

Complex

Experiential Learning
(site visits)

Forum Theater

Jigsaw Discussion

Inquiry Learning

Role Playing

Active Review Sessions
(Games or Simulations)

Interactive Lecture

Hands-on Technology

Case Studies

Brainstorming

Groups Evaluations

Peer Review

Informal Groups

Triad Groups

Large Group
Discussion

Think-Pair-Share

Writing

(Minute Paper)

Self-assessment

Pause for reflection

Simple

NETWORK PROTOCOLS & SECURITY

23EC2210 R/A/E

Topic:

RIP, OSPF & BGP

Session - 22

AIM OF THE SESSION



To familiarize students with the basic concept of internet protocols and Interdomain and Intradomain Routing.

INSTRUCTIONAL OBJECTIVES



This Session is designed to:

1. List out the few routing protocols
2. Describe the routing protocols OSPF and BGP

LEARNING OUTCOMES



At the end of this session, you should be able to:

1. Demonstrate the OSPF routing protocol.
2. Demonstrate the BGP routing protocol.

INTERNET PROTOCOLS

- RIP – Routing Information Protocol
- OSPF – Open Shortest Path First Protocol
- BGP – Border Gateway Protocol

Unicast Routing Protocols: RIP, OSPF, and BGP

Objectives

Upon completion you will be able to:

- *Distinguish between intra and interdomain routing*
- *Understand distance vector routing and RIP*
- *Understand link state routing and OSPF*
- *Understand path vector routing and BGP*

INTRA- AND INTERDOMAIN ROUTING

Routing inside an autonomous system is referred to as intradomain routing. Routing between autonomous systems is referred to as interdomain routing.

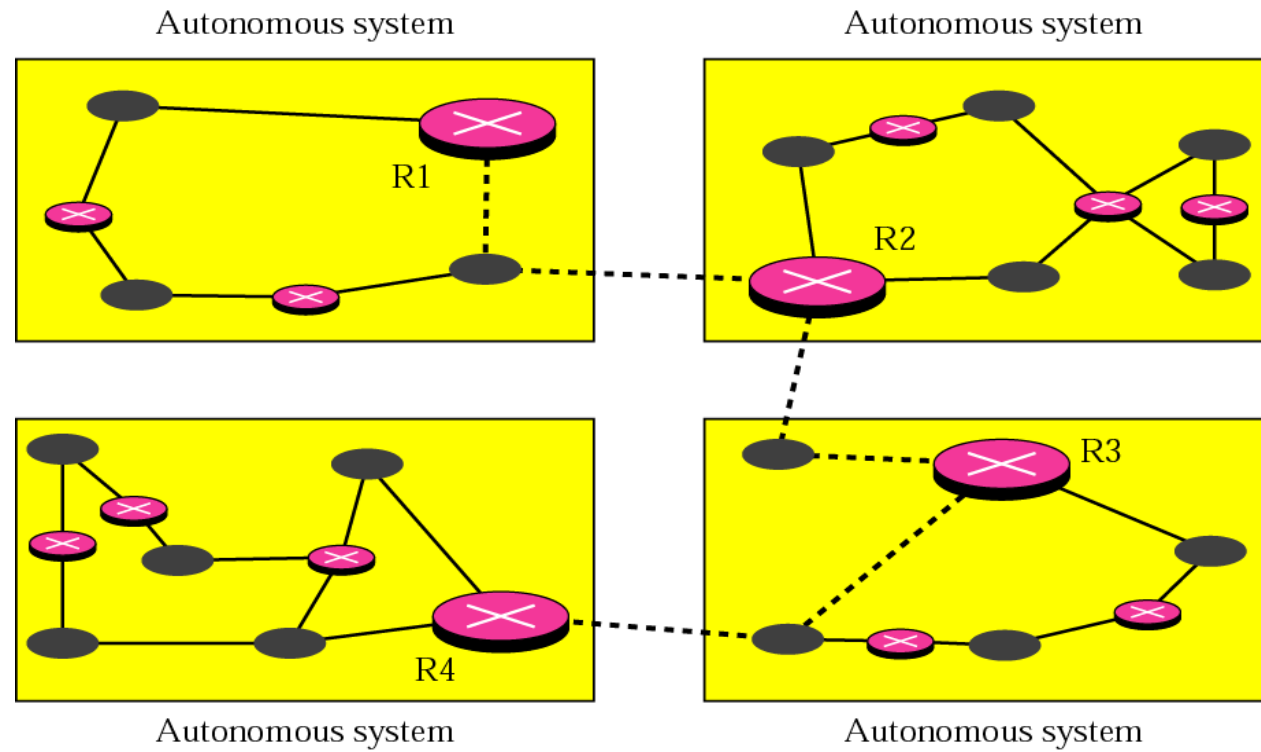
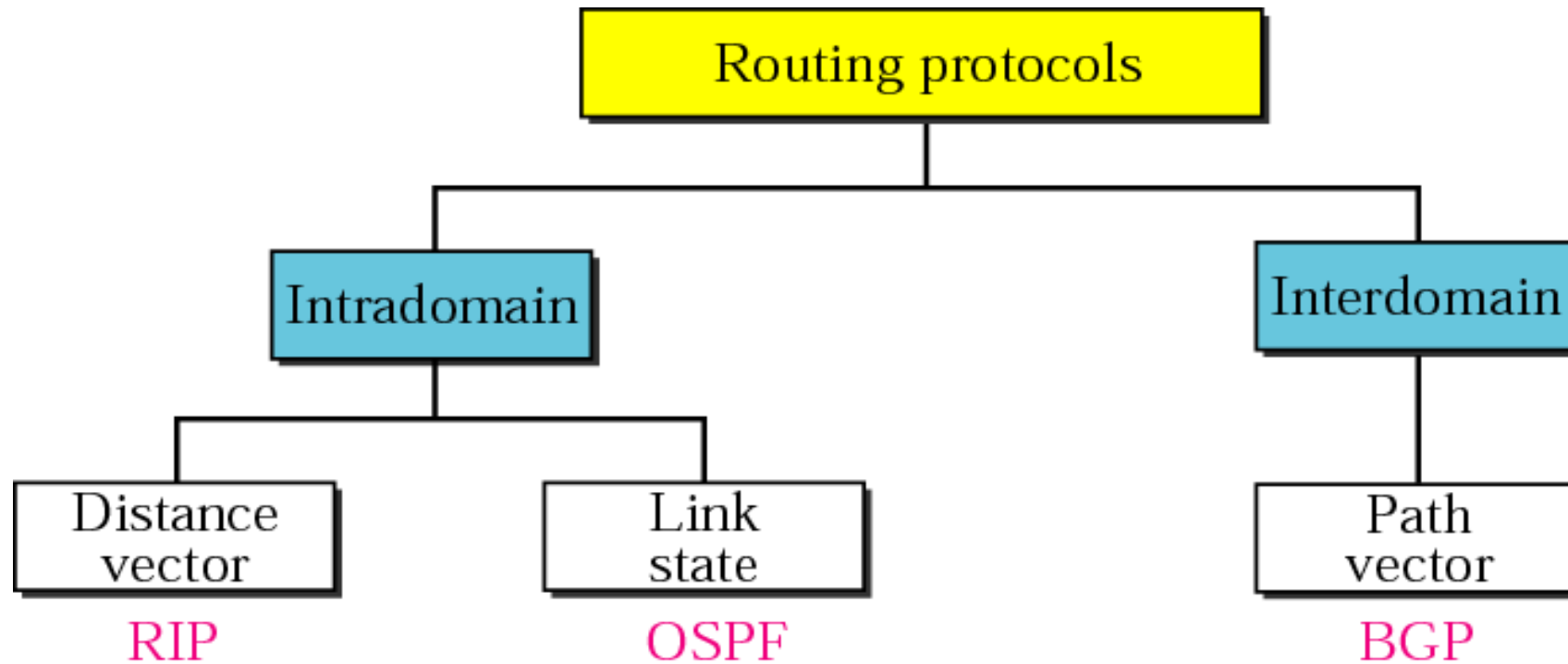


Fig. Autonomous system



DISTANCE VECTOR ROUTING

In distance vector routing, the least cost route between any two nodes is the route with minimum distance. In this protocol each node maintains a vector (table) of minimum distances to every node

The topics discussed in this section include:

Initialization

Sharing

Updating

When to Share

Figure. *Distance vector routing tables*

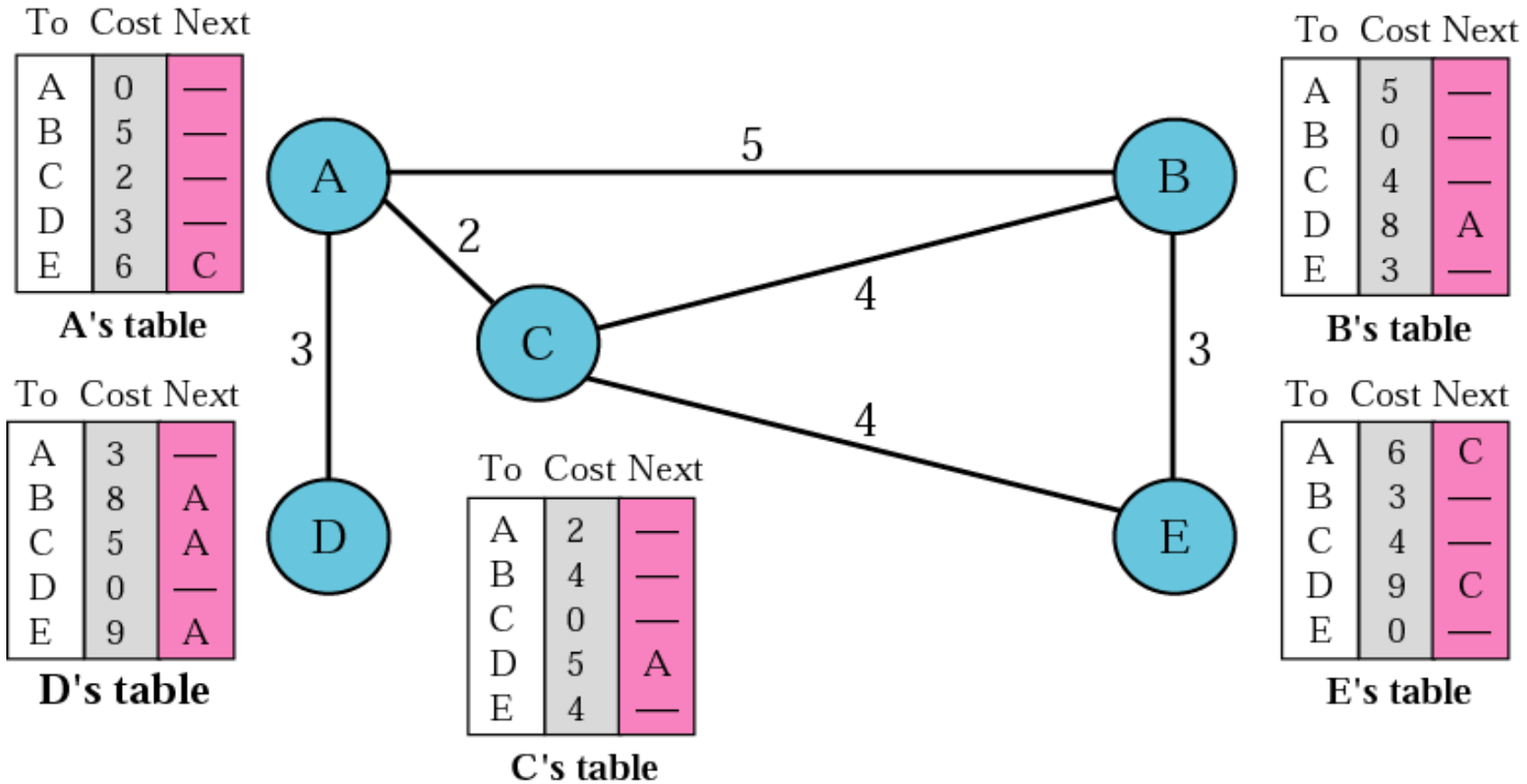
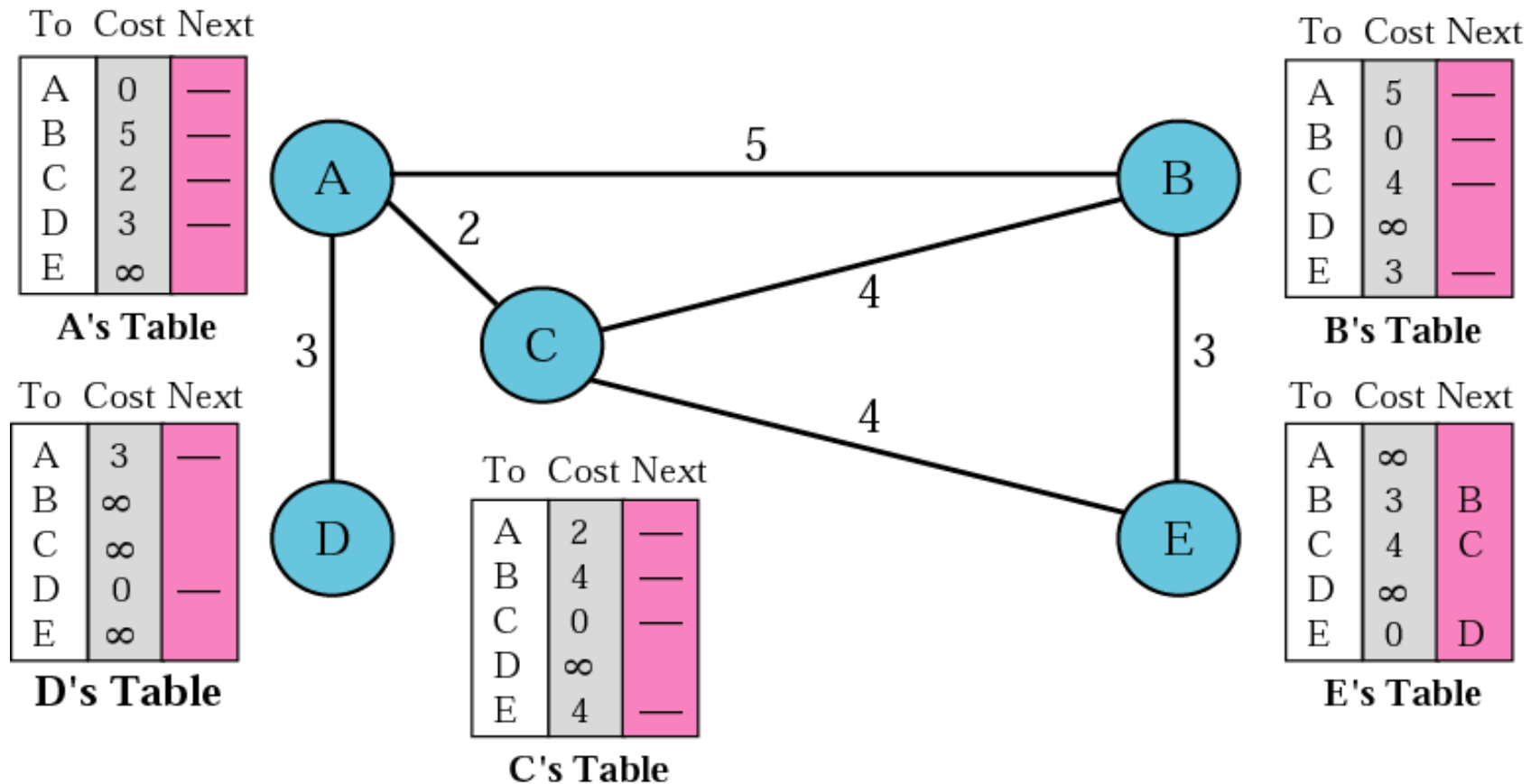
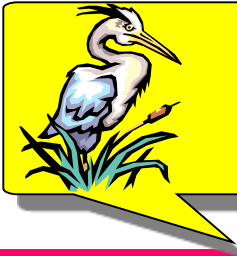


