



SNS COLLEGE OF ENGINEERING



Kurumbapalayam(Po), Coimbatore – 641 107

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Department of Information Technology

Course Name – 19IT401 Computer Networks

II Year / IV Semester

Unit 3 – Network Layer

Topic 1- Services





Network Layer- Services



Services

- Packetizing
- Routing and Forwarding

Other Services Expected from Network Layer

- Error Control
- Flow Control
- Congestion Control
- Quality of Service (QoS)
- Security

PACKET SWITCHING

- A message from the upper layer is divided into manageable packets and each packet is sent through the network.
- The source of the message sends the packets one by one; the destination of the message receives the packets one by one.
- The destination waits for all packets belonging to the same message to arrive before delivering the message to the upper layer.



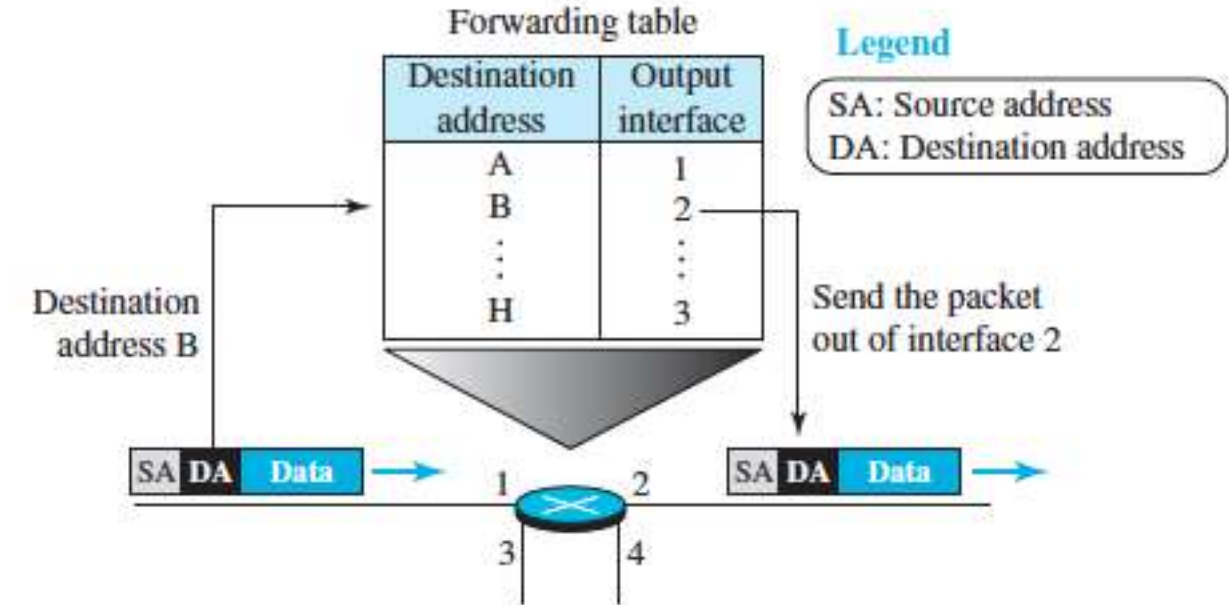
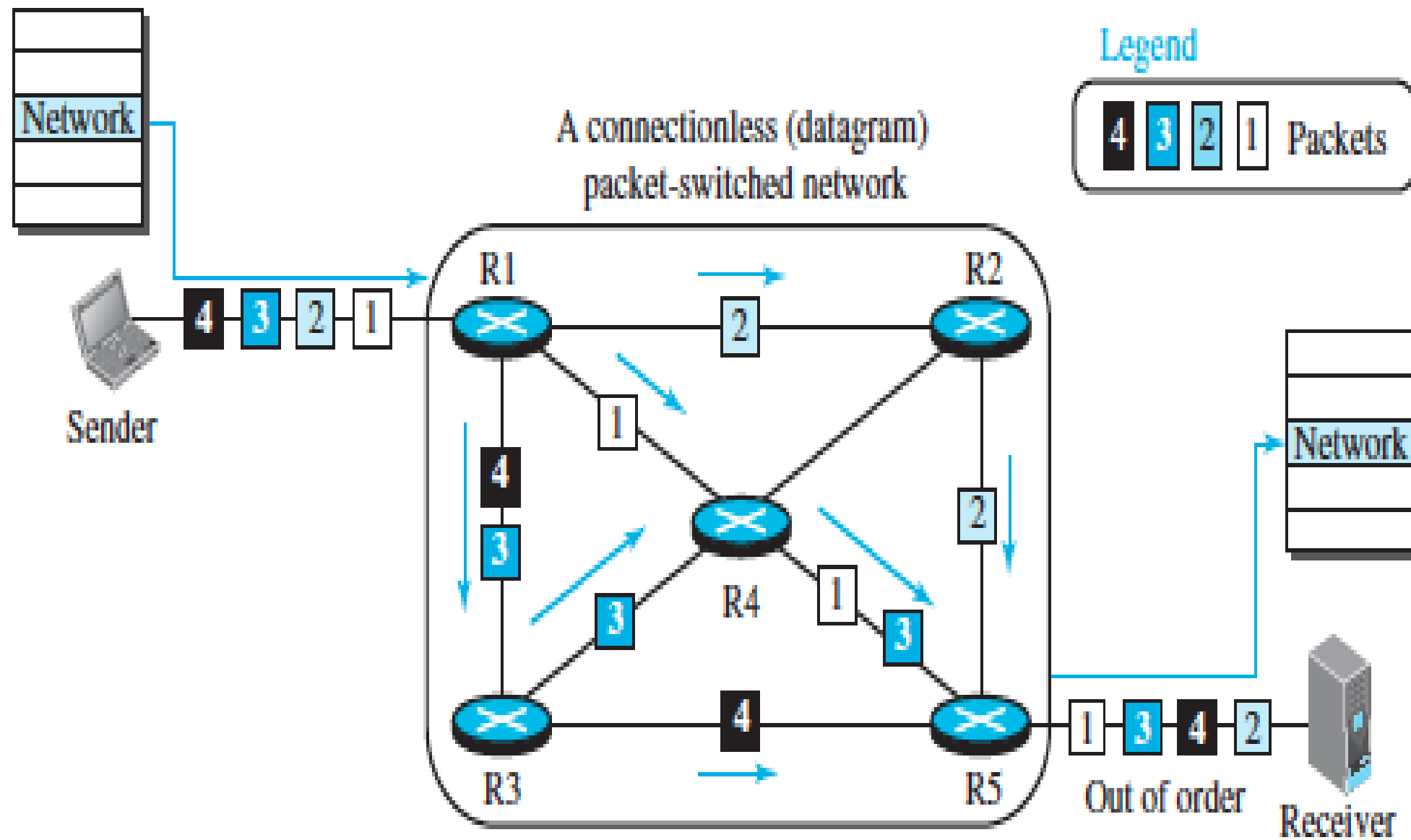
Network Layer- Packet Switching

