Data Forwarding Scenario

Foreword

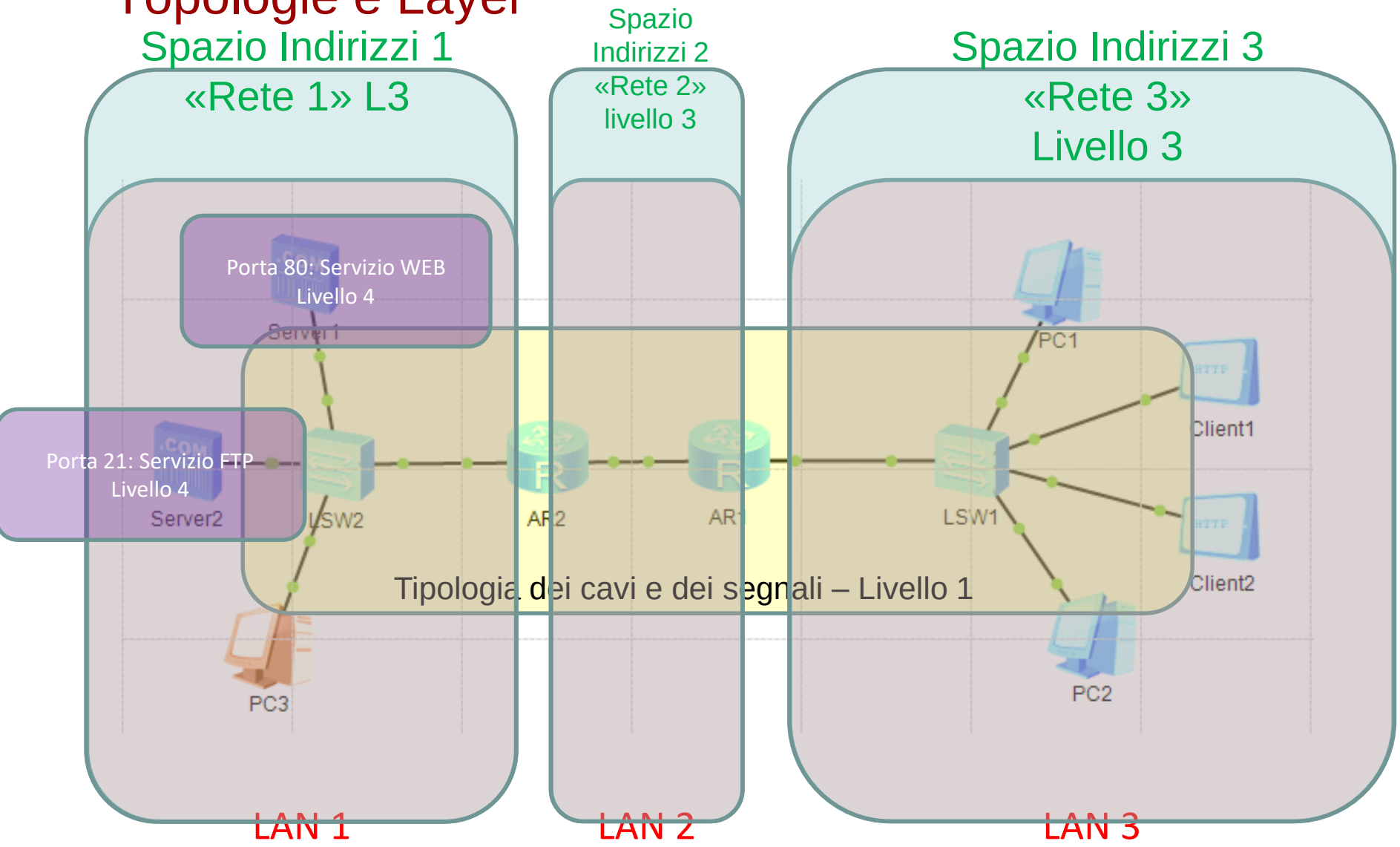
The TCP/IP protocol suite operates as a collection of rules in order to support the end-to-end forwarding of data, together with lower layer protocols such as those defined in the IEEE 802 standards. The knowledge of the lifecycle of data forwarding enables a deeper understanding of the IP network behavior for effective analysis of network operation and troubleshooting of networking faults. The entire encapsulation and decapsulation process therefore represents a fundamental part of all TCP/IP knowledge.

Objectives

Upon completion of this section, trainees will be able to:

- Explain the process steps for data encapsulation and decapsulation.
- Troubleshoot basic data forwarding issues.

