CS 348
Computer Networks
Lec 6

Spring 2020 IIT Goa

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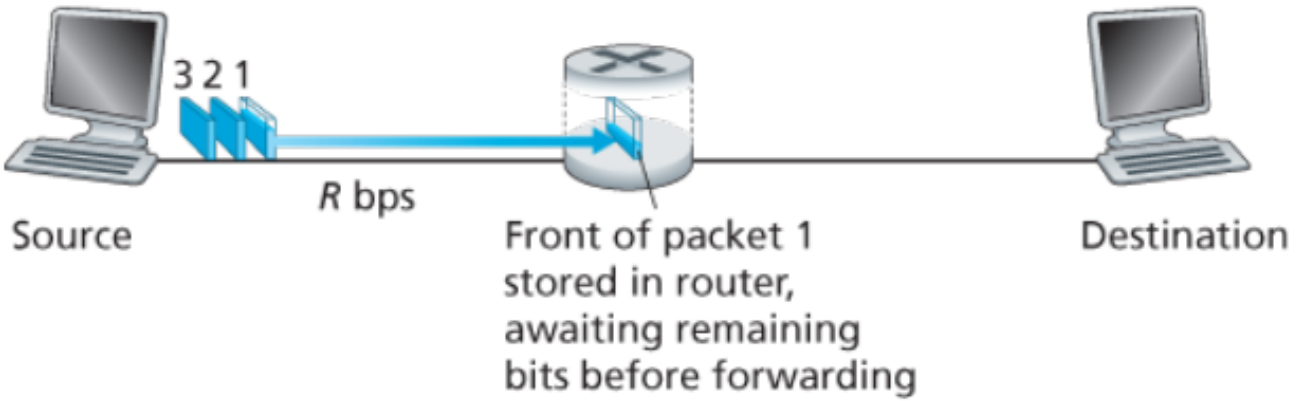
Questions

- How do packet-switched networks work?
- How do we understand and analyze the **Performance** of packet-switched networks?
- Why does the Internet use **Packet Switching**? What are the alternatives?

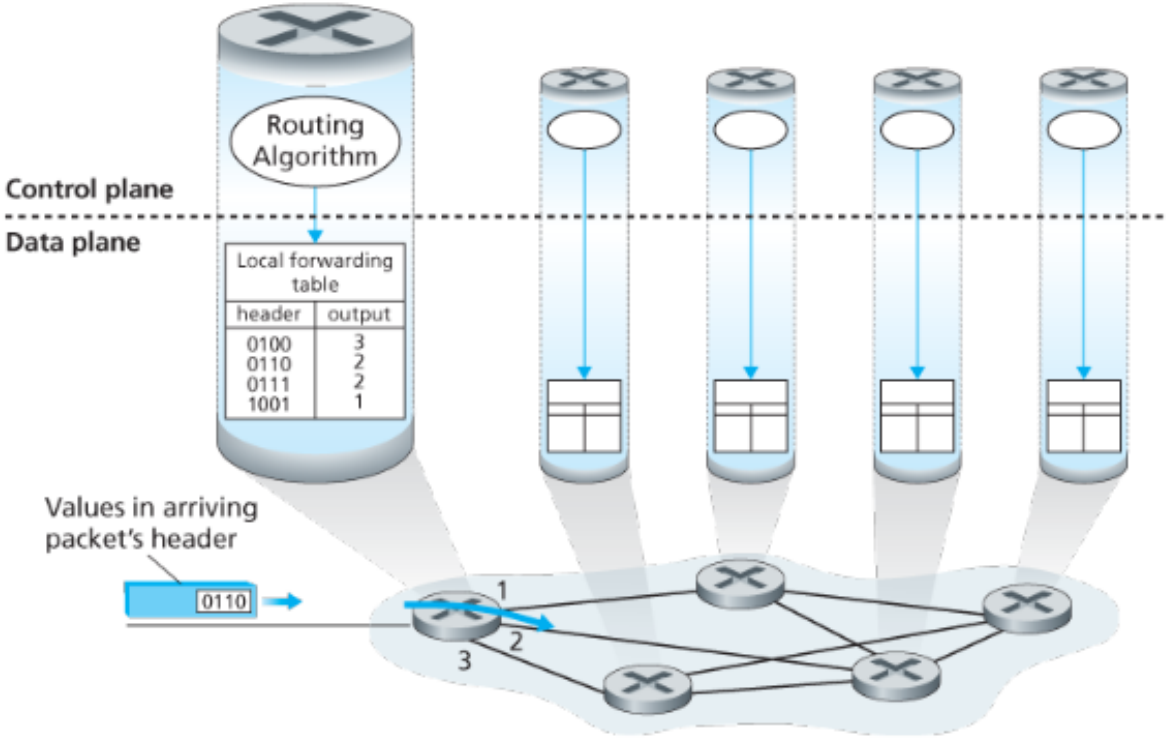
Store-and-Forward Packet Switching

- A packet switch (Router/Switch) must **receive (buffer) the entire packet** before it can begin to transmit the packet onto the next link.



