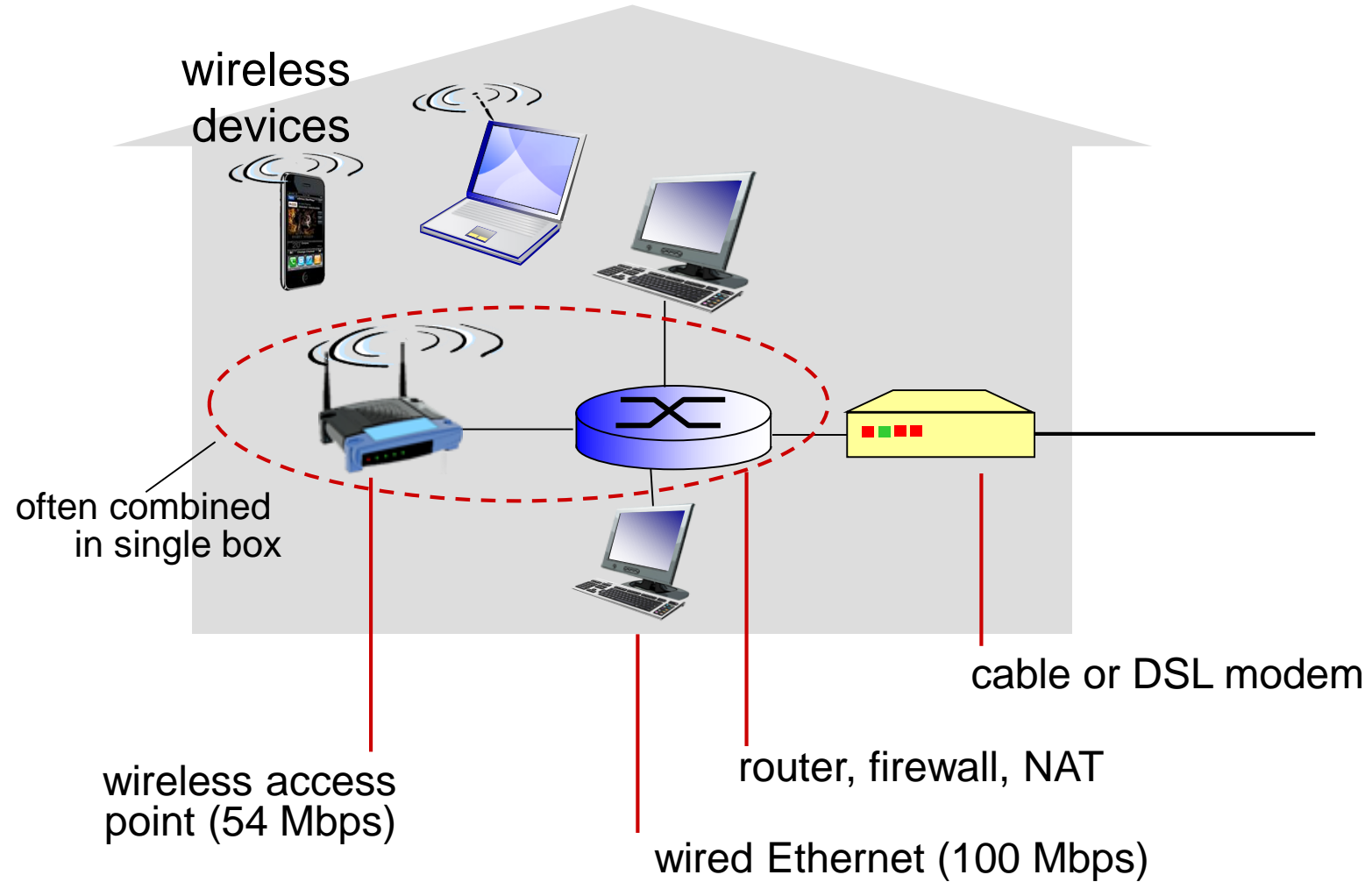
Circuit switching: FDM versus TDM

Example:

4 users

FDM

frequency

time

TDM

frequency

time

Zealand
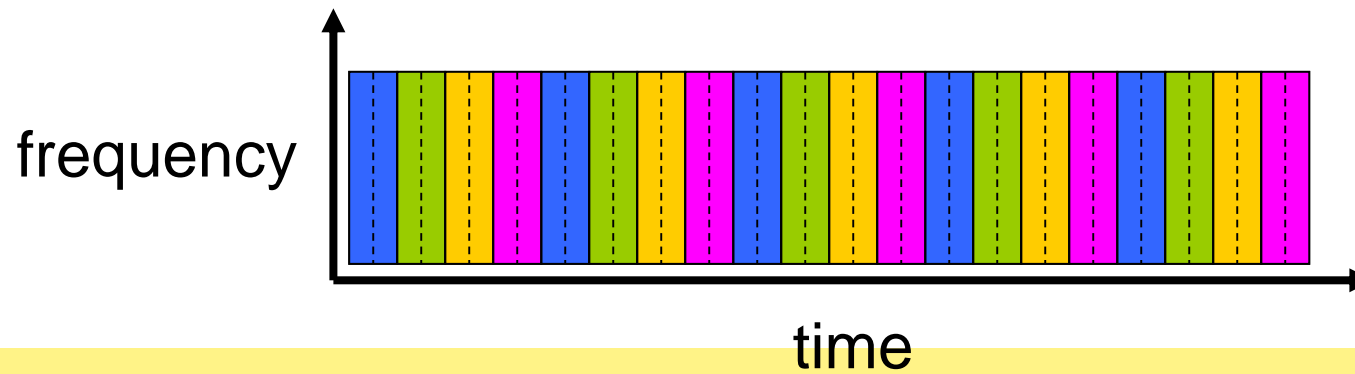
Packet Switching: queueing delay, loss

