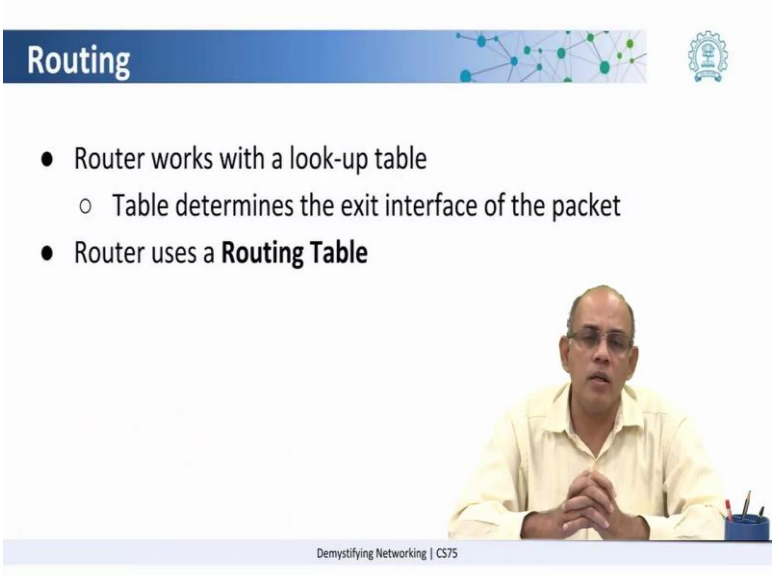
Demystifying Networking
Prof. Sridhar Iyer
Department of Computer Science and Engineering
Indian Institute of Technology, Bombay

Lecture – 40
What is Routing?

Routing is the mechanism of forwarding packets from the source point on the internet to the destination point. How is this done? This is done by routers. Now, what information does a router need to have in order to do this routing? Let us take a moment to think about it.

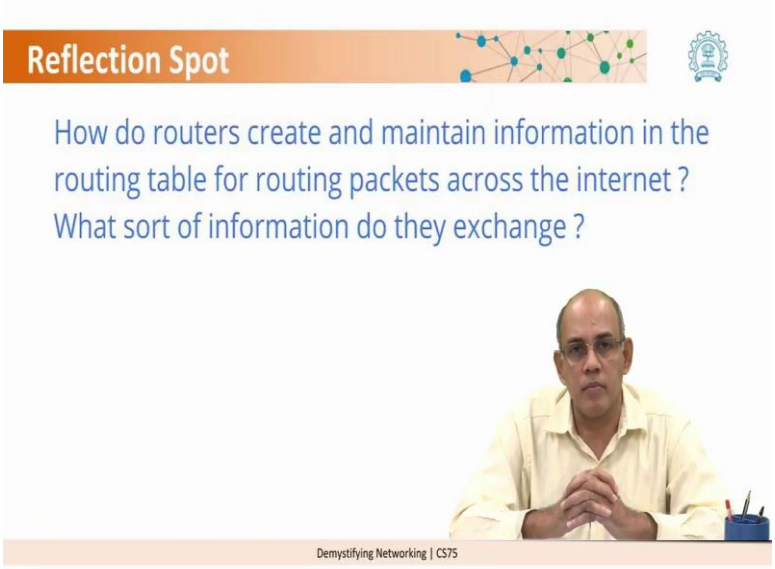
(Refer Slide Time: 00:25)



As many of you would have thought, the router needs some sort of a lookup table. Right! Router needs to know that when a packet arrives on an interface, it has to be sent out on a appropriate interface. Now, how does it know which interface? It has to know that by looking up some kind of a table. So, this table is called the routing table.