A Router forwards Packets

based on its destination address
by consulting a forwarding table



What a Router consists of

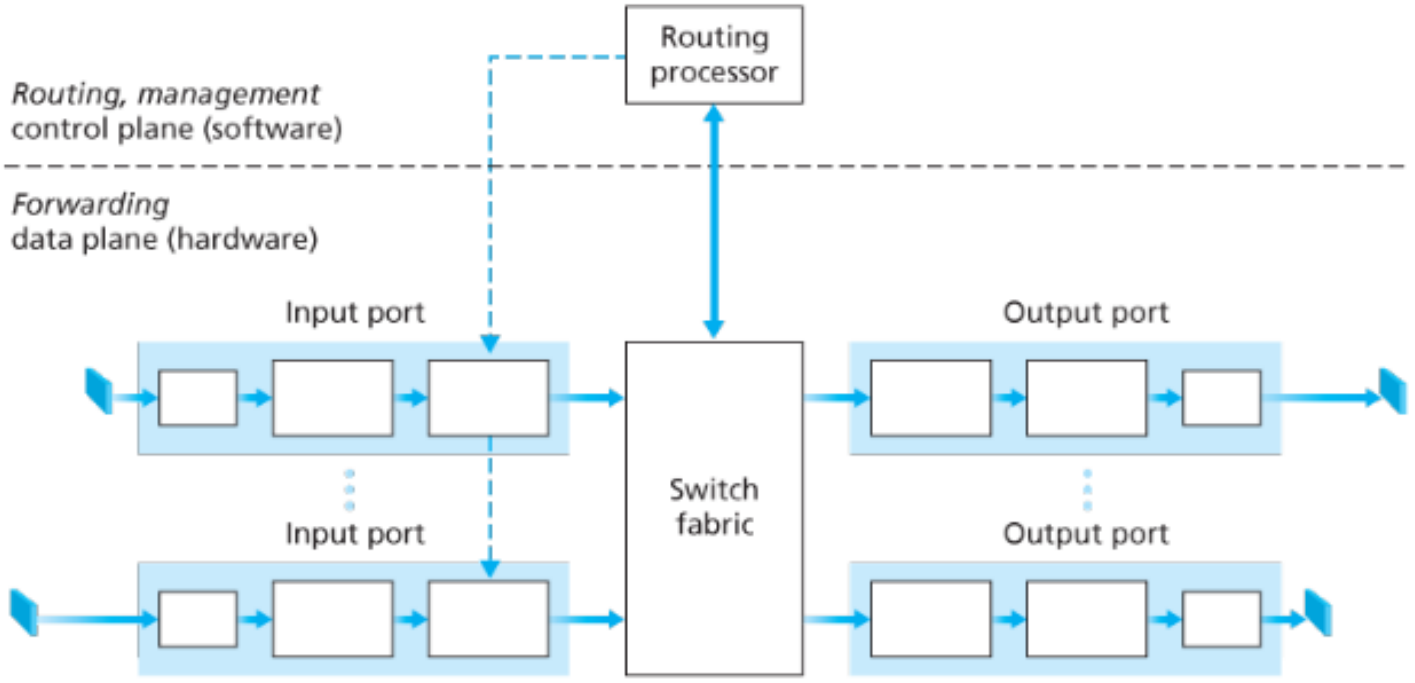


Figure 4.4 Router architecture

Example of a Forwarding table

Network Destination	Netmask	Gateway	Interface	Metric
0.0.0.0	0.0.0.0	192.168.0.1	192.168.0.100	10
127.0.0.0	255.0.0.0	127.0.0.1	127.0.0.1	1
192.168.0.0	255.255.255.0	192.168.0.100	192.168.0.100	10
192.168.0.100	255.255.255.255	127.0.0.1	127.0.0.1	10
192.168.0.1	255.255.255.255	192.168.0.100	192.168.0.100	10

