【CN】Day4

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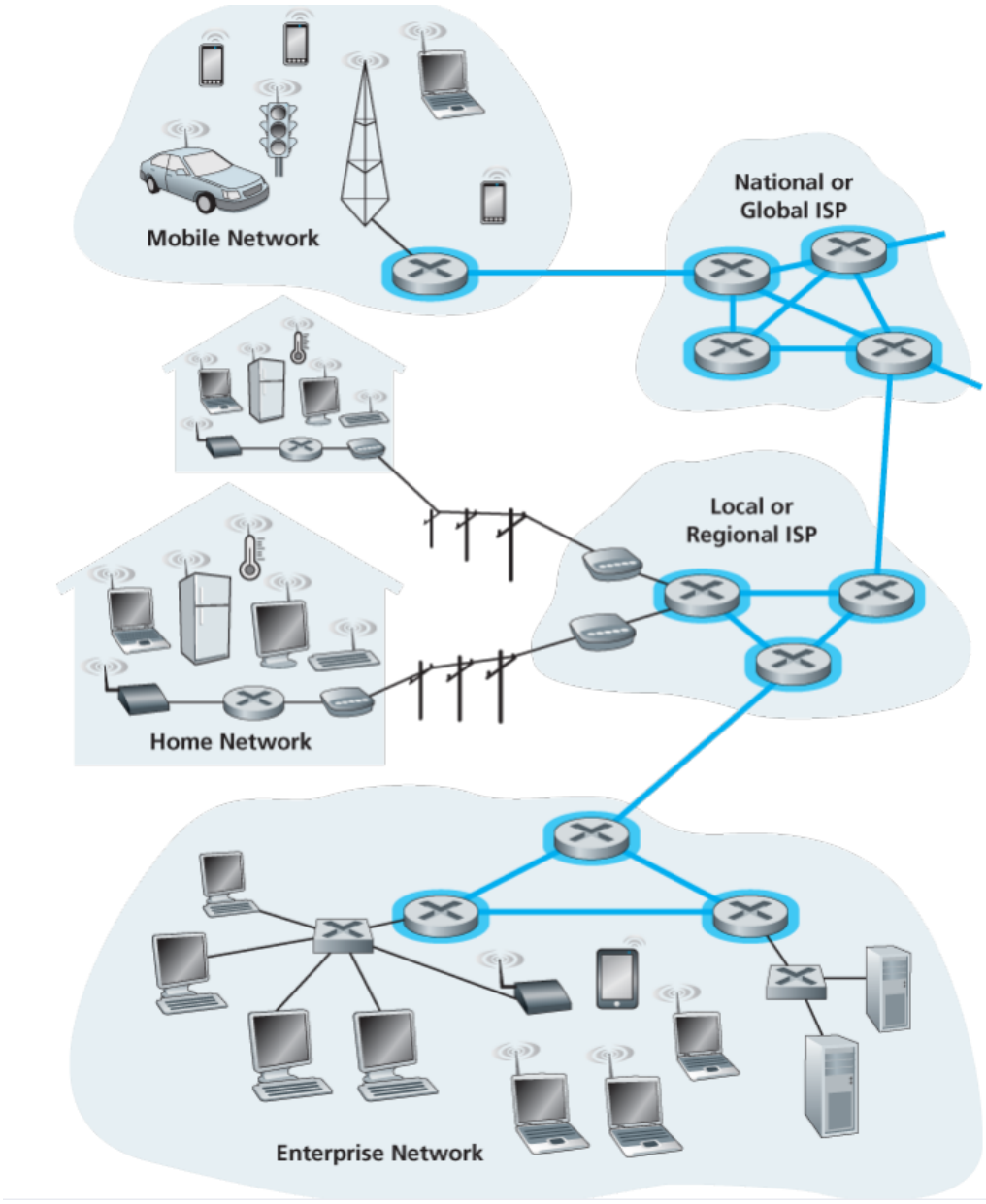
Class	
Type	
Materials	Packet Switching: Store and Forward Transmission, Queuing Delays and Packet Loss, and Forwarding Table and Routing Protocols
Reviewed	☐

【Ch1】Computer Networks and the Internet

1.3 The Network Core

The following figure highlights the network core with thick, shaded lines:



1.3.1 Packet Switching

In a network application, end systems exchange messages with each other. Messages can contain anything the application designer wants. Messages may perform a control function or can contain data.