Topologie e Layer



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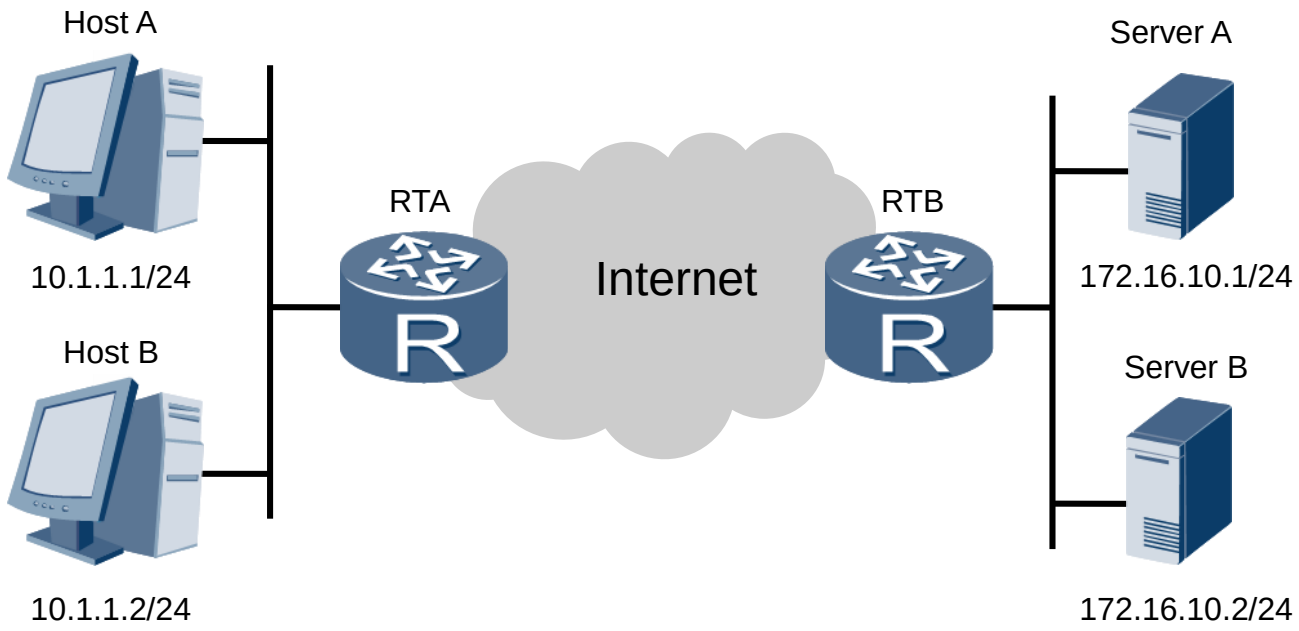
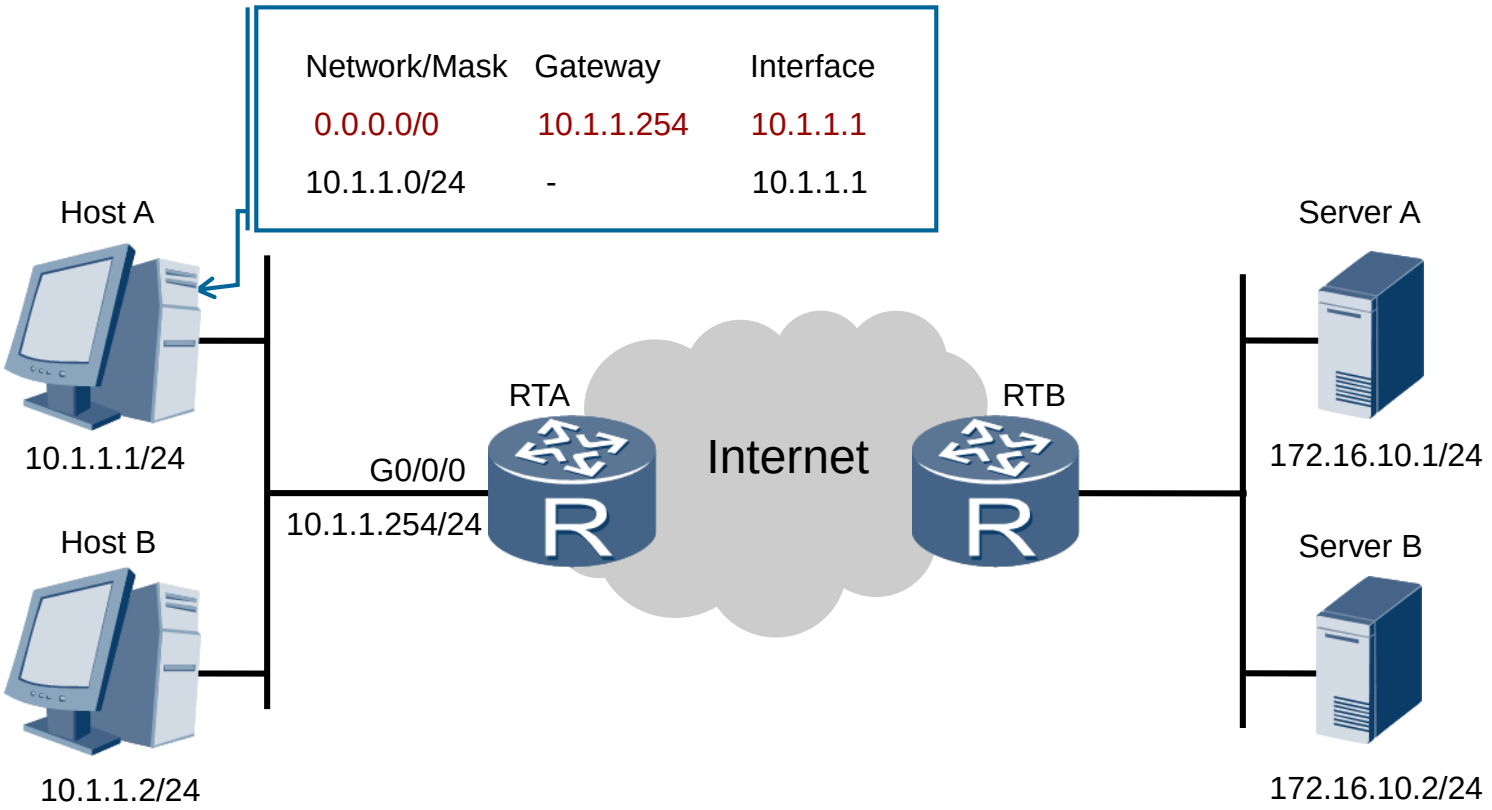
Scenario Introduction