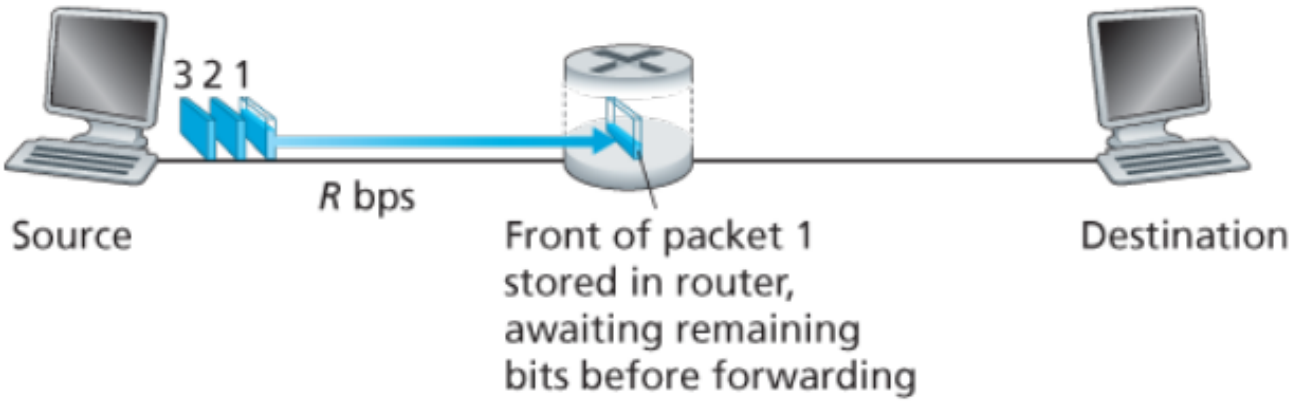
Ref: https://en.wikipedia.org/wiki/Routing_table

Some Terms

- **Latency (same as Delay)**: How much time it takes for something
  - Example: “Transmission Latency for the packet across the link is 10 ms”
- **Bandwidth** : Maximum number of bits that can be sent or received per unit time (bits per second)
  - Example: “The bandwidth of this link is 10 Mbps”
- **Throughput (same as Rate)**: Number of objects/packets/jobs per unit time
  - Example: “The effective throughput between the end-hosts is 10 Kbps”
- **Bottleneck:** The component of a system which is currently limiting the overall performance
  - Example: “The bottleneck link in the system is this copper cable”

Store-and-Forward Packet Switching

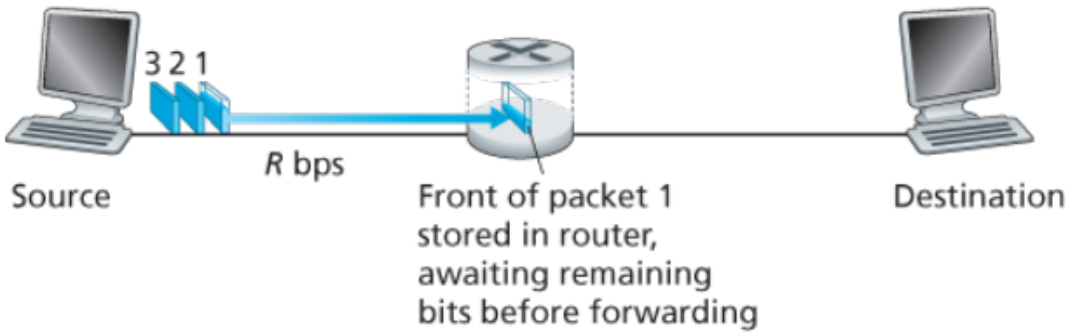
- A packet switch must **receive (buffer) the entire packet** before it can begin to transmit the packet onto the next link.



Store-and-Forward Packet Switching

- **Transmission Rate** of the link = R bits per second
- **Packet Length** = L bits

  => It will take L/R seconds to transmit the entire packet over **one link**. (Thus **Transmission Delay** over **one link** is **L/R)**
- The Destination will receive the entire packet at time **2L/R**

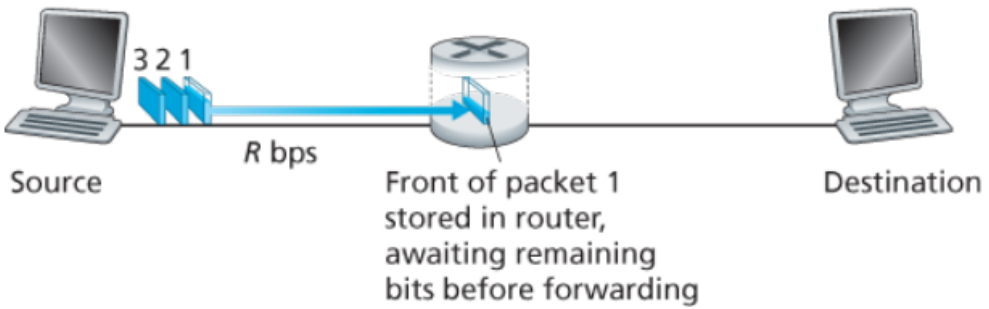


Store-and-Forward Packet Switching

- **Transmission Rate** of the link = R bits per second
- **Packet Length** = L bits

  Need to send 3 packets of the same length.

  After how much time will the Destination receive all 3 packets?



Reference

- **Kurose and Ross, Section 1.3**