RĪGAS TEHNISKĀ UNIVERSITĀTE

Switching at Organisation Level

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2023

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Chapter 1

Introduction

Switching is the mechanism in computer networks that helps in deciding the best route for data transmission. It is a technique for switching information from one node to another, if there are multiple paths in a larger network. In a small network, if we send data from sender to receiver then we can just directly send data, we do not need any intermediary device for switching. However, if we use larger network such as organisation level or the receiver is way far from ther sender, then our data does not directly reach taht device. Therefore, there may be many intermediary nodes in the middle and the information switch through these nodes. In addition, there are three main switching techniques in today network. They are circuit switching, message switching and packet switching.

1.1 Circuit Switching

When two nodes communicate with each other over a dedicated communication path, it is called circuit switching.There 'is a need of pre-specified route from which data will travels and no other data is permitted.In circuit switching, to transfer the data, circuit must be established so that the data transfer can take place. The following figure shows how circuit switching works in real network.

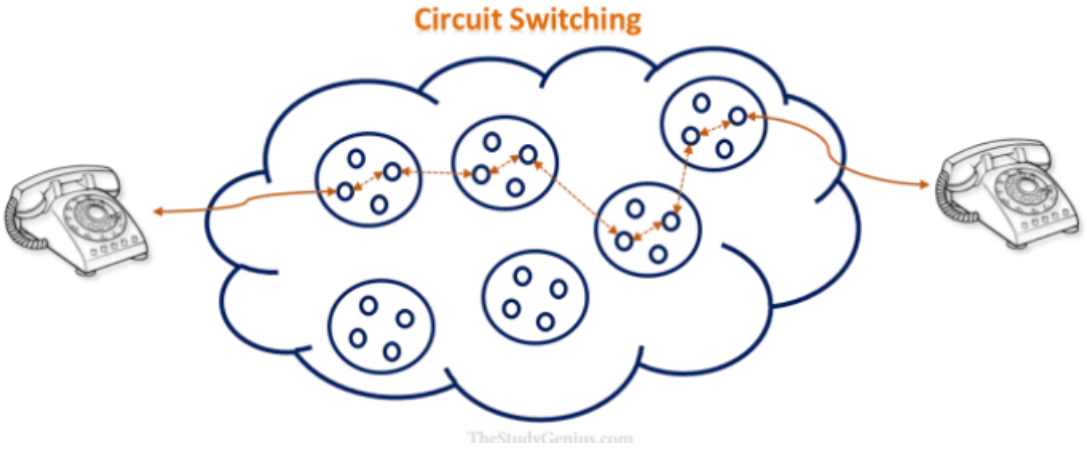

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Figure 1.1: Circuit Switching Topology

1.2 Message Switching

This technique was somewhere in middle of circuit switching and packet switching. In message switching, the whole message is treated as a data unit and is switching / transferred in its entirety. A switch working on message switching, first receives the whole message and buffers it until there are resources available to transfer it to the next hop. If the next hop is not having enough resource to accommodate large size message, the message is stored and switch waits. In figure 1.2, you can see how message switching works in real network.

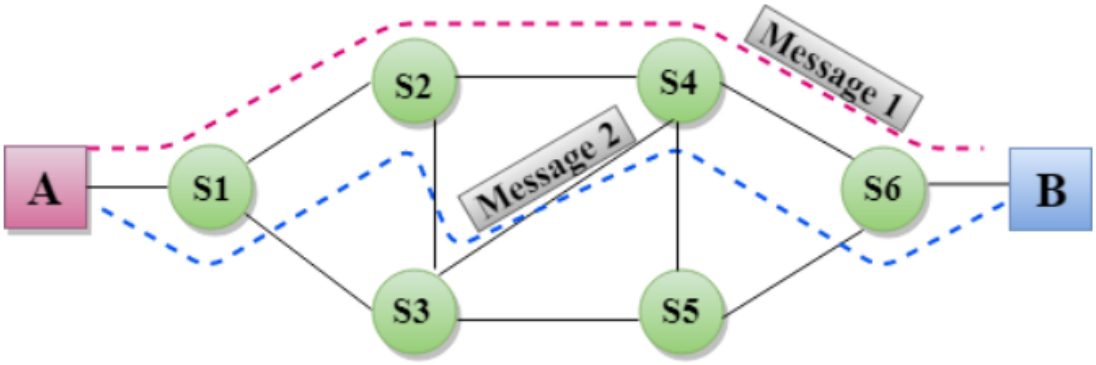

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Figure 1.2: Message Switching Topology