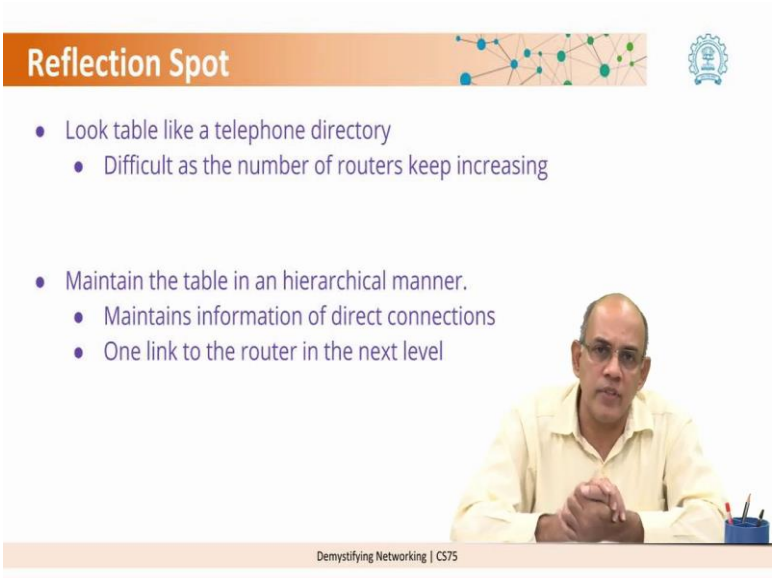
While we can see that every router needs to have a routing table, what is a little more complex is to understand how these routing tables are constructed.

(Refer Slide Time: 01:01)



So here is a reflection spot. Think about, how do routers create and maintain these tables for routing packets across the internet? what sort of information do they exchange? Once you have thought about it, can continue.

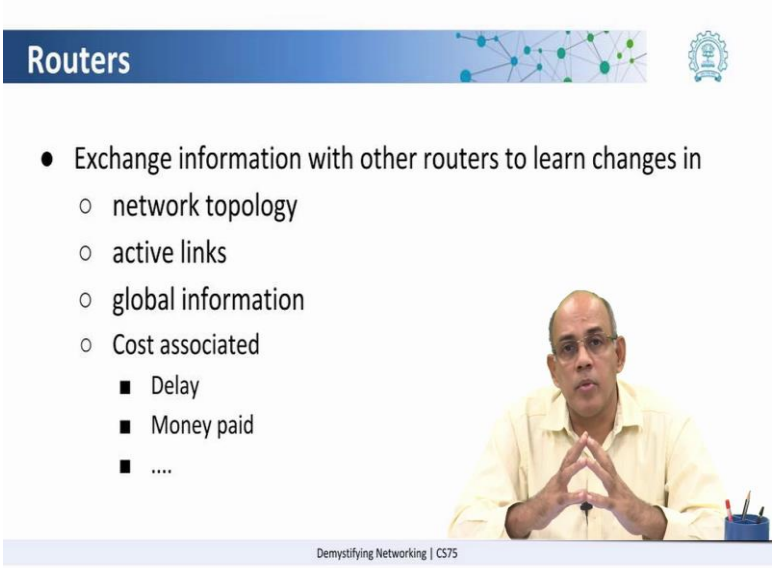
(Refer Slide Time: 01:23)



So, some of you may have thought that routers can create huge tables and they can look it up, much like a telephone directory. While the general concept is valid, it becomes more and more difficult as the numbers keep changing or as the number of entries keep increasing. Hence, what routers do is, that they maintain these tables in a hierarchical manner. A router maintains