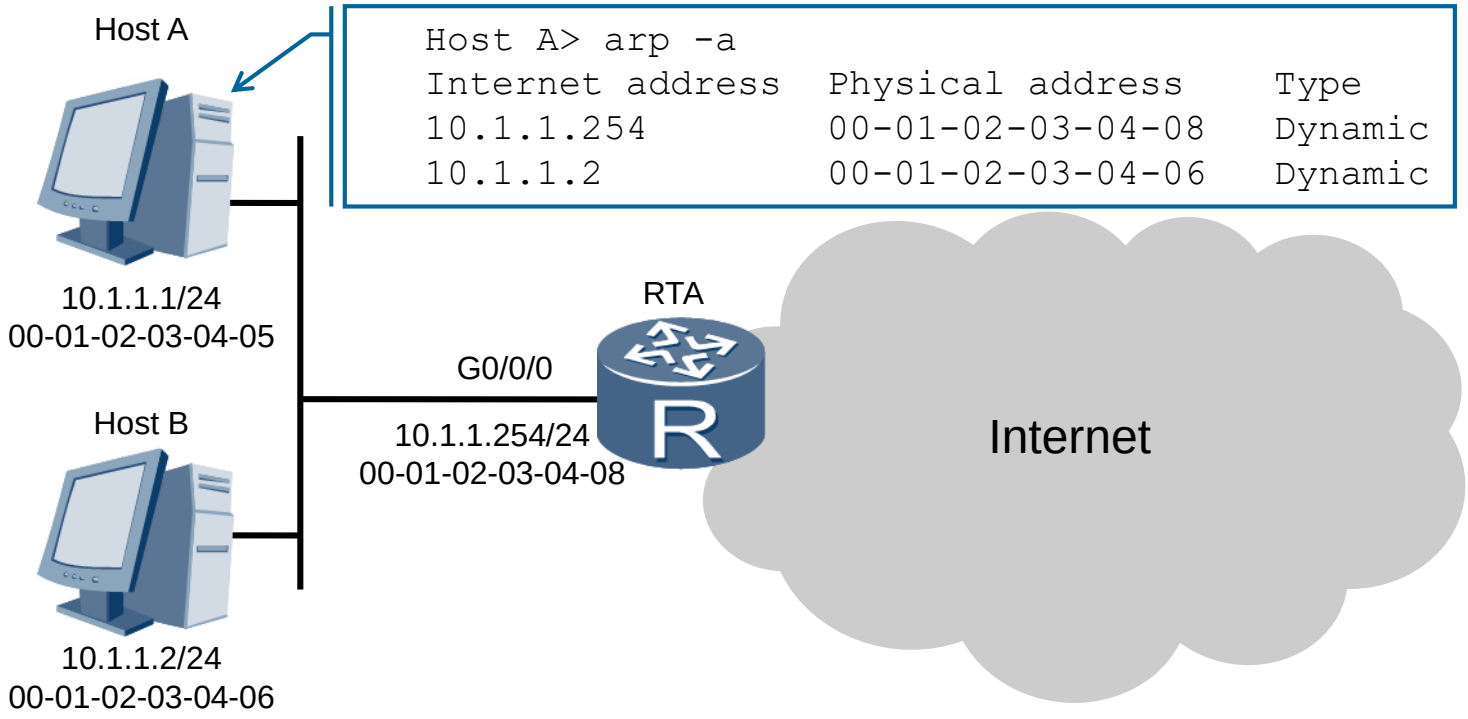
- Data forwarding may be local or remote, however the general forwarding process is the same.

Path Discovery



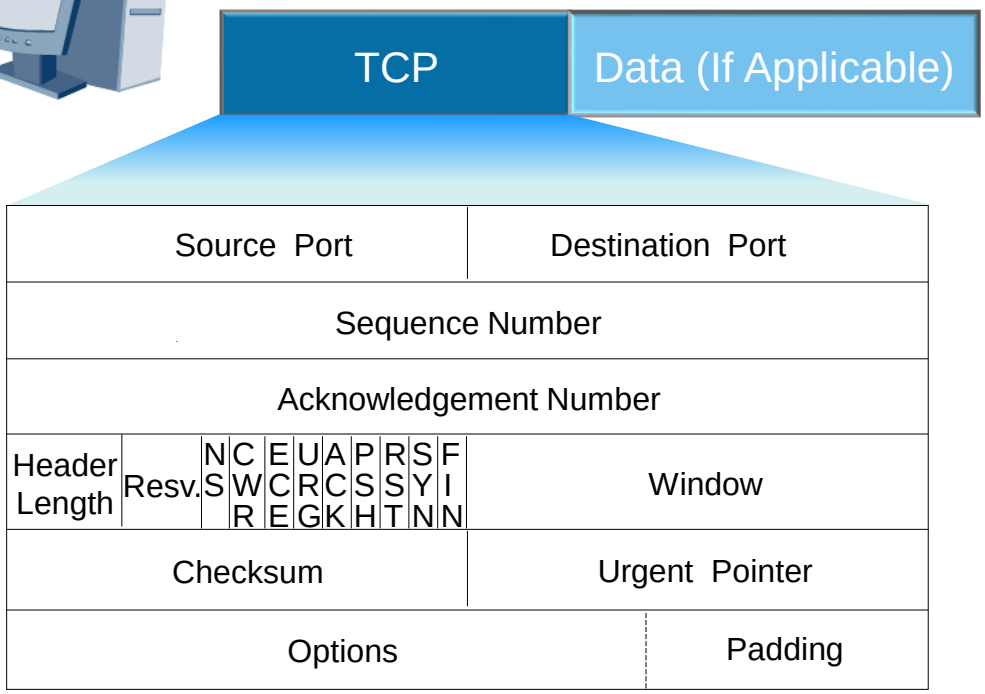
- Host A must have knowledge of a path to the destination.