1.3 Packet Switching

Shortcomings of message switching gave birth to an idea of packet switching. The entire message is broken down into smaller chunks called packets. The switching information is added in the header of each packet and transmitted independently. It is easier for intermediate networking devices to store small size packets and they do not take much resources either on carrier path or in the internal memory of switches. The following figure shows how packet switching works in real network.

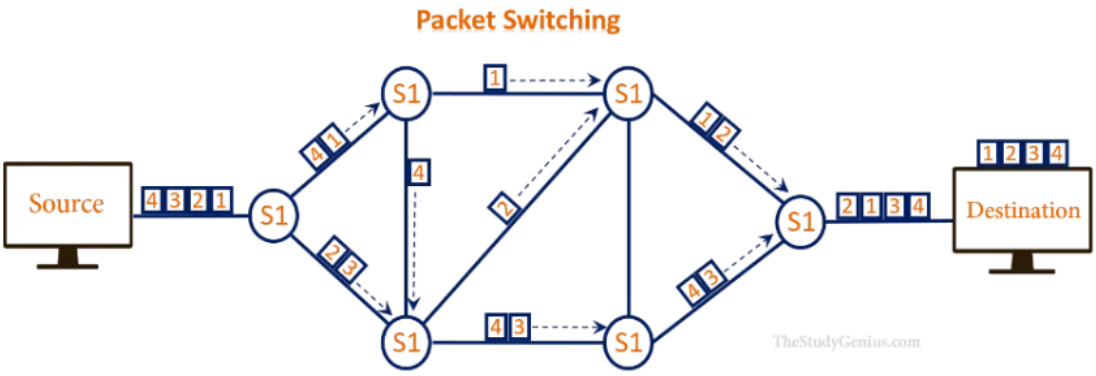

Figure 1.3: Packet Switching Topology

Chapter 2

Methods

In switching at organizational level, we had tested many kind of switching practical lab in our class using Miktrotik devices in order to test Xpra application, VLC video streaming and GSNS3. In this report, I am going to show you how to use Xpra application in your organization level such as companies or small office. I will show you detailed information about switching in organization level. Before I analye about switching using Xpra in organization level, I would like to explain what Xpra is and what Generic routing encapsulation (GRE) tunnel is.

2.1 Xpra

Xpra is an open-source multi-platform persistent remote display server and client for forwarding applications and desktop screens. It gives you remote access to individual applications or full desktops. It allows you to run programs, usually on a remote host, direct their display to your local machine, and then to disconnect from these programs and reconnect from the same or another machine, without losing any state.

2.2 Generic routing encapsulation (GRE)

Generic Routing Encapsulation, or GRE, is a protocol for encapsulating data packets that use one routing protocol inside the packets of another protocol. "Encapsulating" means wrapping one data packet within another data packet, as putting a box inside another box.

GRE is one way to set up a direct point-to-point connection across a network, for the purpose of simplifying connections between separate networks.