A R = 100 Mb/s

R = 1.5 Mb/s

B

queue of packets
waiting for output link

C

D

E

mobile network

global ISP

home network

regional ISP

Proxy server

Firewall

Firewall

institutional network
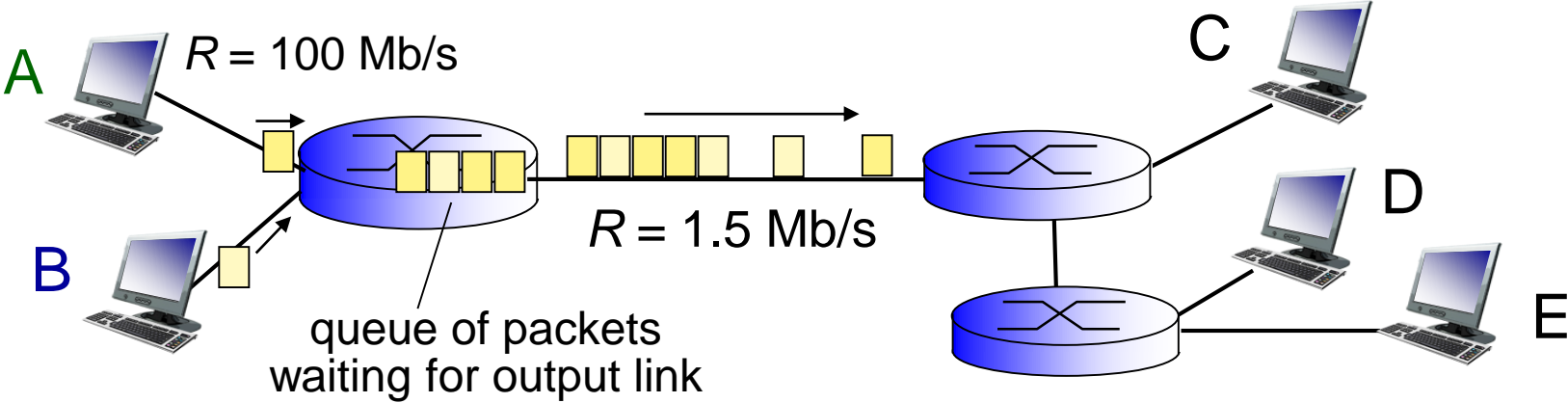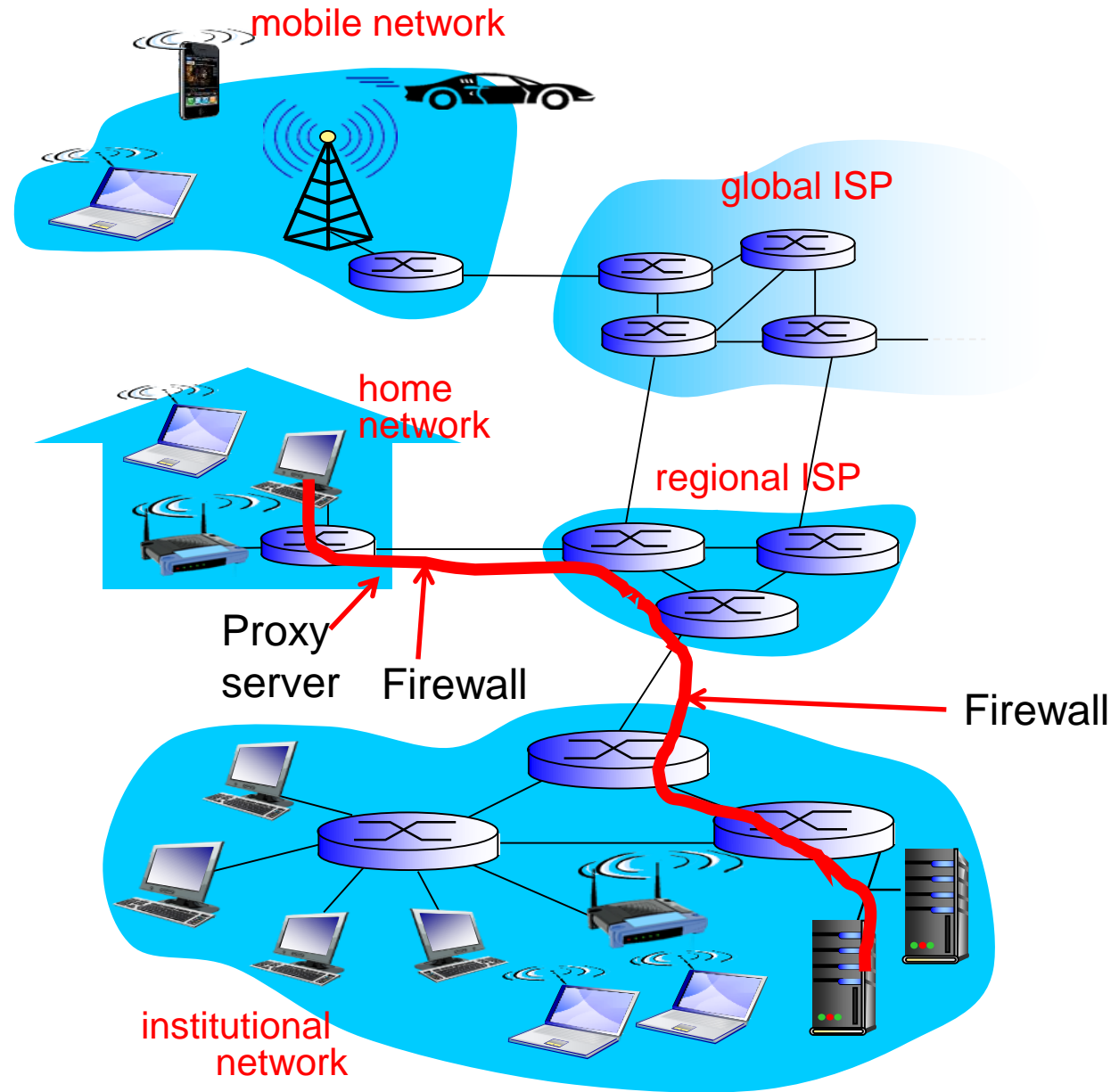
Organization of air travel

ticket (purchase)   ticket (complain)

baggage (check)   baggage (claim)

gates (load)   gates (unload)