Figure. *Initialization of tables in distance vector routing*

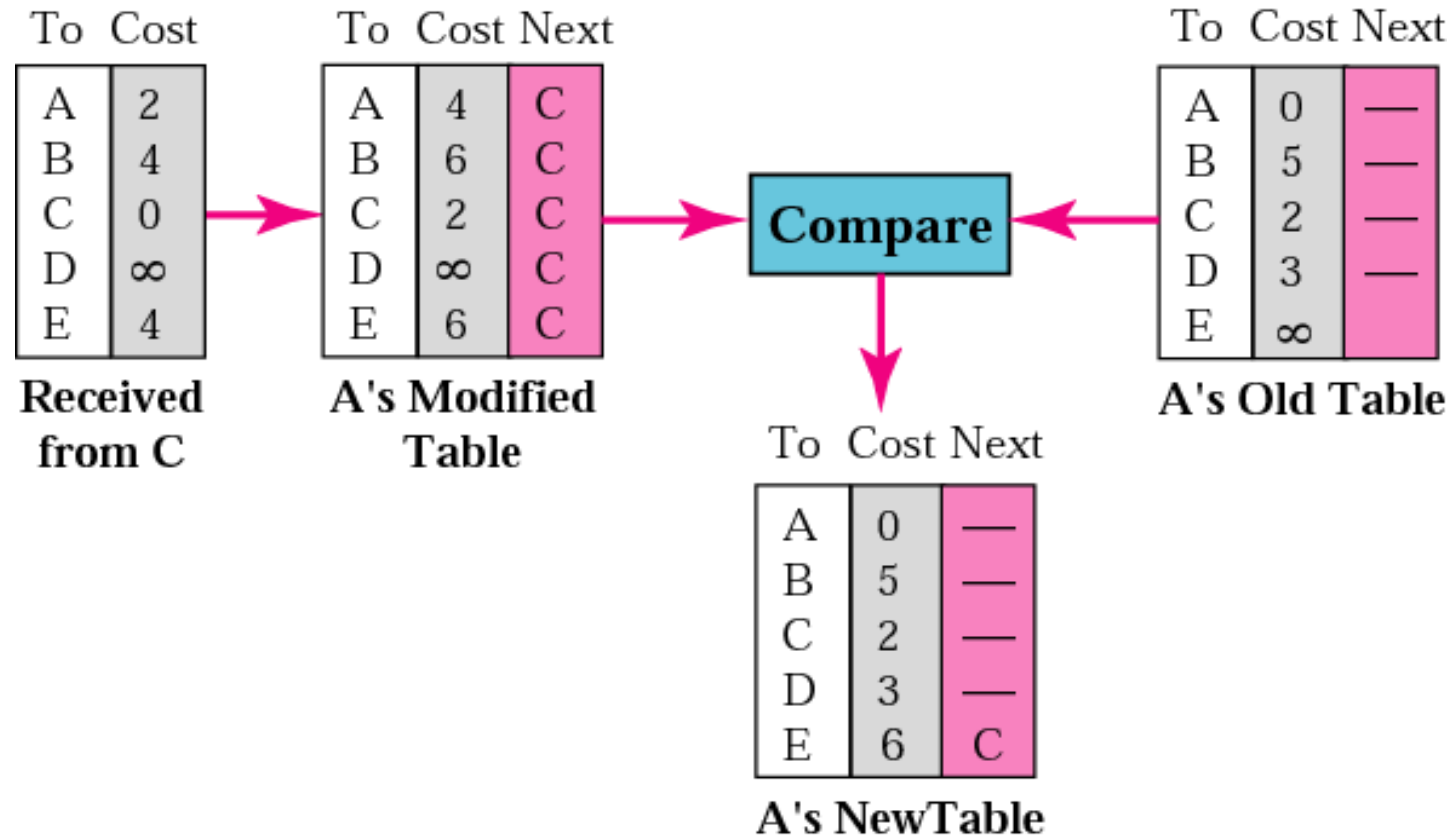




Note:

In distance vector routing, each node shares its routing table with its immediate neighbors periodically and when there is a change.

Figure. *Updating in distance vector routing*



RIP

The Routing Information Protocol (RIP) is an intradomain routing protocol used inside an autonomous system. It is a very simple protocol based on distance vector routing.

The topics discussed in this section include:

RIP Message Format

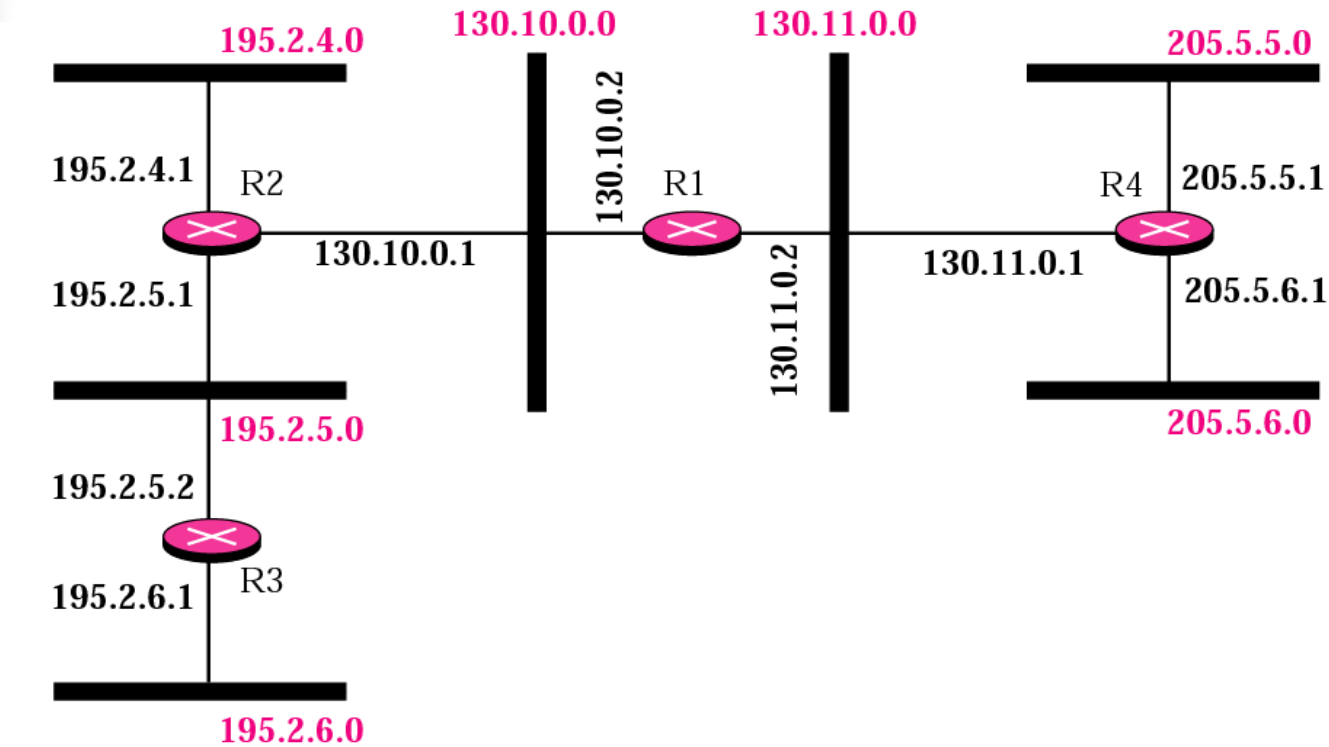
Requests and Responses

Timers in RIP

RIP Version 2

Encapsulation

Figure. *Example of a domain using RIP*



Dest.	Hop	Next
130.10.0.0	1	_____
130.11.0.0	1	_____
195.2.4.0	2	130.10.0.1
195.2.5.0	2	130.10.0.1
195.2.6.0	3	130.10.0.1
205.5.5.0	2	130.11.0.1
205.5.6.0	2	130.11.0.1

R1 Table

Dest.	Hop	Next
130.10.0.0	1	_____
130.11.0.0	2	130.10.0.2
195.2.4.0	1	_____
195.2.5.0	1	_____
195.2.6.0	2	195.2.5.2
205.5.5.0	3	130.10.0.2
205.5.6.0	3	130.10.0.2

R2 Table

Dest.	Hop	Next
130.10.0.0	2	195.2.5.1
130.11.0.0	3	195.2.5.1
195.2.4.0	2	195.2.5.1
195.2.5.0	1	_____
195.2.6.0	1	_____
205.5.5.0	4	195.2.5.1
205.5.6.0	4	195.2.5.1

R3 Table

Dest.	Hop	Next
130.10.0.0	2	130.11.0.2
130.11.0.0	1	_____
195.2.4.0	3	130.11.0.2
195.2.5.0	3	130.11.0.2
195.2.6.0	4	130.11.0.2
205.5.5.0	1	_____
205.5.6.0	1	_____

R4 Table

Figure. *RIP message format*

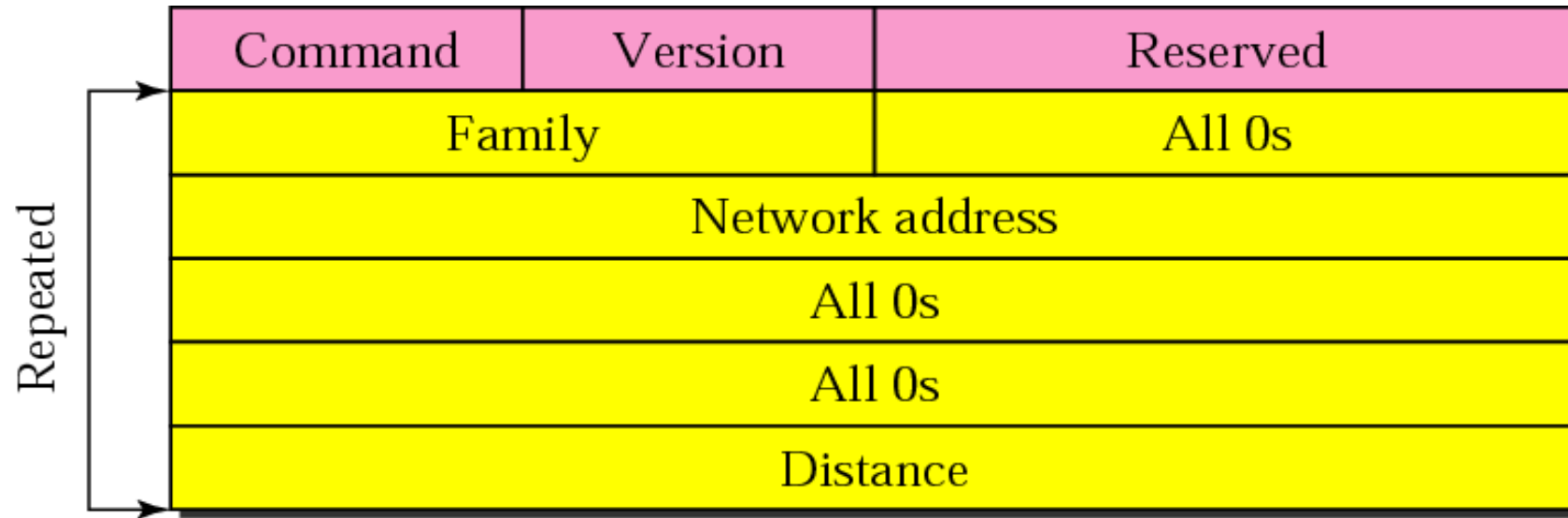
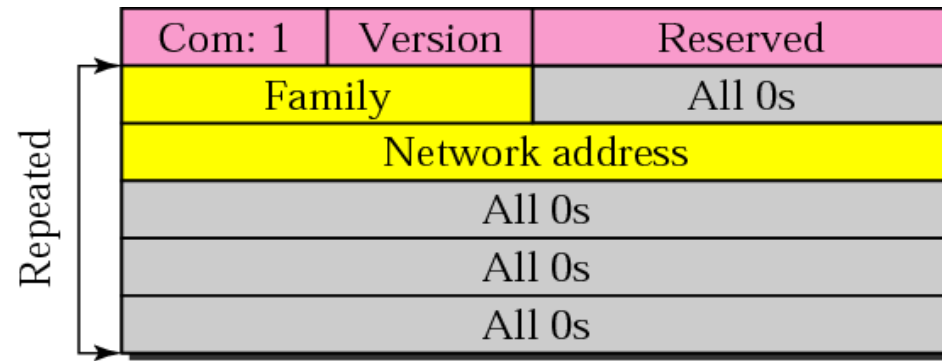
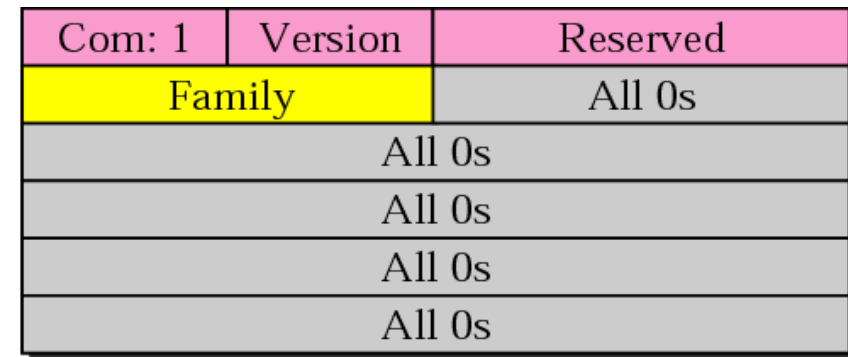