Chapter 3

Materials

In our Lab, we use MikroTik routers (RB951G and RB931-2nD) to test our practical works. In the figure 3.1, RB951G MikroTik router includes one internet port and four Local area network (LAN) ports. In addition, there is one wireless access point in this router. In the

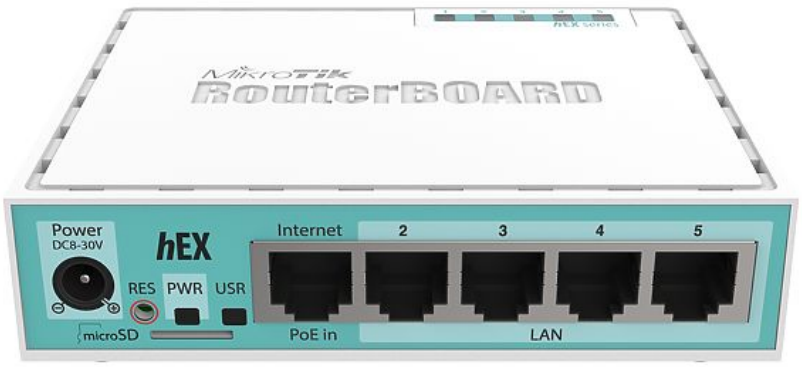

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Figure 3.1: RG951G MikroTik Router

figure 3.2, RB931-2nD hap mini MikroTik router includes one internet port and two local area network (LAN) ports. In addition, there is one wireless access point in this hap mini.

Figure 3.2: RB931-2nD MikroTik Router

Before we starting our practical work, we need to draw topology first for our network and then we need to test simulation by using GNS3. When it is successfully operated in GNS3, we can deploy our methods in real network.

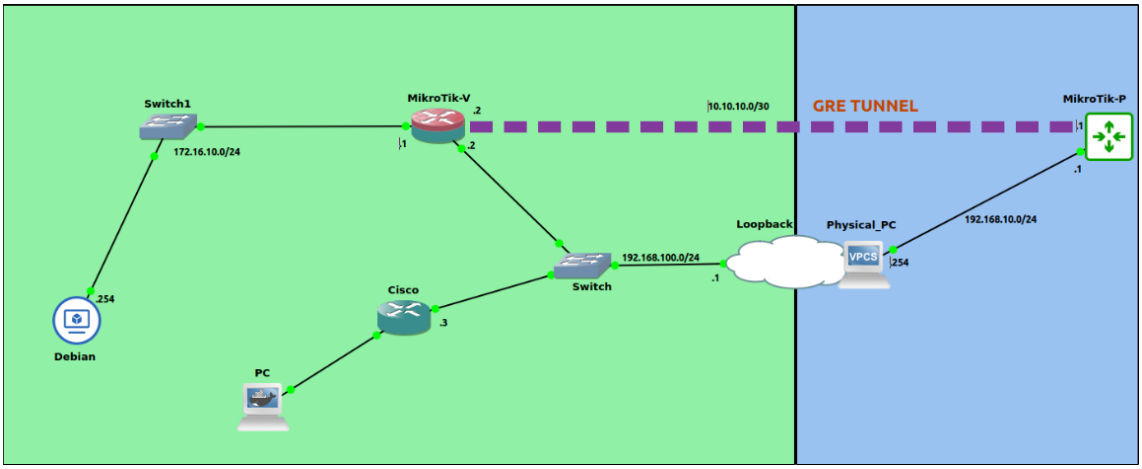

Figure 3.3: Switching Expamle using Xpra

First, I would like to show my topology for Xpra application. In this topology, there

are two kinds of network: physical network and virtual network. The following figure (3.3) shows network topology for GNS3. In this topology, I used two MikroTik devices one is for physical and another is for virtual in GNS3. Between these two routers, I configured Generic routing encapsulation (GRE) tunnel to secure data transmission while we are using Xpra application. In order to create GRE tunnel, we need to check reachability between these two MikroTik devices. Without having reachability, we cannot create GRE tunnel between physical Mikrotok router and virtual MikroTik router.

The second topology shows switching network topology in GNS3. In this topology, there are two routers one for MikroTik and one for Cisco, two switches and two virtual machines: one is Debian and one is virtual pc from GNS3. The following figure shows virtual network topology in GNS3.