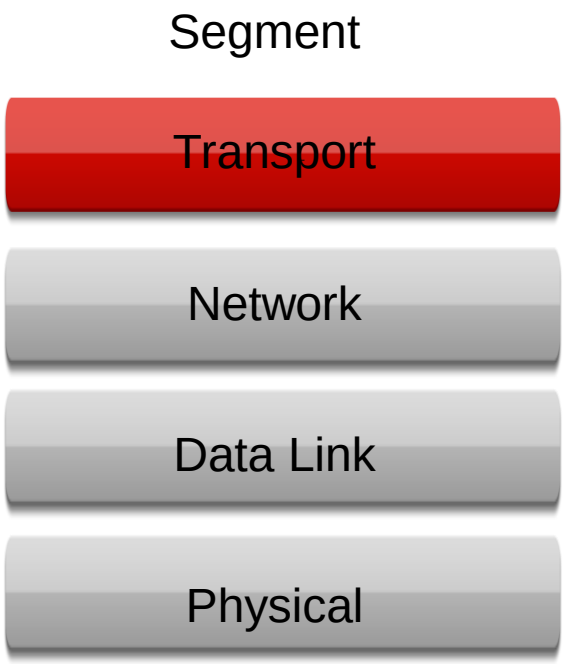
ARP



- The ARP cache table is used to discover the data link next-hop.
- An unknown next-hop will generate an ARP request.

TCP Encapsulation





- Encapsulation is performed once path is confirmed.

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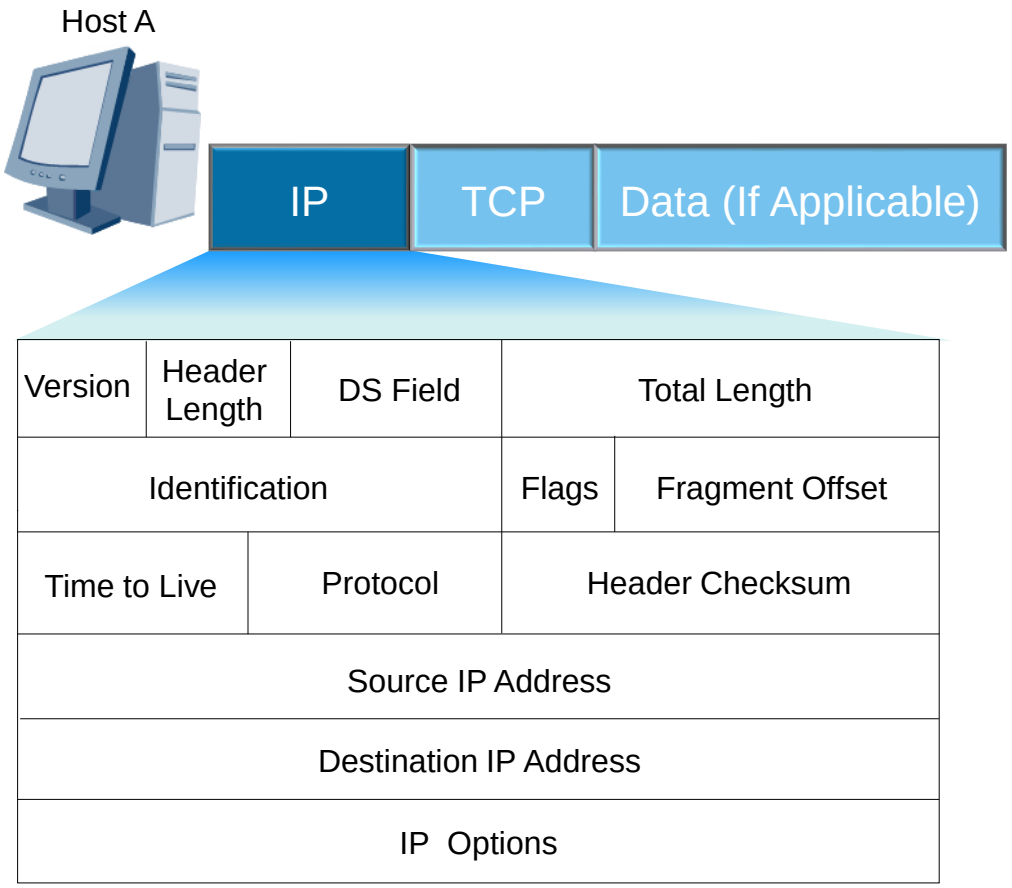
IP Encapsulation



Packet (Datagram)