Figure. *Request messages*



a. Request for some



b. Request for all

Figure. *RIP timers*

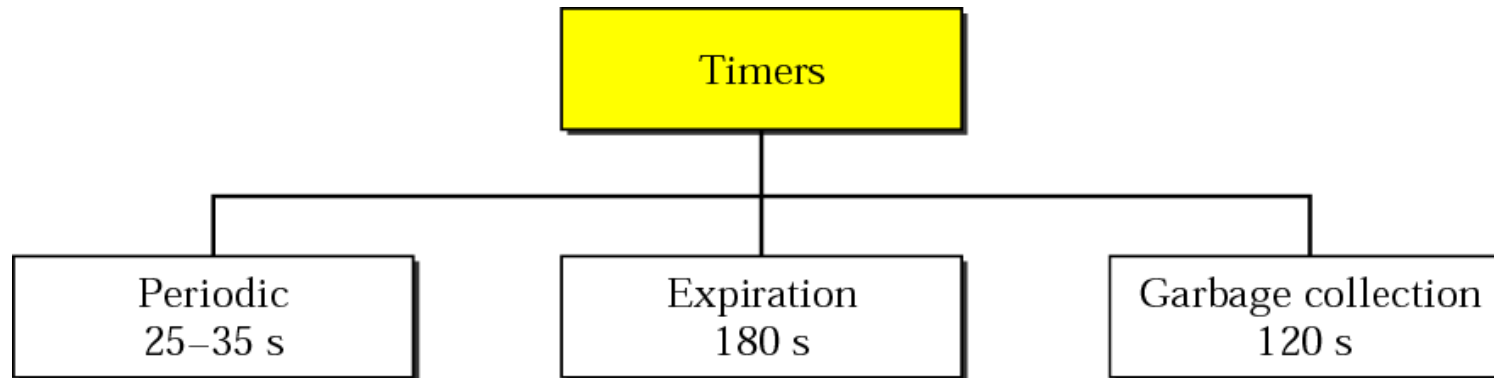


Figure. *RIP version 2 format*

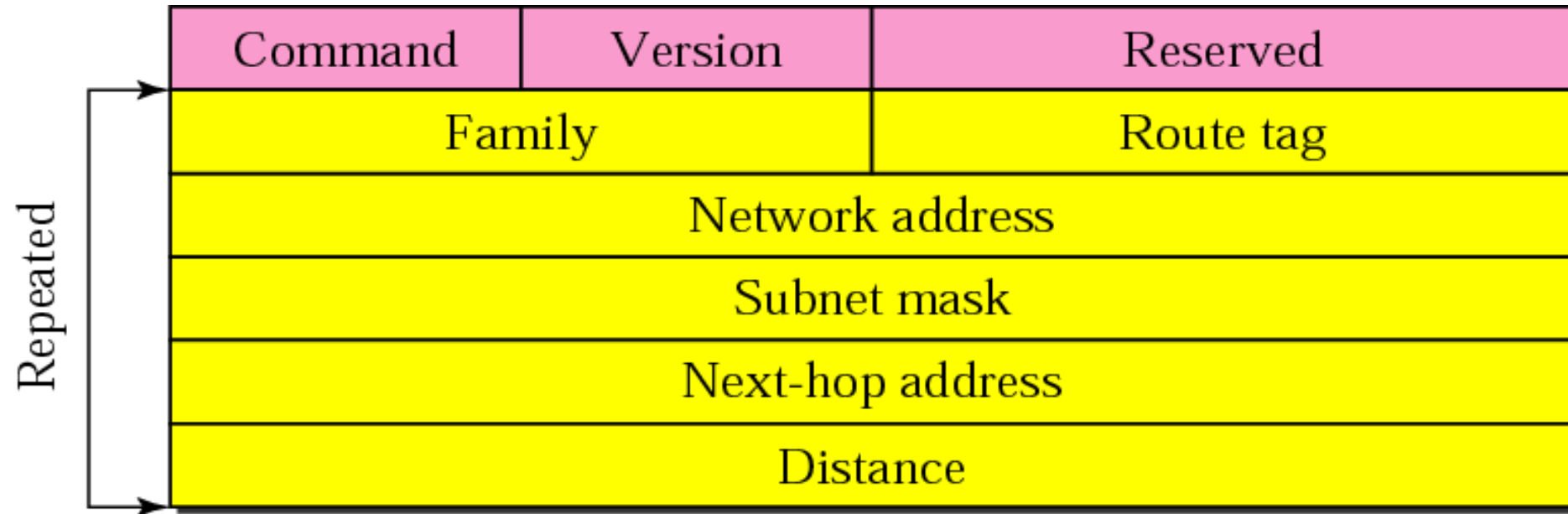
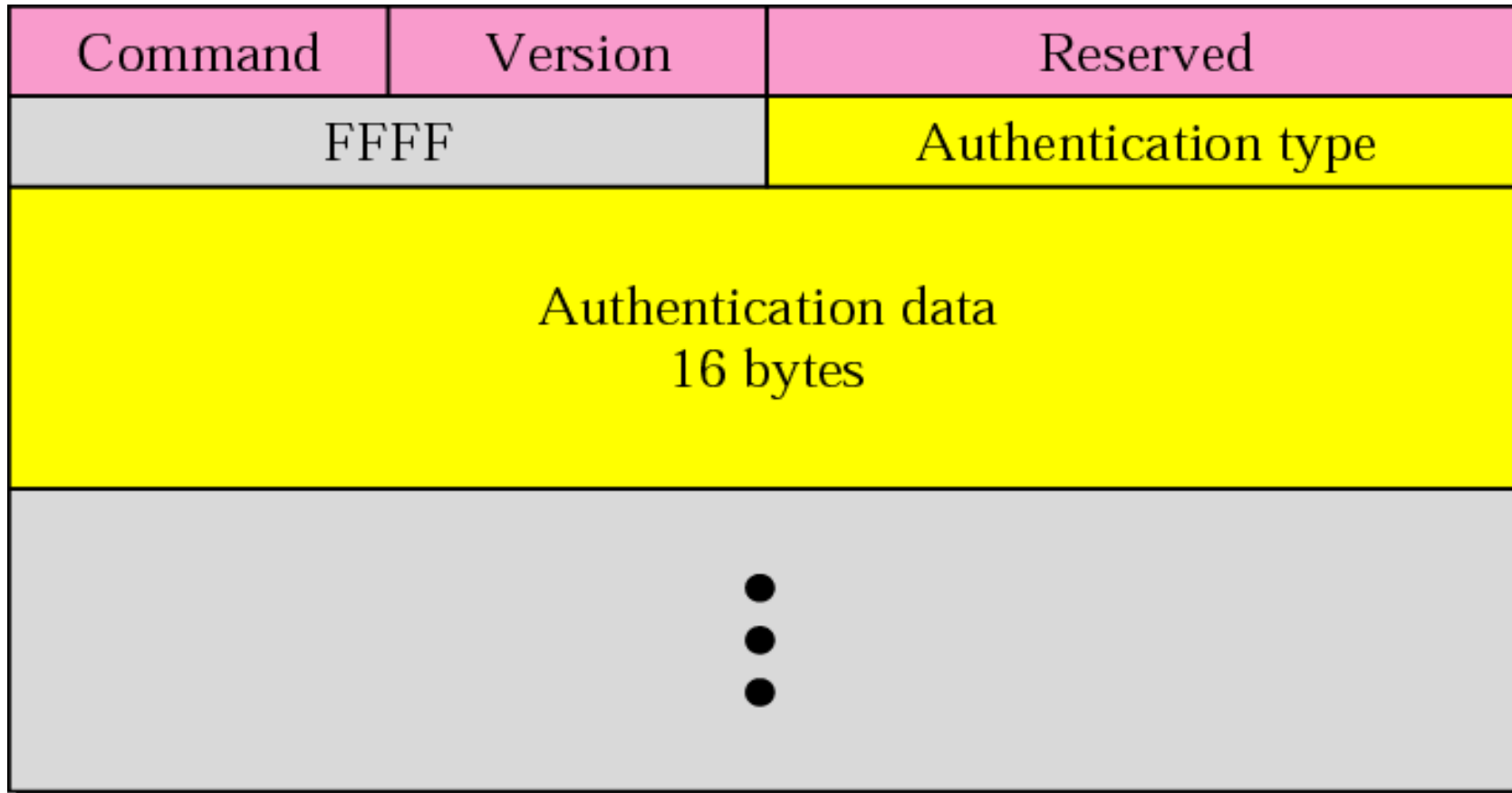
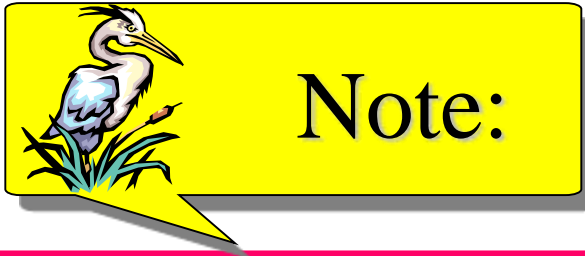