Today, a packet-switched network can use two different approaches to route the packets:
The datagram approach and
The virtual circuit approach .

Datagram Approach: Connectionless Service

- When the network layer provides a connectionless service, each packet traveling in the Internet is an independent entity; there is no relationship between packets belonging to the same message. The switches in this type of network are called routers .
- A packet belonging to a message may be followed by a packet belonging to the same message or to a different message
- Each packet is routed based on the information contained in its header: source and destination addresses.
- The destination address defines where it should go; the source address defines where it comes from. The router in this case routes the packet based only on the destination address.
- The source address may be used to send an error message to the source if the packet is discarded.
- In the datagram approach, the forwarding decision is based on the destination address of the packet.

Network Layer- Packet Switching



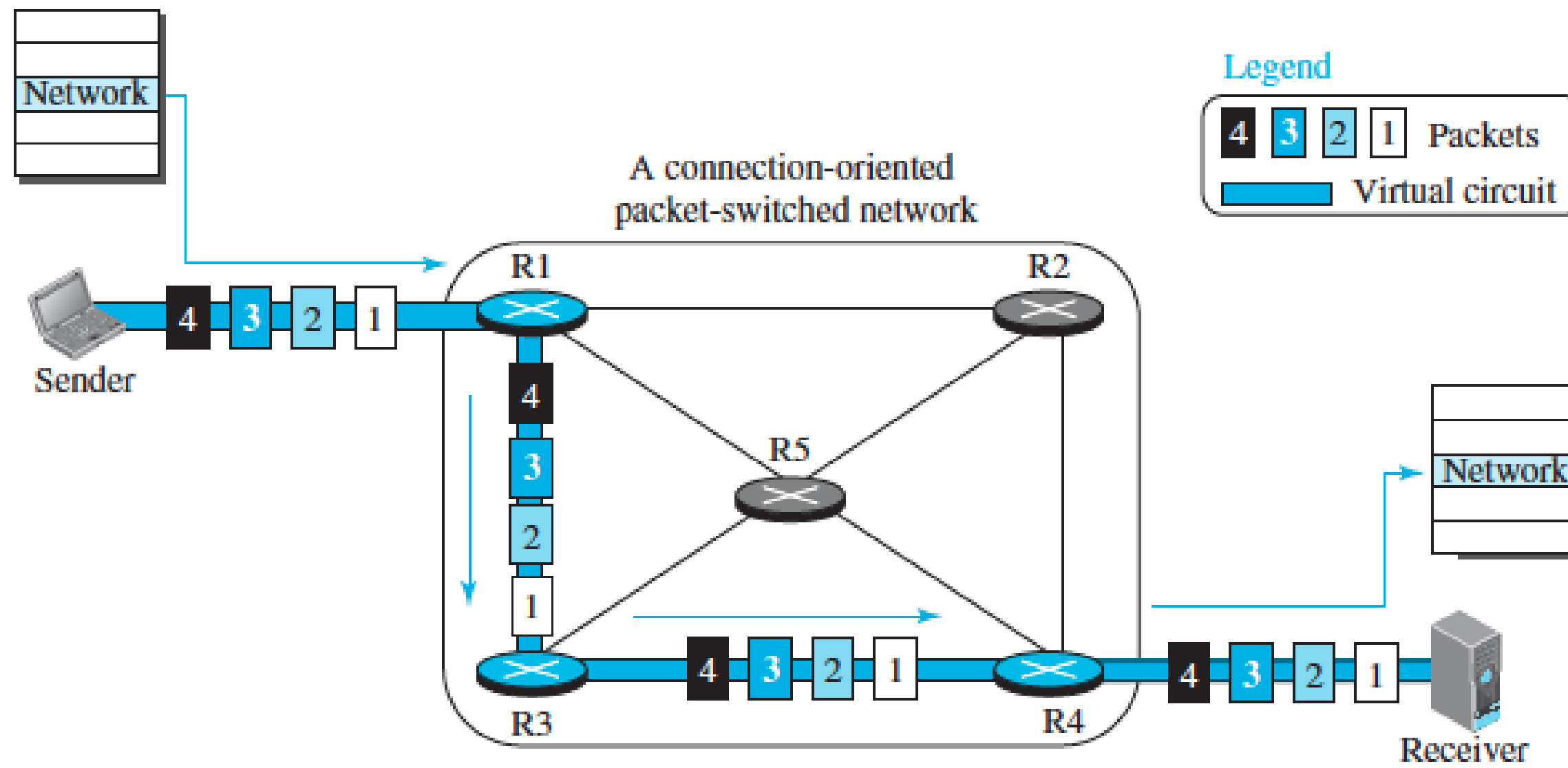


Network Layer- Packet Switching

Virtual-Circuit Approach: Connection-Oriented Service

- In a connection-oriented service (also called virtual-circuit approach), there is a relationship between all packets belonging to a message.
- Before all datagrams in a message can be sent, a virtual connection should be set up to define the path for the datagrams.
- After connection setup, the datagrams can all follow the same path.
- In this type of service, not only must the packet contain the source and destination addresses, it must also contain a flow label, a **virtual circuit identifier** that defines the virtual path the packet should follow.

Network Layer- Packet Switching





Network Layer- Packet Switching



Connection Establishment

It has two phases

- Setup Phase
- Data Transfer Phase

Setup Phase

In the setup phase, a router creates an entry for a virtual circuit.