- Transport
- Network
- Data Link
- Physical

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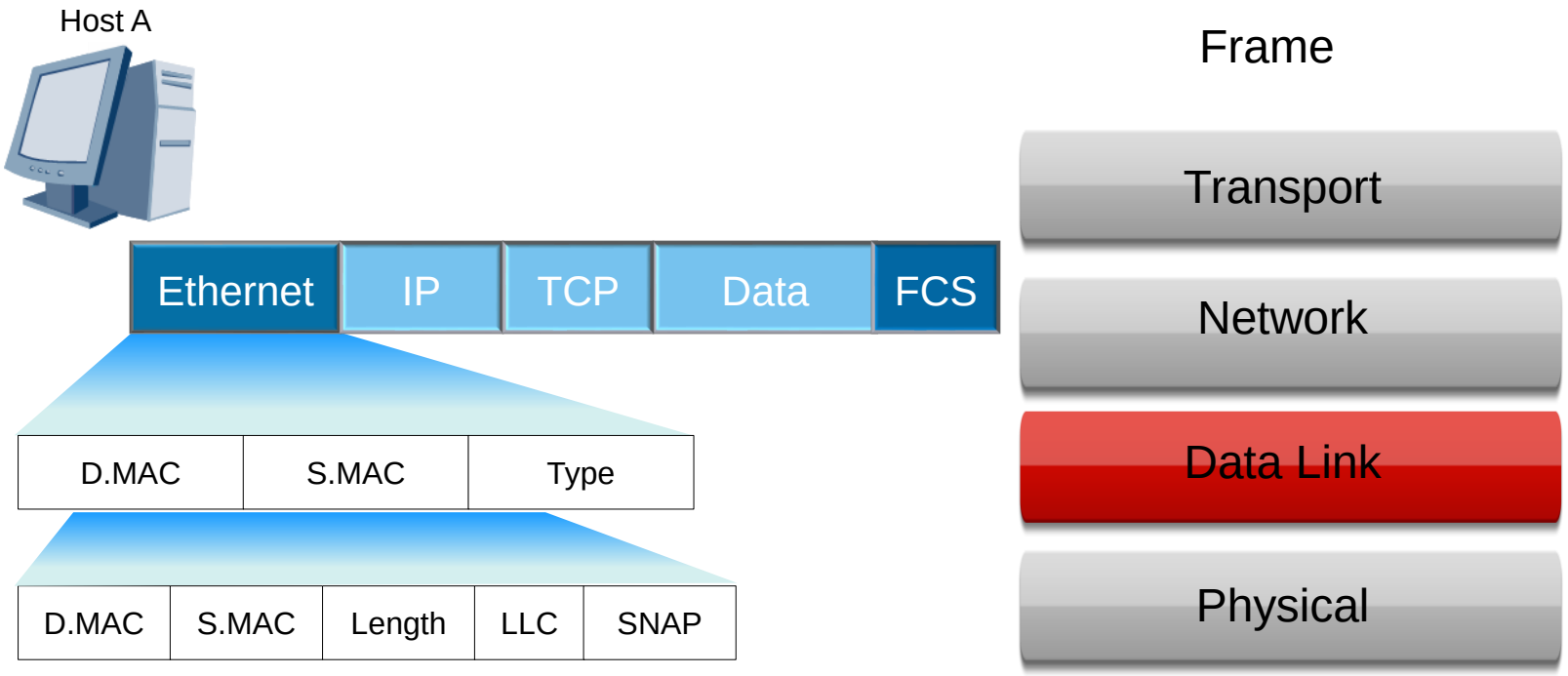
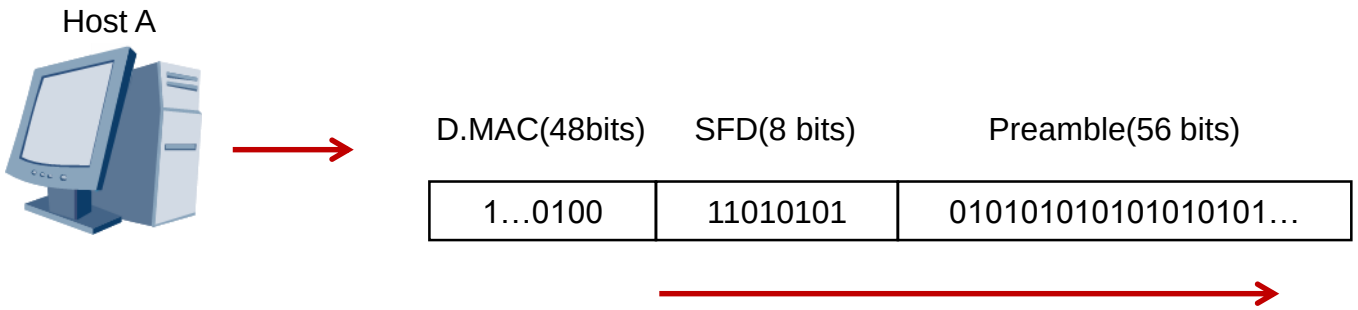
Ethernet Framing