Figure. *Authentication*





***RIP uses the services of UDP on
well-known port 520.***

LINK STATE ROUTING

In link state routing, if each node in the domain has the entire topology of the domain, the node can use Dijkstra's algorithm to build a routing table.

The topics discussed in this section include:

Building Routing Tables

Figure. *Concept of link state routing*

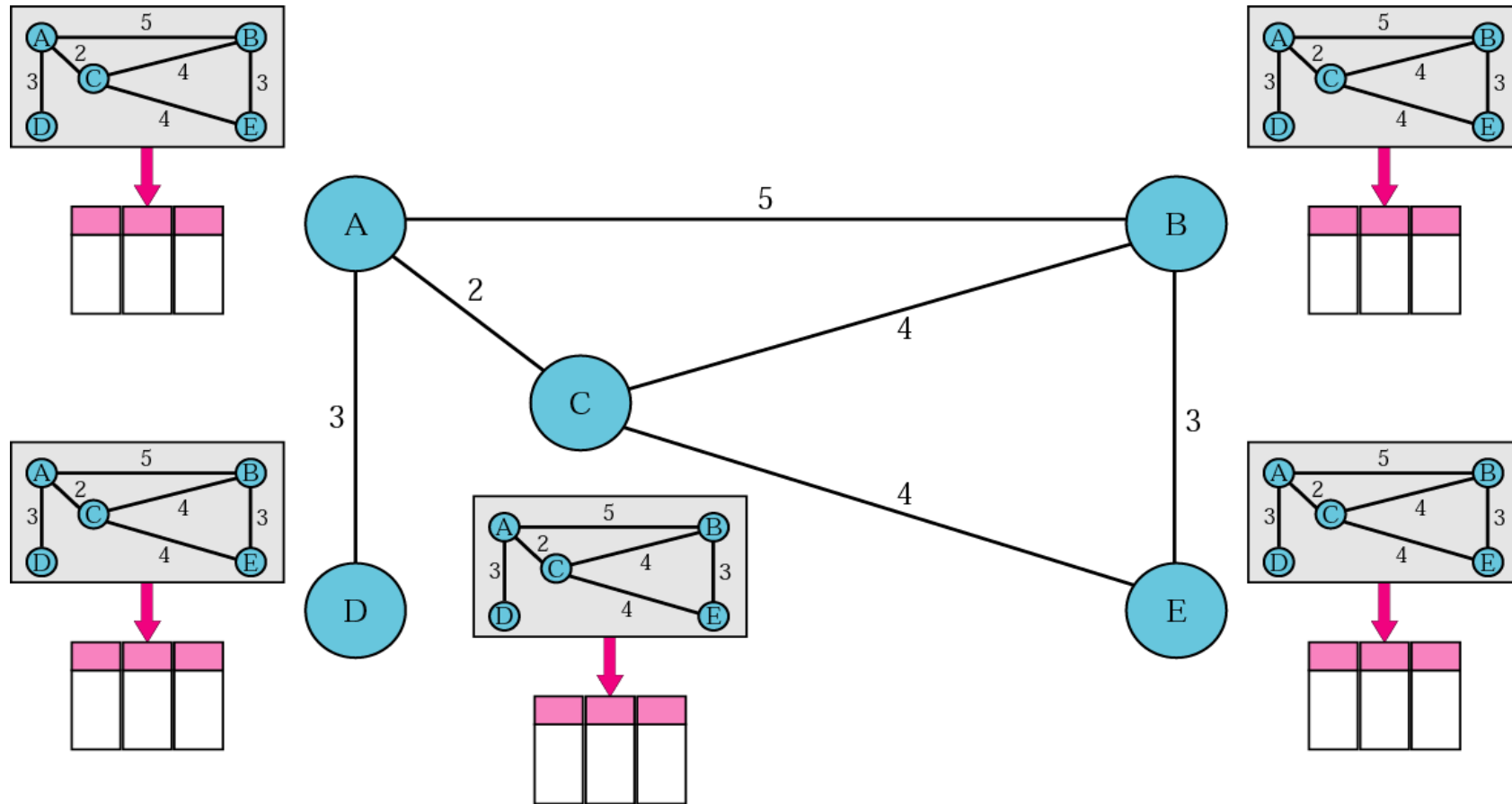


Figure. *Link state knowledge*

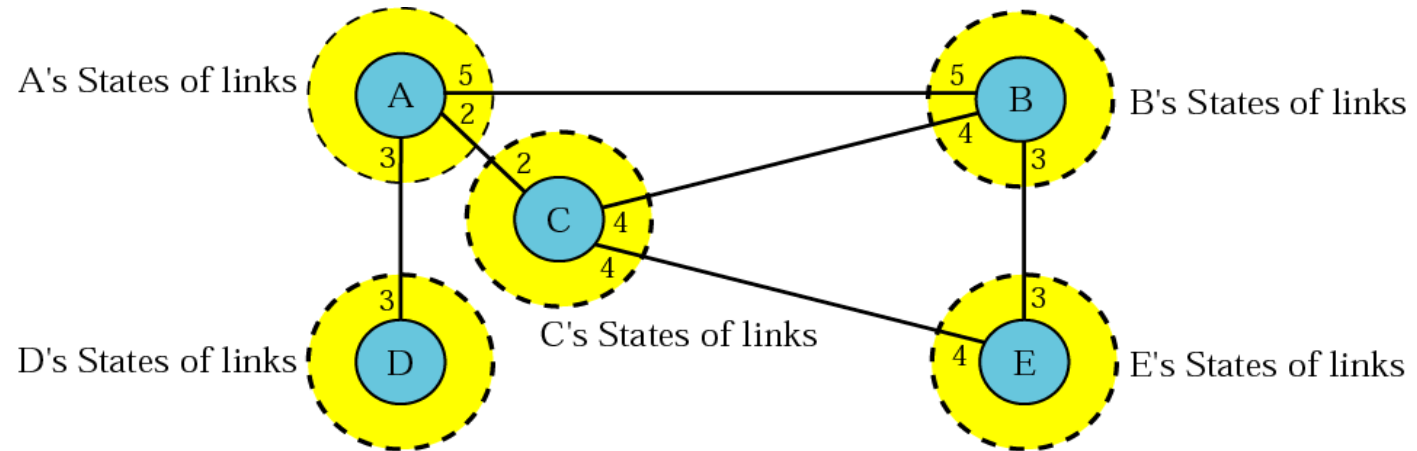


Figure. *Dijkstra algorithm*

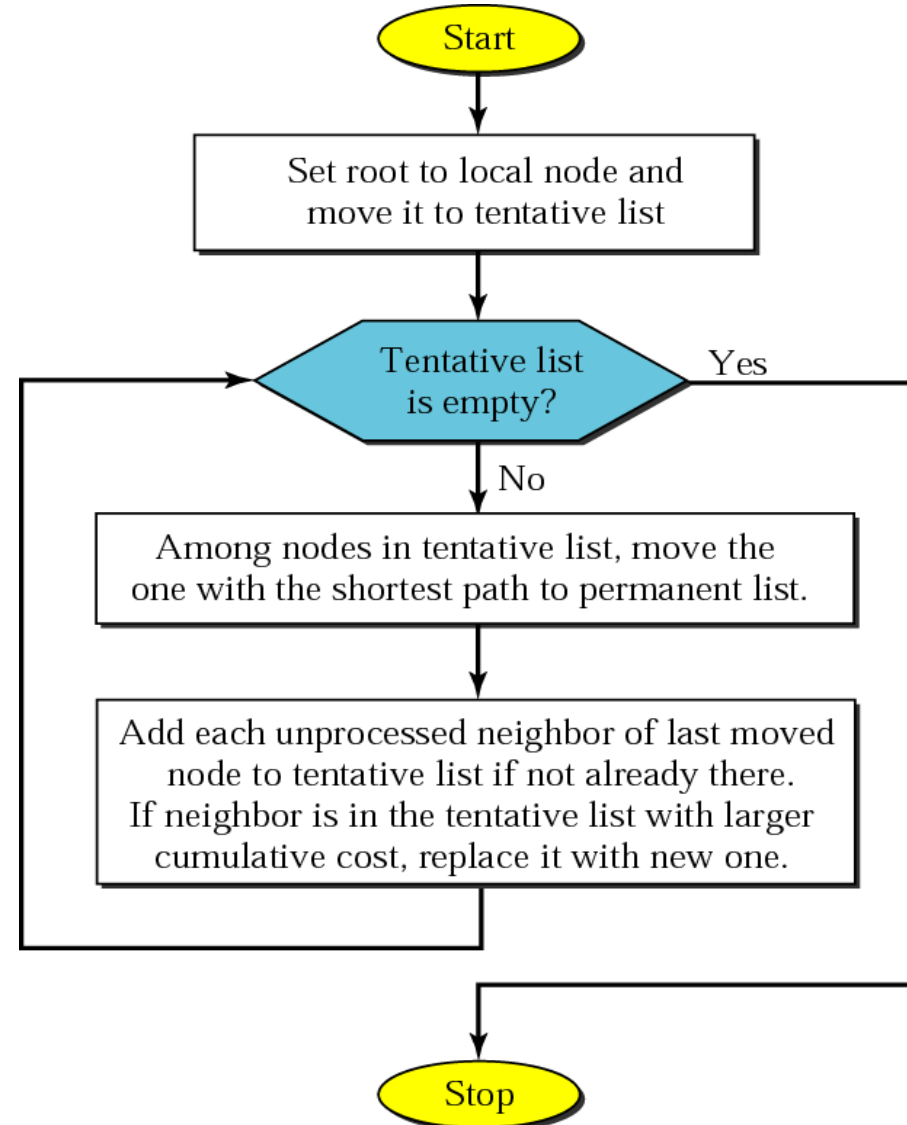
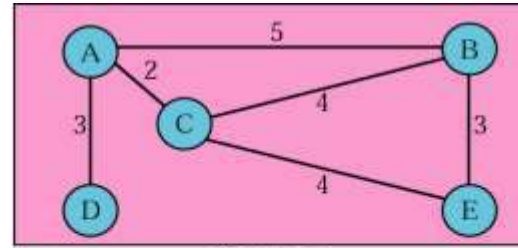
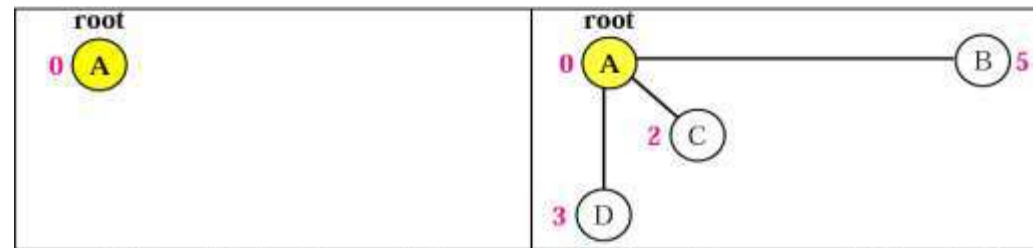


Figure. *Example of formation of shortest path tree*