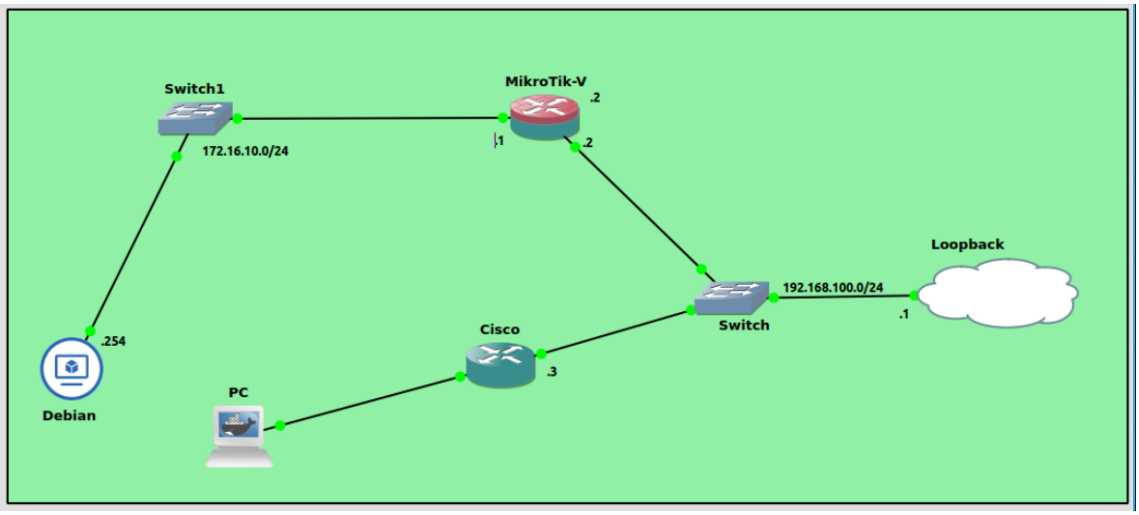

Figure 3.4: Virtual Network Topology in GNS3

Chapter 4

Research

In our experience, we did a lot of research on switching using Xpra. The first research is how to create Xpra server and access from the client using different interfaces such as secure socket shell (SSH), Web browser or Graphical User Interface (GUI). In this research, we are going to show you access Xpra using web browser using Chrome. From our experience, it is better to use Xpra than other interface such as SSH or GUI.

First of all, we would like to show you how to run Xpra server on your personal computer. There are many ways to create Xpra server on your PC.

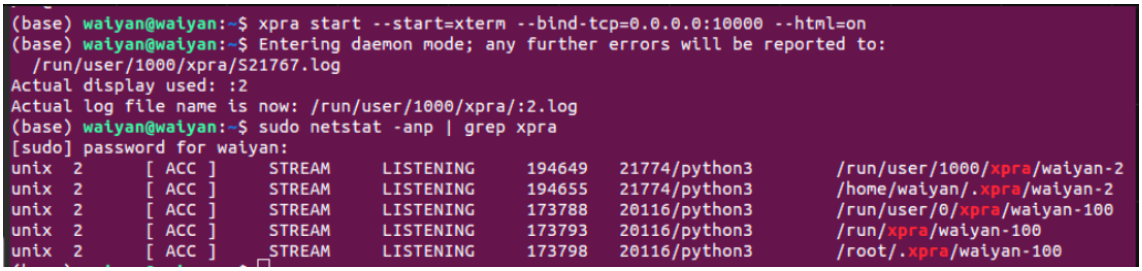

Figure 4.1: Running Xpra Server

In addition, you can also add some commands what you want to before running Xpra server. For example, you can add "–clock=off" in your command line and it will affect on client site which means there will be no sound even when you click wrong button in client side. When you run correct command line from client in order to connect to Xpra server, you will open any application from server freely. The following figure shows the resluts of accessing Xpra from client site.

