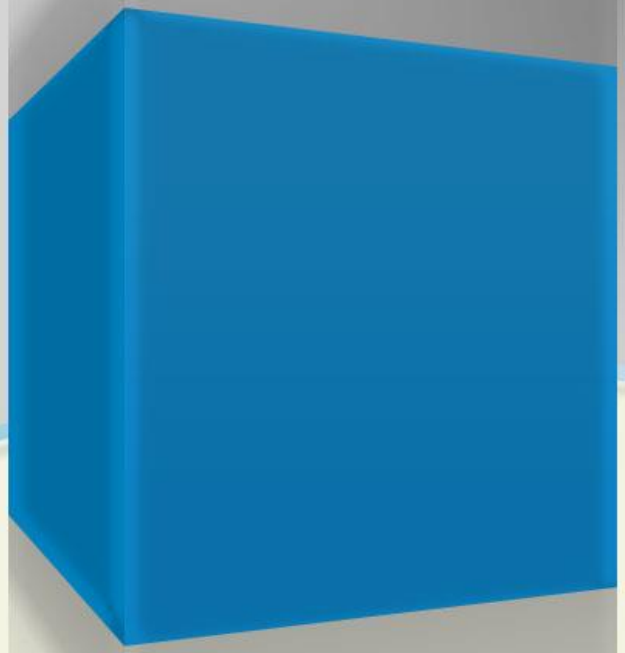
Computer Network Protocols
Network Layer (Part 1)
Lesson 1



كلية المستقبل الجامعة
قسم هندسة تقنيات الحاسوب
المرحلة الرابعة

By
Dr. Layth Abdulkareem Hassnawi

Introduction

- ***network layer*** *it's the third layer of OSI reference model which is responsible about routing of data from* ***one network to another network*** *choosing the* ***best path*** *from the routing table.*

- ***Routing table*** *consist of* ***only the best routes*** *for every destinations.*

The main functions of network layer

- ***Routing:*** *determine route taken by packets from source to destination.*

- ***Forwarding:*** *move a packet from router's input to appropriate router output.*

Types of Routing

Static	• It is configure by Administrator manually • Need for destination network ID • It is secure and fast • Used for small organization which have network of 10-15 routers
Dynamic	• Means automatically routing • Dynamic routes means that the router learns of paths of destinations by receiving periodic updates from other routers • Is automatically choose the best shortest path • Can be done by using routing protocol
Default	• Is configured for unknown destination • When there is no entry for the destination network in a routing table, the router will forward the packet to its default router. • It is last preferred routing

Routing Algorithm

*The **routing algorithm** is that part of the network layer software **responsible for deciding which output line an incoming packet should be transmitted on**. Routing algorithms can be grouped into two major classes: **Static (non-adaptive)** and **dynamic (adaptive).***

Non adaptive algorithms (static routing)	Adaptive algorithms (dynamic routing)
• ***Do not** base their routing decisions on measurements or estimates of the current traffic and topology.* • *It is called static algorithm.*	• *Change their routing decisions to reflect changes in the topology, and usually the traffic as well.* • *It is called dynamic.*

Static Algorithm

Flooding	• A simple local technique, where each router must make decisions based on local knowledge, **not the complete picture of the network**. • Is a simple algorithm to send a packet **along all paths** (Every incoming packet is sent out **on every outgoing** line **except** the one it arrived on). • Generates **infinite number of duplicate packets** unless some measures are taken to damp the process. • One such measure is to have a **hop counter** in the header of each packet, which is **decremented** at each hop, with the packet being discarded when the counter reaches zero
Shortest Path Routing	• Shortest path routing first developed by **Dijkstra** algorithm. • Find the shortest path from a **specified source to all other destinations** in the network. • In the general case, the labels on the lines could be computed **as a function** of the distance, bandwidth, average traffic, communication cost, measured delay, and other factors.

Static Algorithm

Example 1: Find the shortest path from router A to router H?