runway takeoff   runway landing

airplane routing   airplane routing

airplane routing
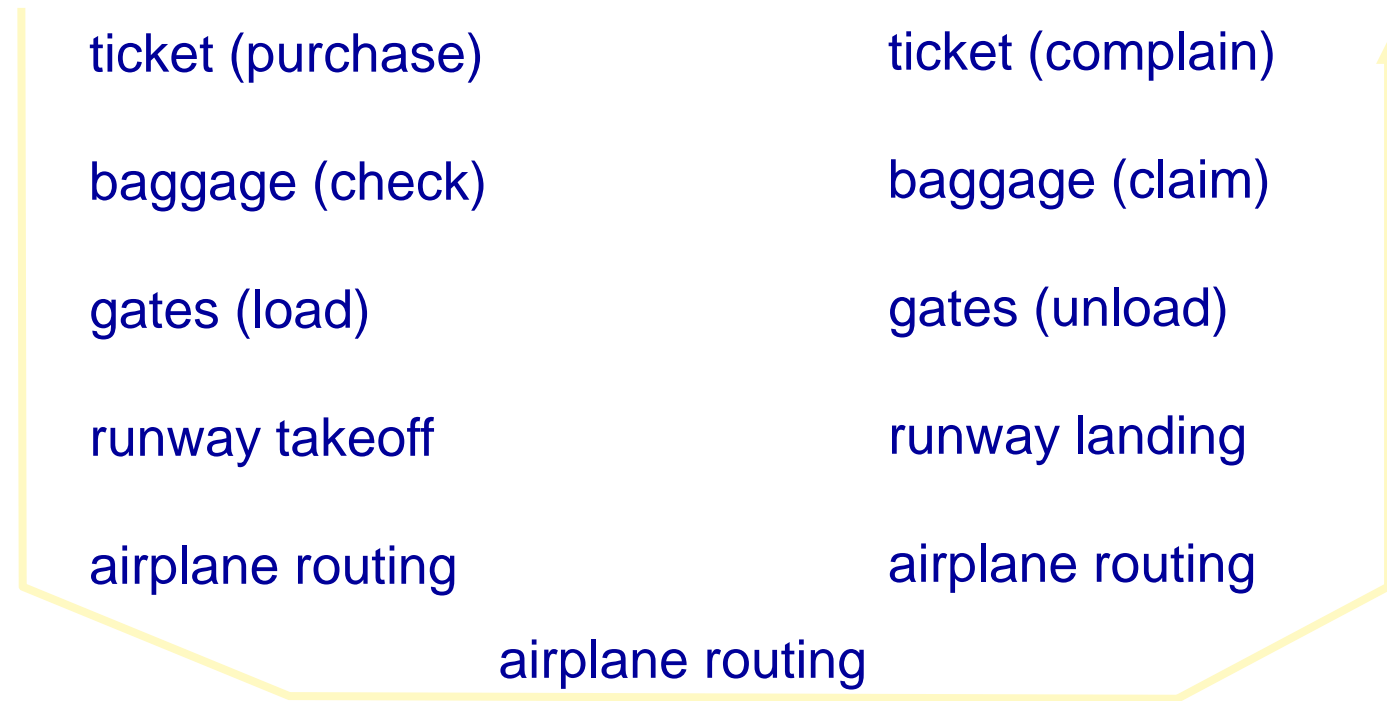
Layering of airline functionality

ticket (purchase)			ticket (complain)	ticket
baggage (check)			baggage (claim	baggage
gates (load)			gates (unload)	gate
runway (takeoff)			runway (land)	takeoff/landing
airplane routing	airplane routing	airplane routing	airplane routing	airplane routing

departure
airport

intermediate air-traffic
control centers

arrival
airport

Encapsulation

source

message	M
segment	H_t	M
datagram	H_n	H_t	M
frame	H_l	H_n	H_t	M

source

- application
- transport
- network
- link
- physical

switch

- link
- physical

router

- network
- link
- physical

H_n H_t M
H_l H_n H_t M

H_n H_t M

destination

	M
	H_t	M
	H_n	H_t	M
	H_l	H_n	H_t	M

- application
- transport
- network
- link
- physical

SLUT