For example, suppose source A needs to create a virtual circuit to destination B.

Two auxiliary packets need to be exchanged between the sender and the receiver:

- the request packet and
- the acknowledgment packet.

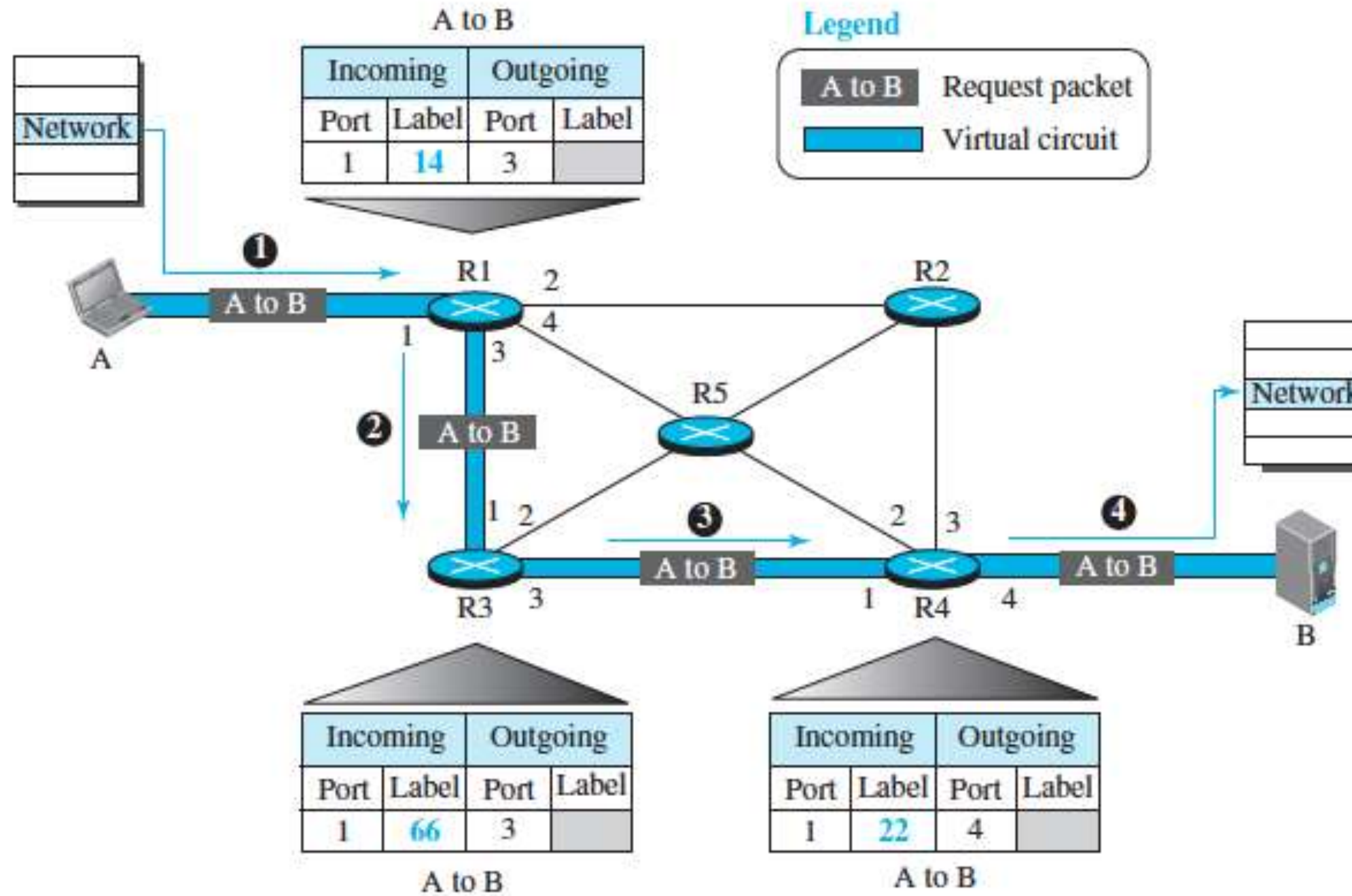
Request packet

A request packet is sent from the source to the destination. This auxiliary packet carries the source and destination addresses.