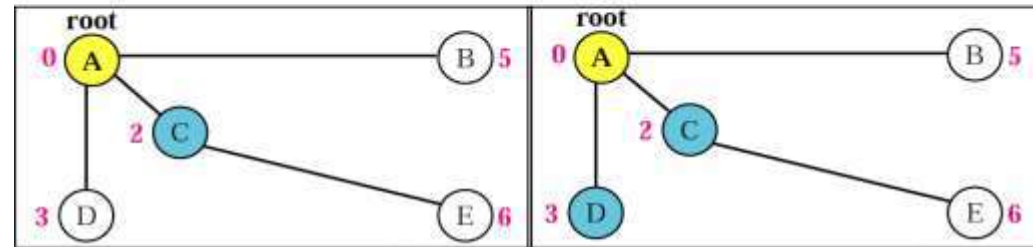


Topology



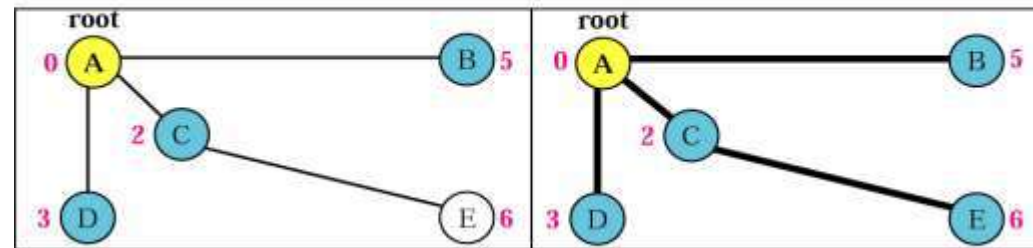
1. Set root to A and move A to tentative list

2. Move A to permanent list and add B, C, and D to tentative list



3. Move C to permanent and add E to tentative list

4. Move D to permanent list.



5. Move B to permanent list

6. Move E to permanent list (tentative list is empty)

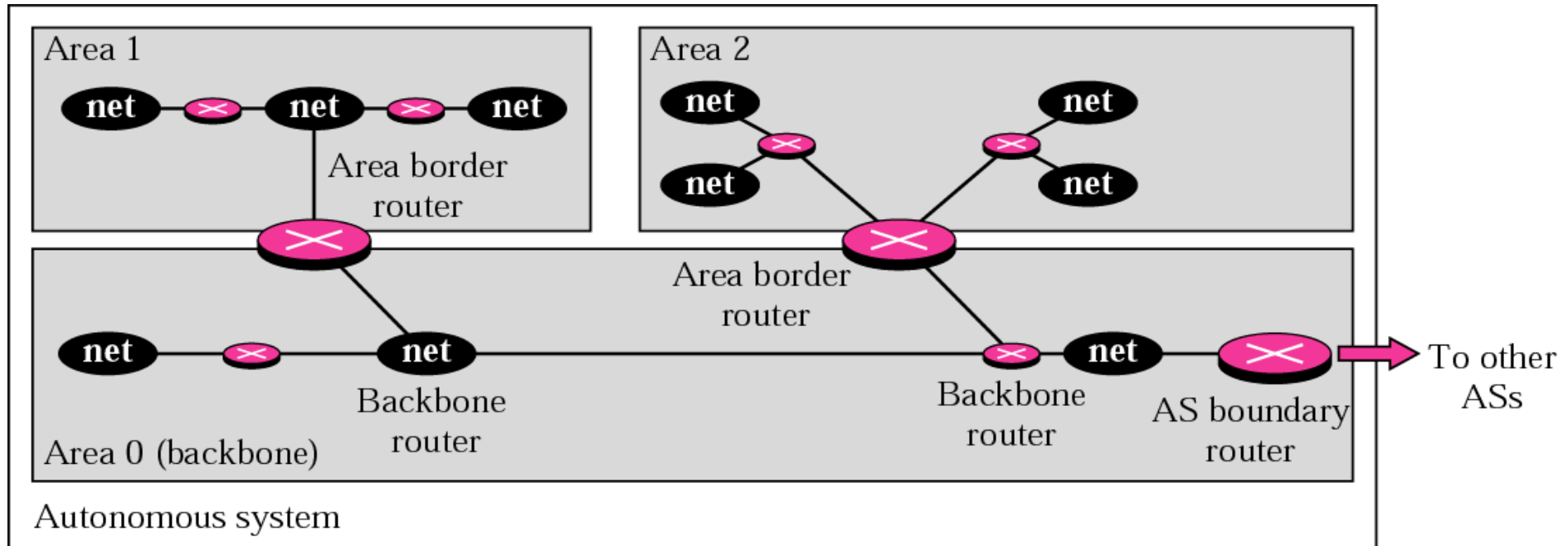
Table. Routing table for node A

<i>Node</i>	<i>Cost</i>	<i>Next Router</i>
A	0	—
B	5	—
C	2	—
D	3	—
E	6	C

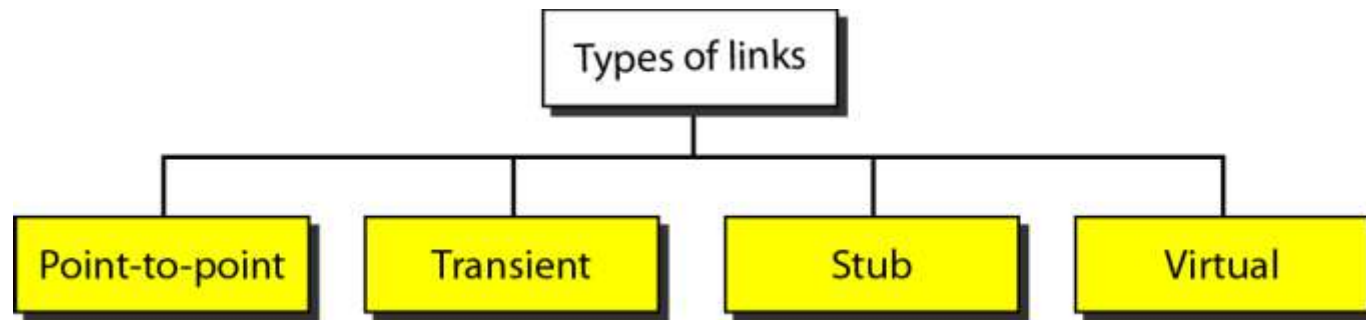
OSPF

The Open Shortest Path First (OSPF) protocol is an intradomain routing protocol based on link state routing. Its domain is also an autonomous system.