To send a message from a source end system to a destination end system, the source breaks long messages into smaller chunks of data known as packets.

Between source and destination, each packet travels through communication links and packet switches(for which there are two predominant types, routers and link-layer

switches).

Packets are transmitted over each communication link at a rate equal to the full transmission rate of the link. So, if a source end system or a packet switch is sending a packet of L bits over a link with transmission rate R bits/sec, then the time to transmit the packet is L/R seconds.

Store and Forward Transmission

Most packet switches use store-and-forward transmission at the inputs to the links.

Store-and-forward transmission means that the packet switch must receive the entire packet before it can begin to transmit the first bit of the packet onto the outbound link.

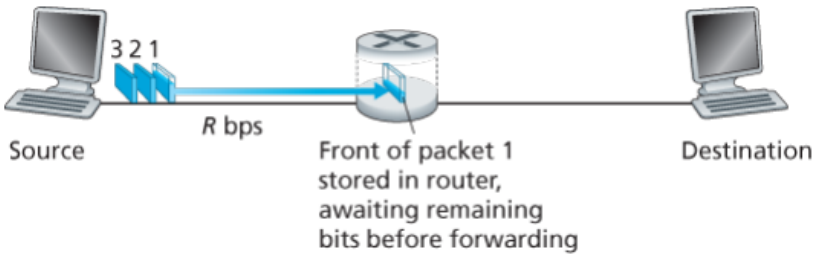


Figure 1.11 Store-and-forward packet switching

Queuing Delays and Packet Loss

Each packet switch has multiple links attached to it. For each attached link, the packet switch has an output buffer(also called an output queue), which stores packets that the router is about to send into that link.

The output buffers play a key role in packet switching. If an arriving packet needs to be transmitted onto a link but finds the link busy with the transmission of another packet, the arriving packet must wait in the output buffer.

Thus, in addition to the store-and-forward delays, packets suffer output buffer queuing delays. These delays are variable and depend on the level of congestion in the network.

Since the amount of buffer space is finite, an arriving packet may find that the buffer is completely full with other packets waiting for transmission. In this case, packet loss will occur-either the arriving packet or one of the already-queued packets will be dropped.

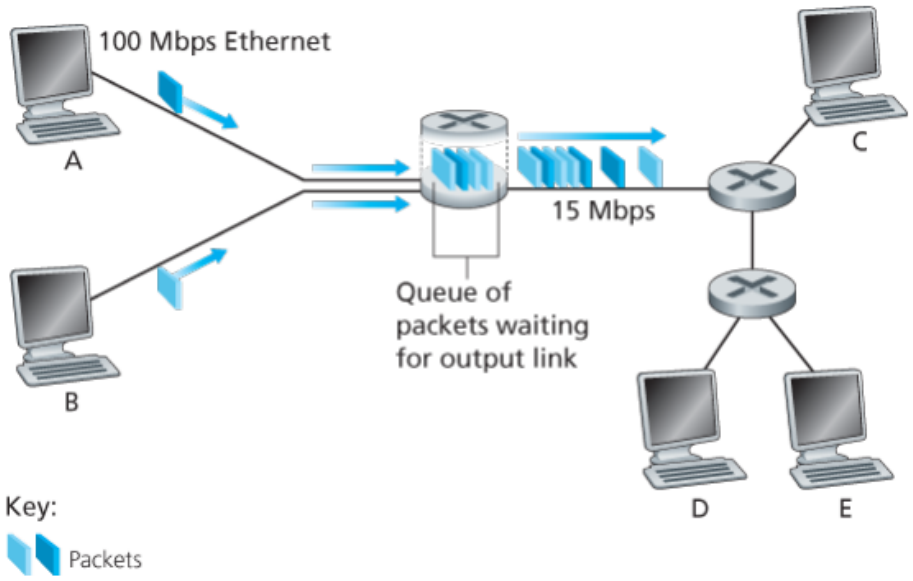


Figure 1.12 Packet switching

Forwarding Tables and Routing Protocols

How does the router determine which link it should forward the packet onto?

In the Internet, every end system has an address called an IP address. When a source end system wants to send a packet to a destination end system, the source includes the destination's IP address in the packet's header.

This address has a hierarchical structure. When a packet arrives at a router in the network, the router examines a portion of the packet's destination address and forwards the packet to an adjacent router.

More specifically, each router has a forwarding table that maps destination addresses to that router's outbound links.