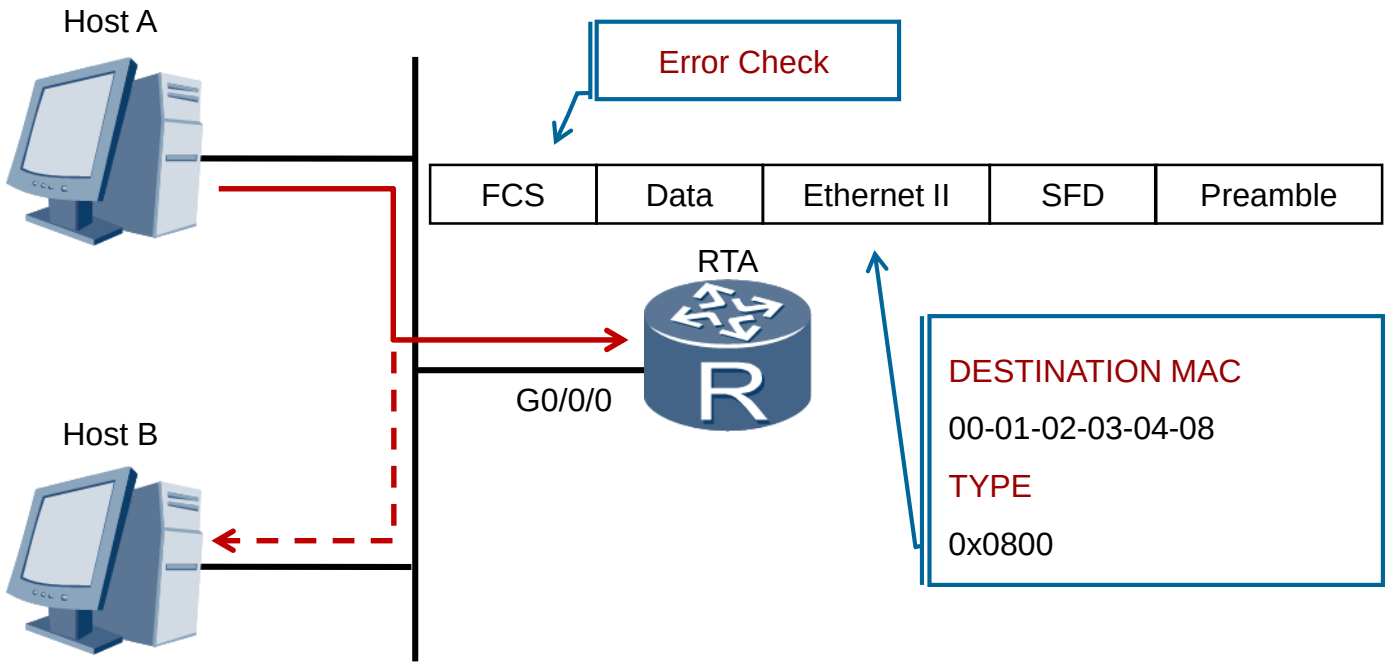
- Frame type is dependant on the encapsulated protocols.
- IP is the upper layer protocol, so the Ethernet II frame is used.

Frame Forwarding



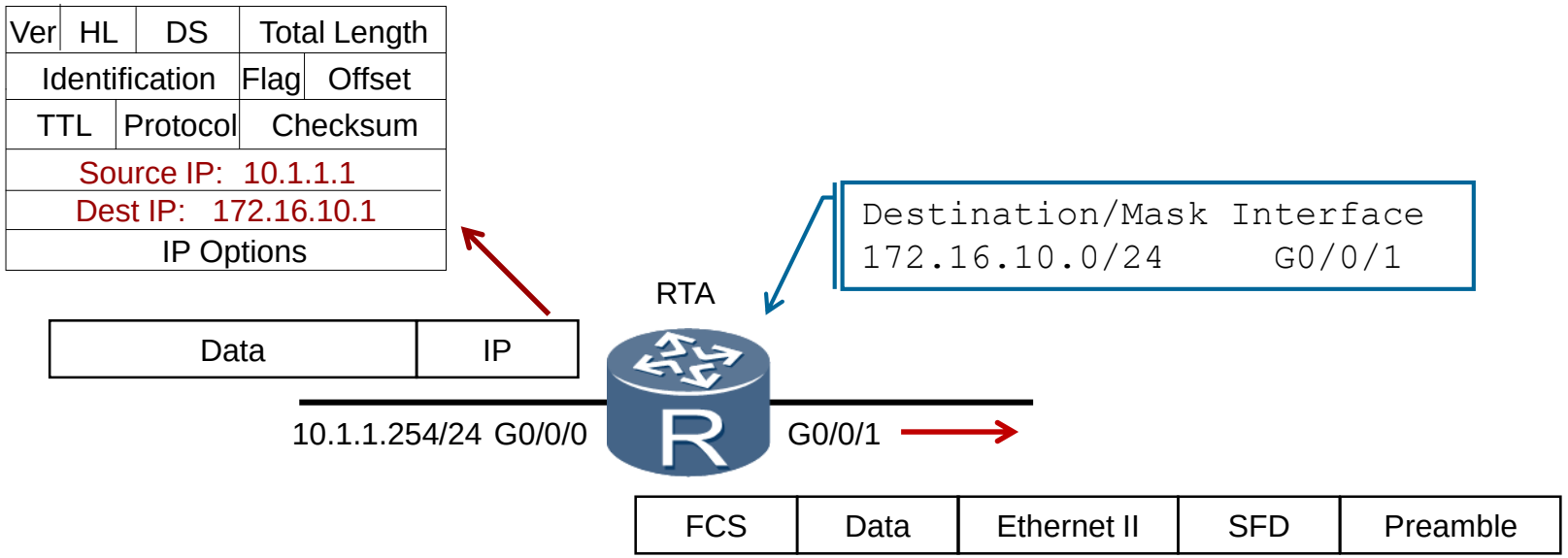
- Data link layer uses carrier sense to detect for existing traffic.
- Preamble and SFD used to synchronize with forwarded frame.