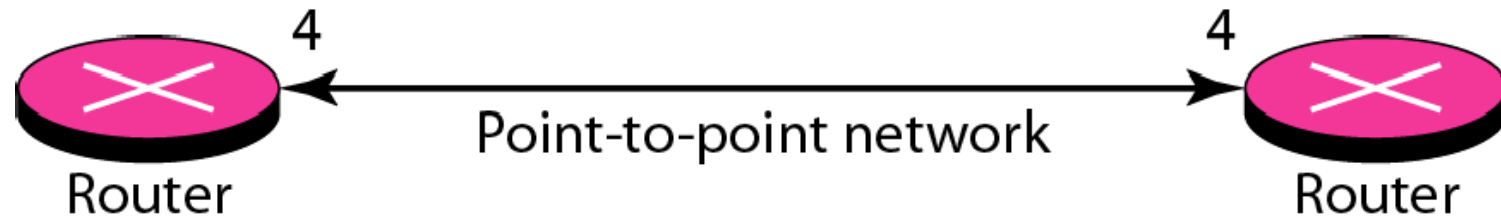
Figure *Areas in an autonomous system*



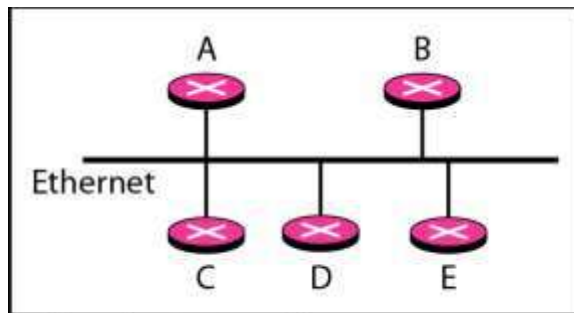
TYPES OF LINKS



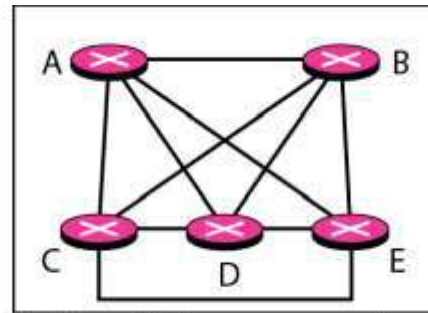
POINT-TO-POINT LINK



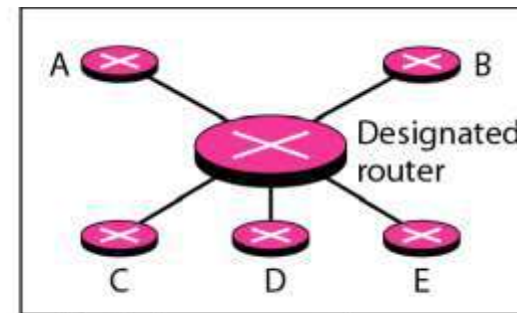
TRANSIENT LINK



a. Transient network

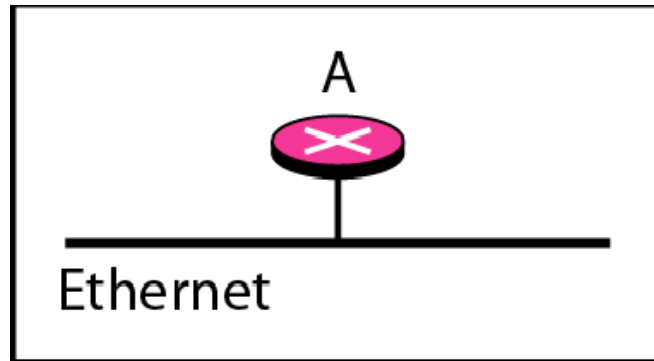


b. Unrealistic representation

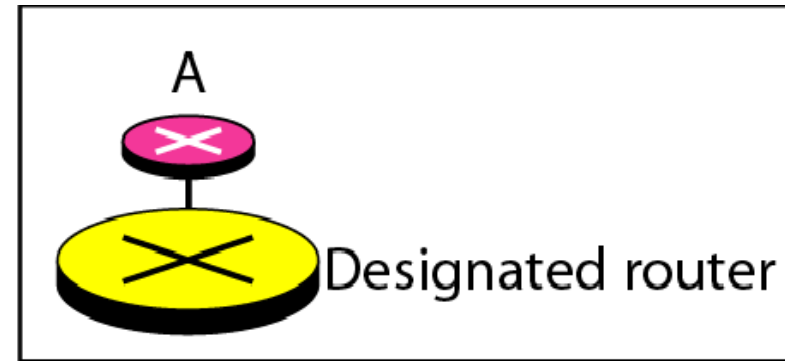


c. Realistic representation

STUB LINK



a. Stub network