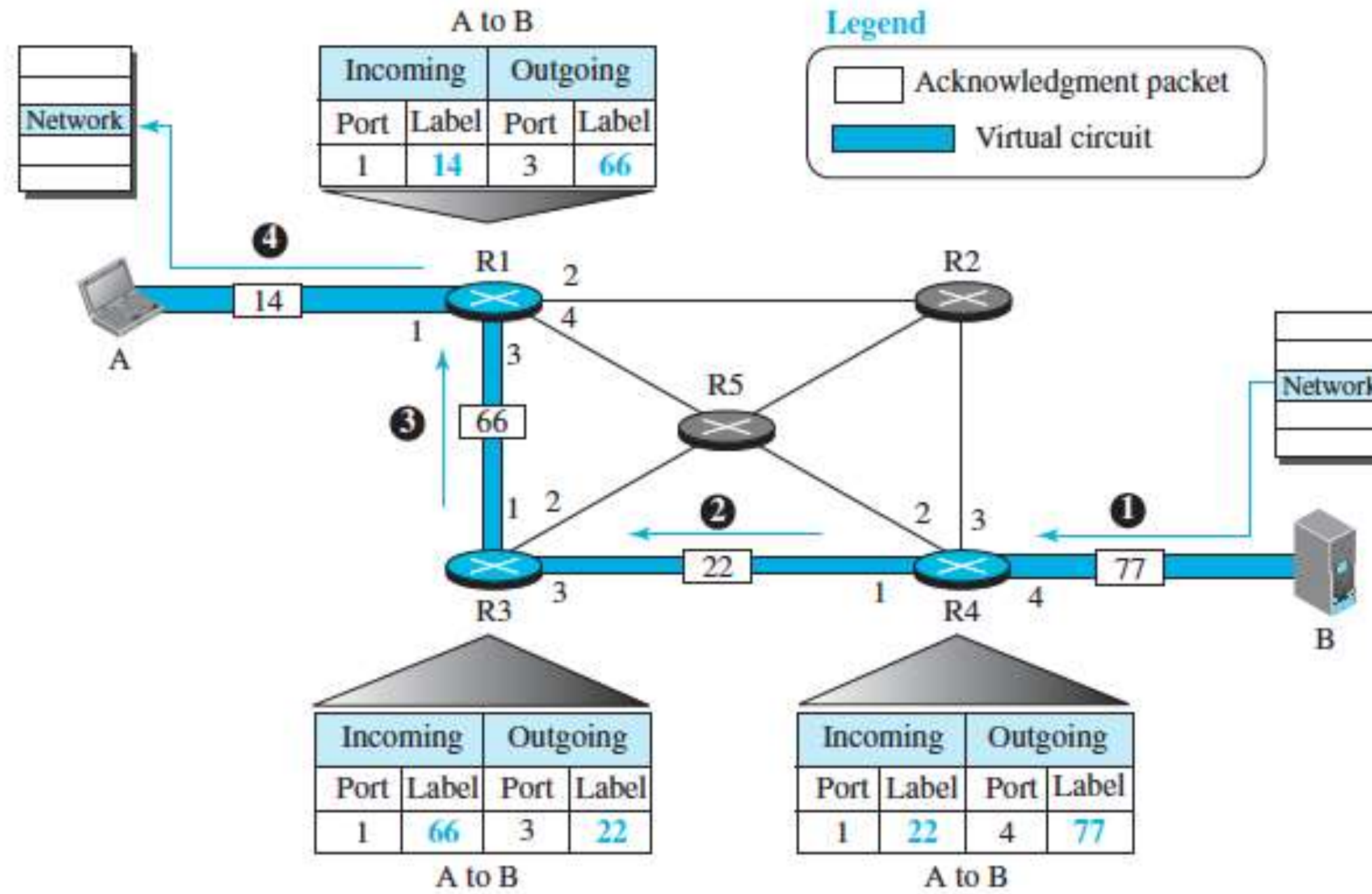
Acknowledgment Packet

A special packet, called the acknowledgment packet, completes the entries in the switching tables