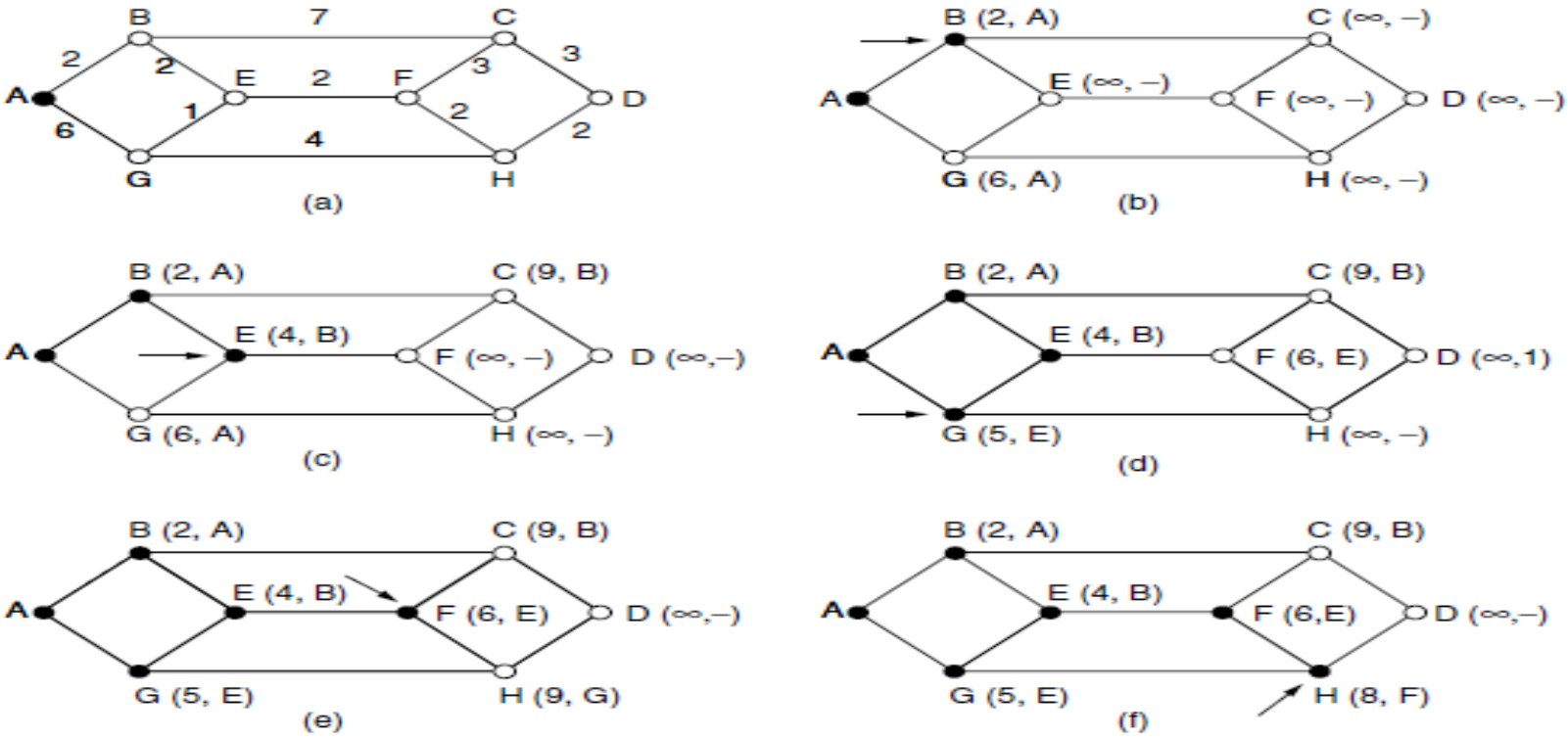


Figure The first six steps used in computing the shortest path from *A* to *D*. The arrows indicate the working node.

End Of Lesson 1

Thanks For Listening