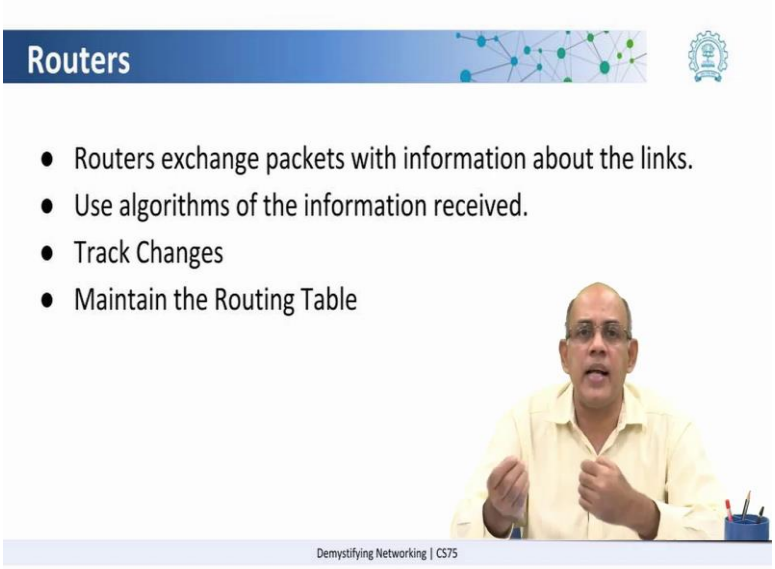
all the information about the networks to which it is directly connected to and it maintains one link to a router which is going into the next level of the network.

(Refer Slide Time: 02:03)



So, these routing tables also have to deal with the fact that some links may go up or down. Right! Some networks may become an inaccessible along the particular path. So, routers also have to exchange information, which tells them which links are active and in more complex systems or in more real life systems, there is also a cost associated with the link. The cost may be in terms of the delay, the cost may be in terms of the money that has to be paid for sending packets on that link and so on.

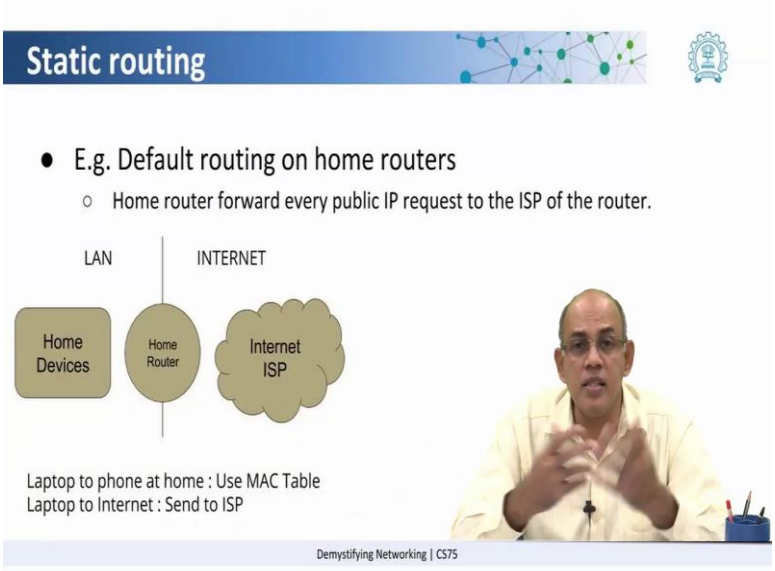
(Refer Slide Time: 02:39)



So, routers exchange packets on these links, which help them to create this routing table as well as to be able to maintain them in the current state of the network.

While all this may sound somewhat complex, it is easy to follow them when we do them in a packet tracer. So, we will start with static routing. Before we get into the details, let us remember that static routing is something which we encounter very frequently.

(Refer Slide Time: 03:15)



This is basically your home router. When your home router is connected to the internet ISP, essentially on that link, what it is configured for is a static router. What that tells the router is that, irrespective of the number of devices that you may be having in your home, your laptops and your mobile phones, all of which are connecting to the same Wi-Fi home router, on the inner side in the LAN, it uses the MAC addresses to send the packets to the individual devices.

On the internet side, all it does is to send all the packets to that single static route or to that single ISP's router to which it is connected. So, this is the simplest example of a static router. And in the case of a home network a static route is sufficient. Of course, this does not work on the internet scale because there is a lot of complexity in creating static routes, maintaining static routes from one end of the network to the other. Hence, we also need dynamic routing. Before we go into dynamic routing, let us look at the example of static routing using packet tracer.