Network Layer- Packet Switching



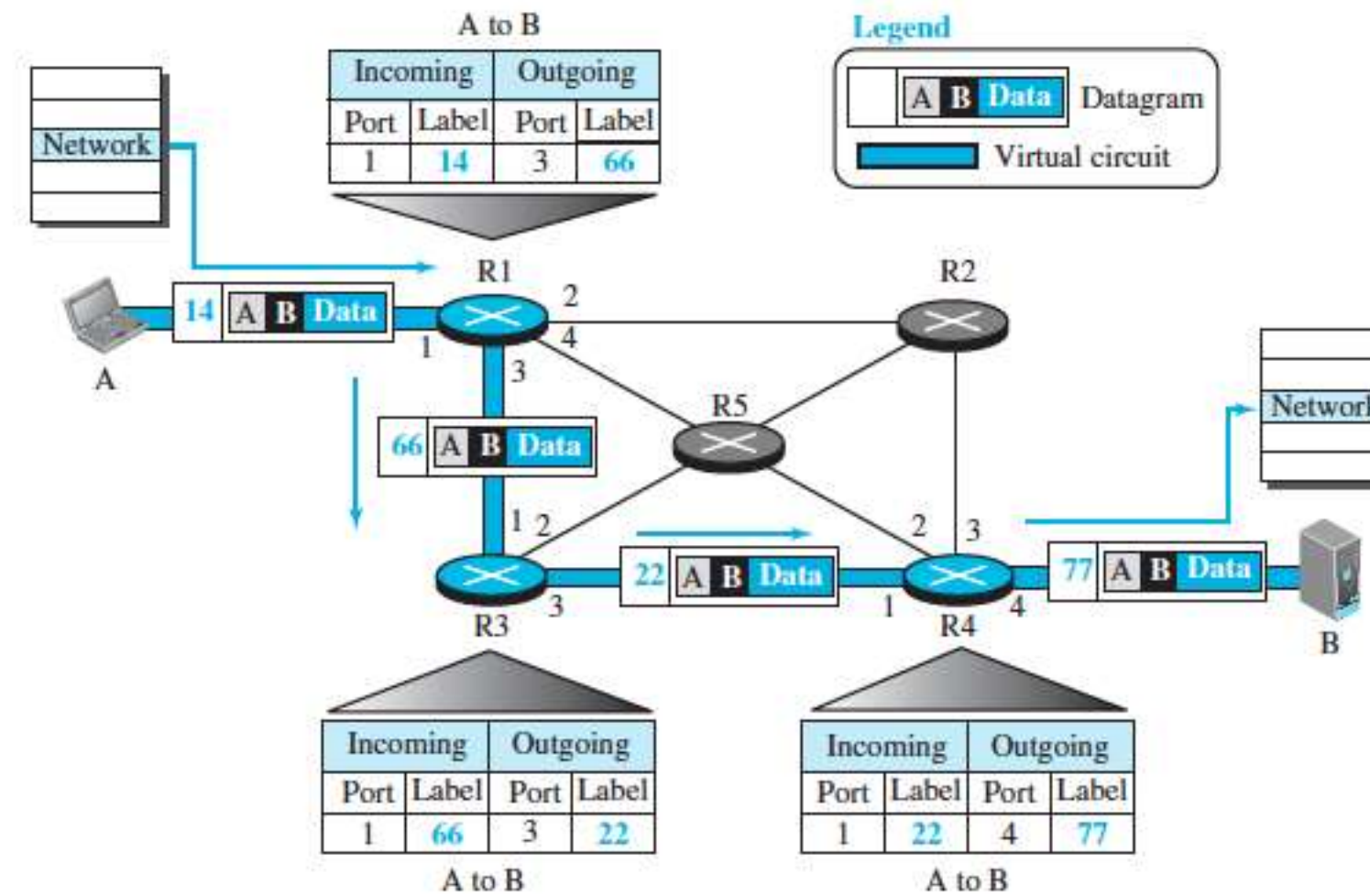
Network Layer- Packet Switching



Network Layer- Packet Switching

Data-Transfer Phase

The second phase is called the data-transfer phase. After all routers have created their forwarding table for a specific virtual circuit, then the network-layer packets belonging to one message can be sent one after another.





THANK YOU