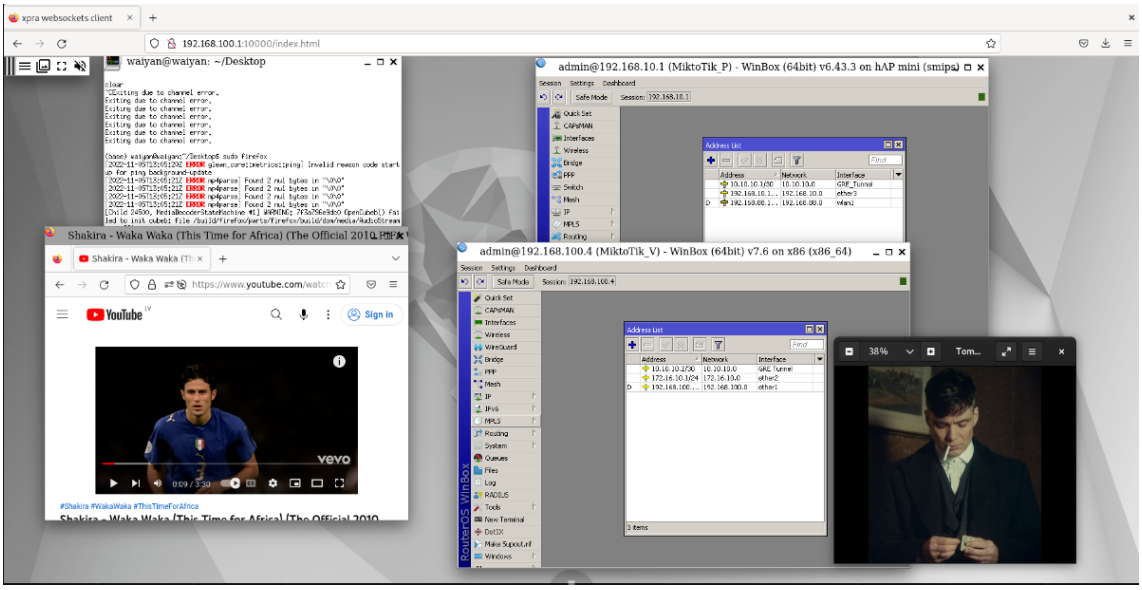

Figure 4.2: Accessing Xpra remotely

From our experience, we tested switching technique successfully using Xpra application. As you can see, we tested remotely by using Web browser in order to open Winbox, youtube, photo from server. Moreover, you will get current Xpra section even if you change from one client to another. This is our virtual experience for switching.

As we mentioned above, we have to deploy our switching technique in real network after it is successfully operated in simulation. Therefore, we tested our simulation experience in our class and the results were the same as we did in simulation. In real switching network, we need to be careful about one thing which is reachability in our reality. Without reachability in our network, we cannot receive a successful result in switching.

Chapter 5

Analysis

After analysing switching in the class, we realized that it is very crucial not only for Local area network (LAN) but also Wide Area network (WAN) and Internet. In switching, we believe that reachability is very crucial between source and destination. Therefore, today Internet switching system is based on overlay and underlay networks. For underlay networks, Internet is based on layer 2 or layer 3. Later 2 is Ethernet via Virtual Local Area Network (VLAN). In layer 3, there are many kinds of routing protocols for reachability such as Routing Information Protocol (RIP), Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF), Interior Gateway rotocol (IGP), Border Gateway Protocol (BGP). For overlay network, Internet is based on Virtual Private Network (VPN) tunnels such as Generic routing encapsulation (GRE), Internet Protocol Security (IPsec) and Layer 2 Tunneling Protocol (L2TP) etc. Without these two networks, it is impossible to do switching between one place and another.

Chapter 6

Conclusion

To be conclude, switching at all levels is critical because we cannot access any data without switching not only local area network but also global. In our class, we had already tested many kinds of switching such as VLC streaming, CCTV accessing, File sharing in our local network. In some cases such VLC streaming and CCTV accessing, we need to use quality of service in order to get real time data without losing anything because streaming and voice are sensitive data over Internet. If you cannot handle such kind of data, we will not receive the best performance over switching globally.

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