b. Representation

Figure *Example of an AS and its graphical representation in OSPF*

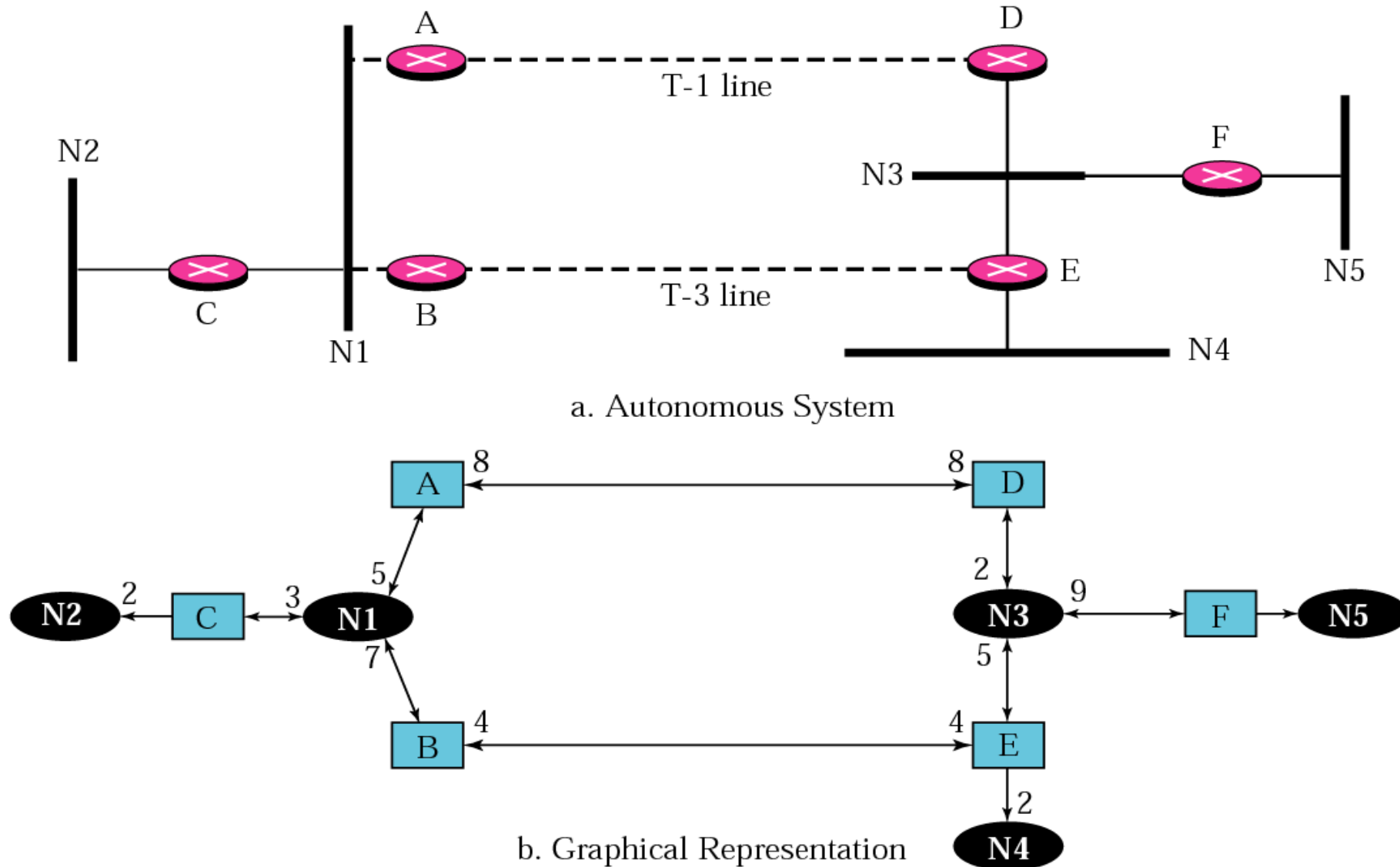


Figure *Types of OSPF packets*

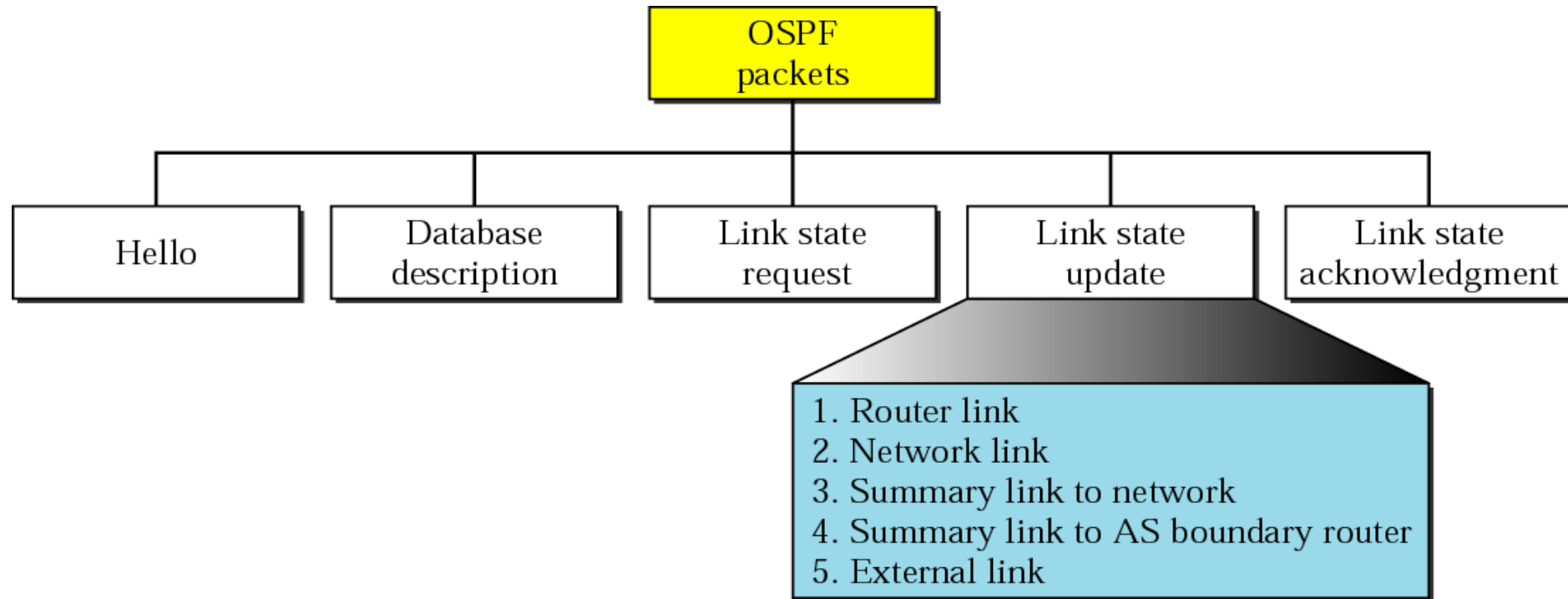


Figure *OSPF common header*

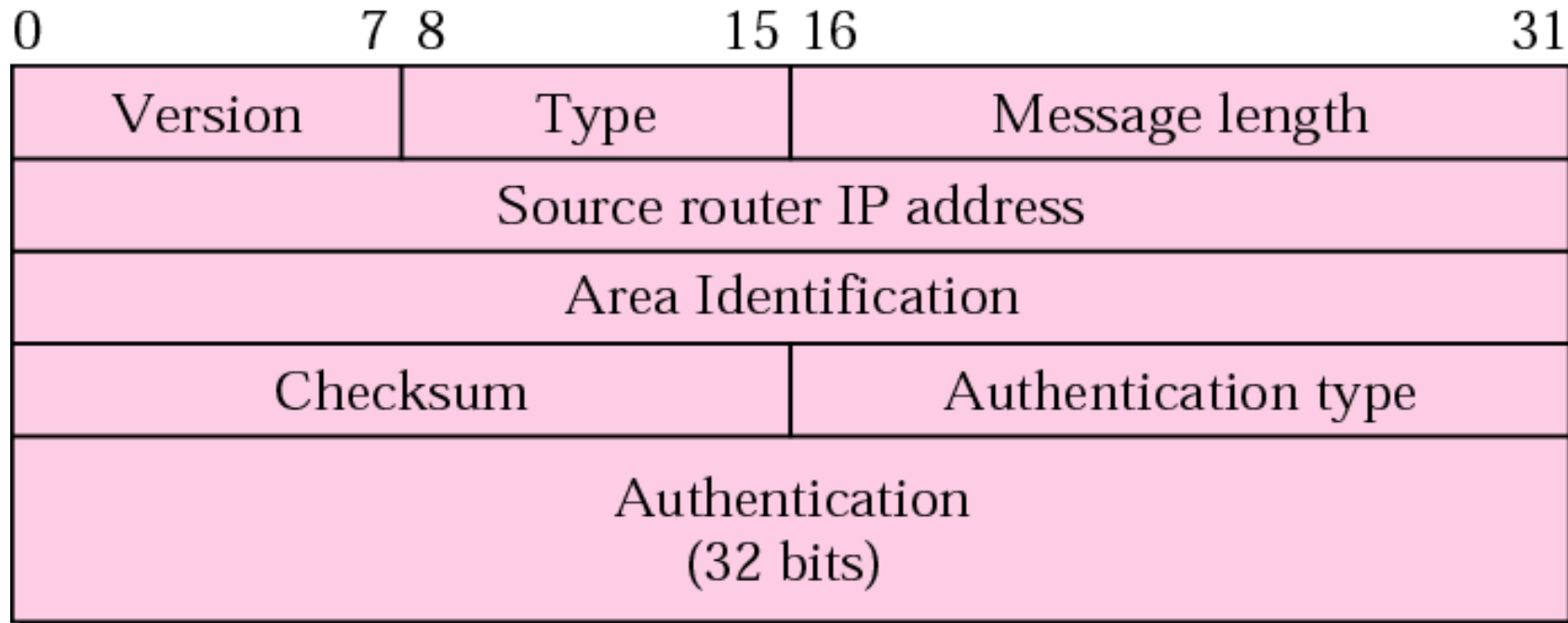
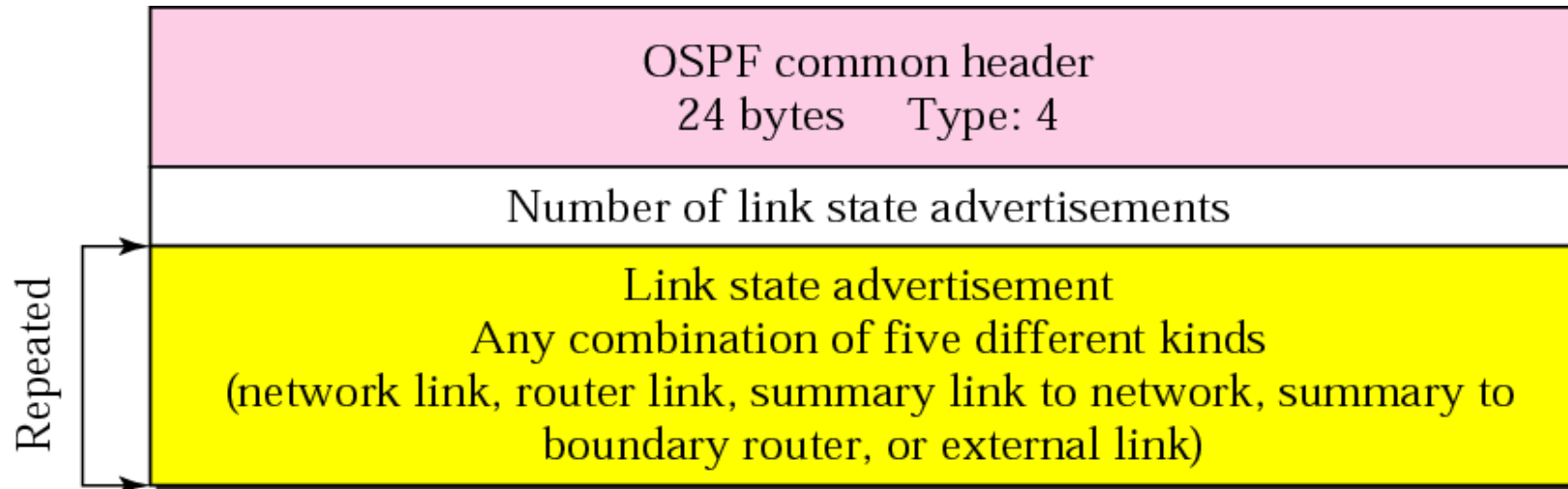


Figure *Link state update packet*





OSPF packets are encapsulated in IP datagrams.

THANK YOU



Team -Network Protocols and Security