Frame Processing



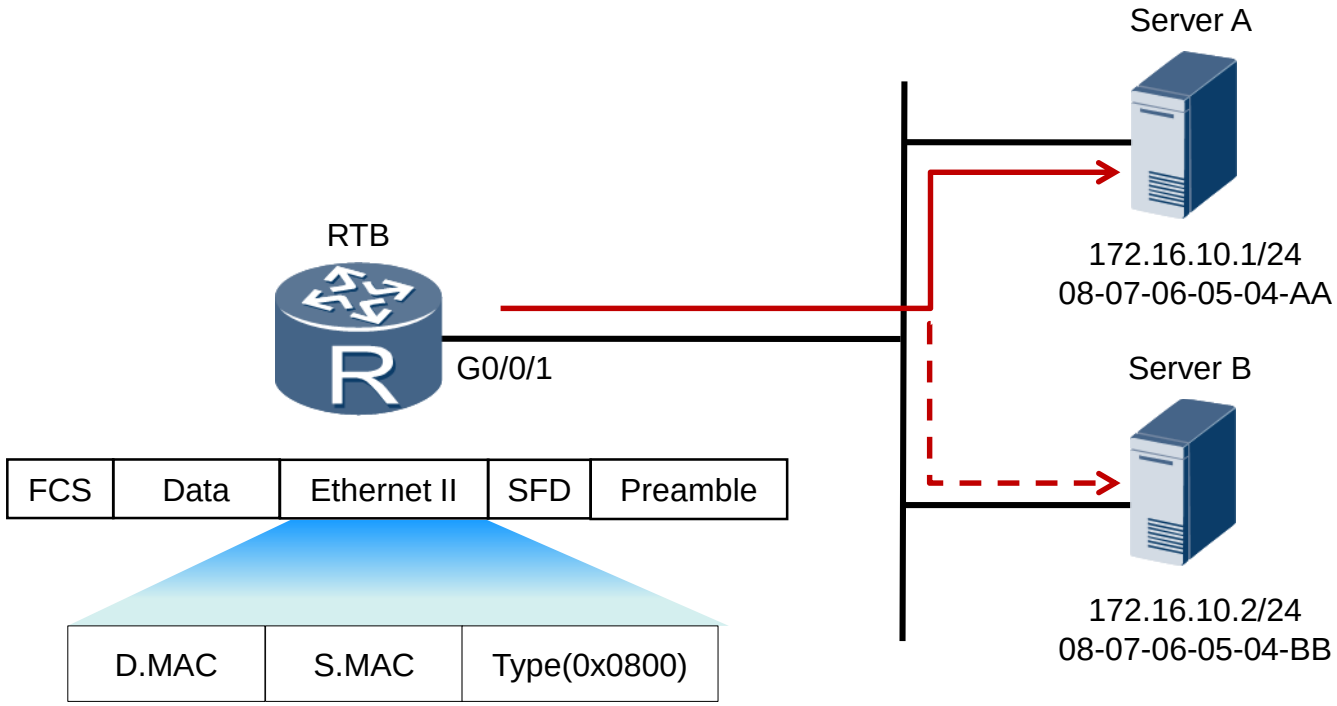
- Frame will be received by all in the same collision domain.
- Only the gateway (RTA) will process the frame.

Packet Processing



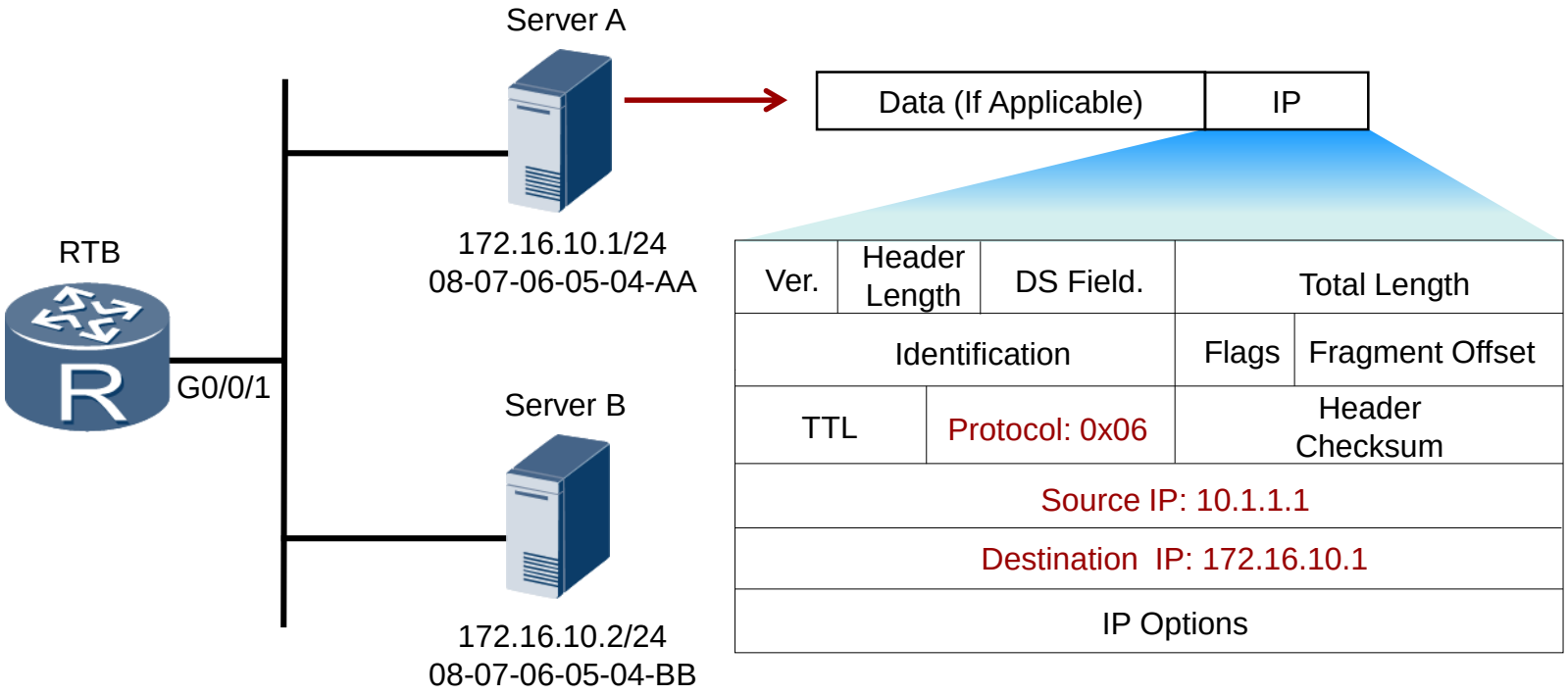
- Destination IP is checked against the address of the gateway.
- A new frame header is constructed following discovery process.

Frame Decapsulation



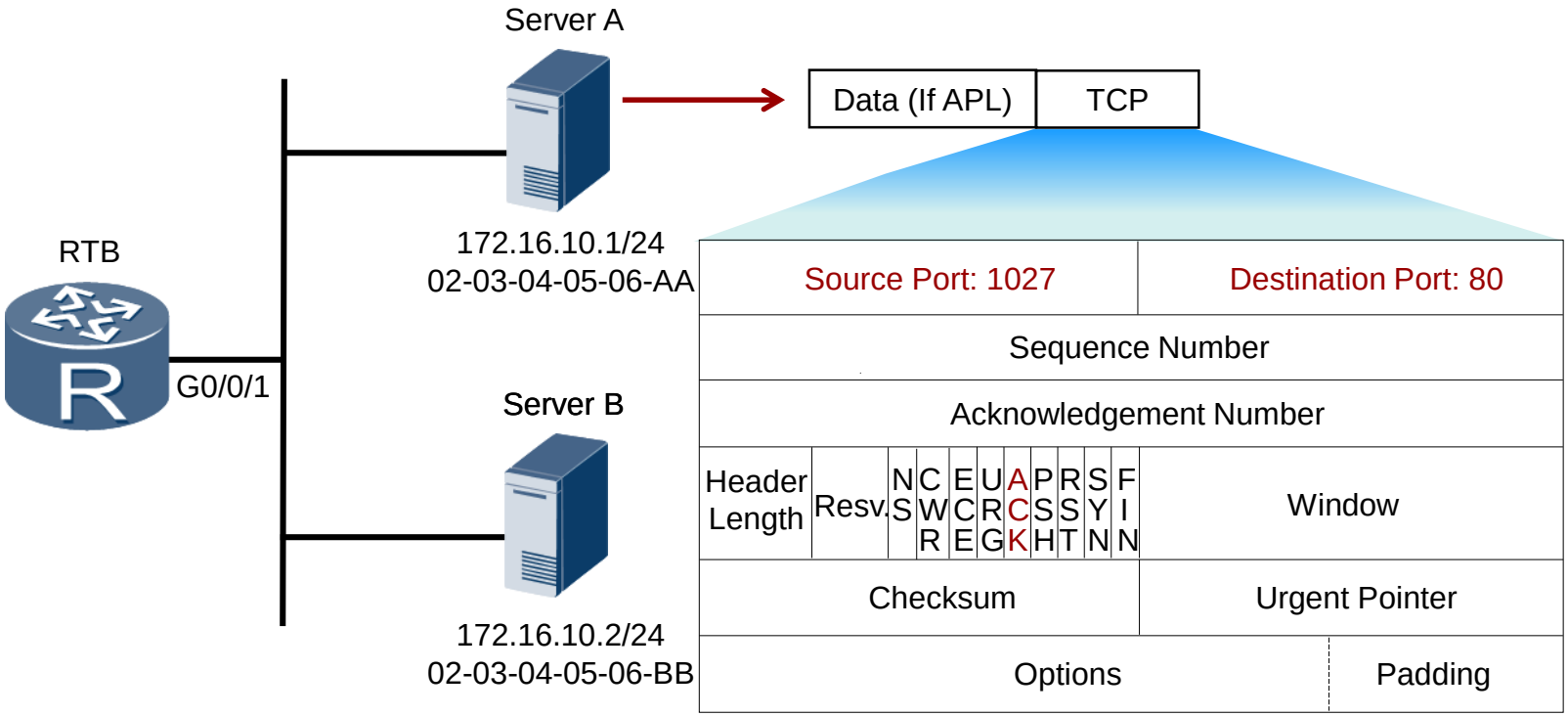
- Frame is forwarded with destination MAC address of Server A.
- Server A compares interface MAC to frame destination MAC.

Packet Decapsulation



- Server A compares own IP to destination address of IP header.
- IP header is processed and discarded, data is directed to TCP.

Segment Decapsulation



- TCP header builds connection with the service at port 80.
- Parameters within the TCP header used to manage connection.

Summary

- What information is required before data can be encapsulated?
- What happens when a frame is forwarded to a destination to which it is not intended?
- How does the data in the frame ultimately reach the application it is intended for?
- When multiple sessions of the same application are active (e.g. multiple web browsers), how does the return data reach the correct session?

Thank you

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