Final Report

Lab 3.1 - Mapping the internet

Group Member

Nattasit Mahakusolsirikul 5730192821

Danupat Khamnuansin 5730196321

Phatchara Chokdurong 5730367321

Wasin Saengow 5730539021

Aouychai Buranamanit 5730684221

Suppavich Kongthanarit 5731105421

Present

Teacher Araya Ramsin

Abstract

Communication is the key of success. We could never deny the truth that it is really necessary. Previously, It was difficult to communicate with people around the world. But in these present days, the tool that will easily help you achieve that is the internet. However, it sometimes can be very slow to reach the destination. Thus, the objective of this paper is to present a way to check the connectivity of the internet and to examine the internet pathway between the source and the target destination. The laboratory tests included ping tool and traceroute (or tracert) tool in command-line-prompt. Ping tool is used for test internet connectivity and traceroute tool is used for examine the internet pathways. The results indicated a list of pathways that data packets have passed from source to destination. The results are intended to provide how internet packet is traversed to the destination and they can show that what part of the route makes internet connection slow.

Introduction

The internet services are invented for a long time ago, However, most people don't really understand how it works. In the past, there is a methodology or protocol that provides internet routing service which is developed as time passes. The study in the past shows that there is a basic algorithm that leads the packet to travel through the route in which the system considers to be the best path. As time has passed, the algorithm leading the packet needs to be changed because of an increase of internet service provider (ISP) that comes into a network.

An Internet service provider (ISP) is an organization that provides services for accessing and using the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned. However, in the present day, the researcher claims that two traceroutes between the same source and destination conducted some time apart may produce different results. This is due to the "meshed" nature of the interconnected networks that comprise the Internet and the Internet Protocols ability to select different pathways over which to send packets. In this study, we will examine the internet service in the present day by using a route tracing computer software called traceroute.

Route tracing computer software is a utility that lists the networks data has to traverse from the user's originating end device to a distant destination network. Route tracing utilities allow a user to determine the path or routes as well as the delay across an IP network. Several tools exist to perform this function.

The traceroute (or tracert) tool is often used for network troubleshooting. By showing a list of routers traversed, it allows the user to identify the path taken to reach a particular destination on the network or across internetworks. Each router represents a point where one network connects to another network and through which the data packet was forwarded. The number of routers is known as the number of "hops" the data traveled from source to destination. The displayed list can help identify data flow problems when trying to access a service such as a website. It can also be useful when performing tasks such as downloading data. If there are multiple websites (mirrors) available for the same data file, one can trace each mirror to get a good idea of which mirror would be the fastest to use.

Routes traced can go through many hops and a number of different Internet Service Providers (ISPs), depending on the size of your ISP, and the location of the source and destination hosts. Each “hop” represents a router. A router is a specialized type of computer used to direct traffic across the Internet. Imagine taking an automobile trip across several countries using many highways. At different points in the trip, you come to a fork in the road in which you have the option to select from several different highways. Now further imagine that there is a device at each fork in the road that directs you to take the correct highway to your final destination. That is what a router does for packets on a network.

The main objectives of this paper are: to give a methodology of checking the internet connectivity, and to examine the internet pathway between the source and the target destination

Methodology and Design

This study examines the Internet pathway to destination networks by using traceroute (or tracert) tool and ping tool with sample computer desktop based on Lab 3.1 “mapping the internet” in Computer Network Laboratory course. The traceroute (or tracert) tool is often used for network troubleshooting. By showing a list of routers traversed, it allows the user to identify the path taken to reach a particular destination on the network or across internetworks, ping is a tool used to test whether a host is reachable. Packets of information are sent to the remote host with instructions to reply.

To make this experiment properly, first we need to determine the internet connectivity by determining whether the remote server is reachable. To test the internet connectivity, the ping tool is used to measure a ratio of output data transmission and return data transmission.

As shown in Fig. 1, to use the ping tool, open command-line prompt then type ping www.cisco.com, then the ratio was calculated by the ping tools. If the loss ratio is 0%, it means the internet connectivity is good and stable. Otherwise, it means there is some problem occurring while connecting.

```
C:\>ping www.cisco.com

Pinging e144.dscb.akamaiedge.net [72.246.234.230] with 32 bytes of data:
Reply from 72.246.234.230: bytes=32 time=3ms TTL=53
Reply from 72.246.234.230: bytes=32 time=2ms TTL=53
Reply from 72.246.234.230: bytes=32 time=2ms TTL=53
Reply from 72.246.234.230: bytes=32 time=2ms TTL=53

Ping statistics for 72.246.234.230:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 3ms, Average = 2ms
```

Figure 1 shows the results of pinging

After testing the connectivity of the internet, we are going to use the traceroute (or tracert) tool to examine the internet pathway to www.cisco.com by typing “tracert www.cisco.com’’ at the command-line prompt.

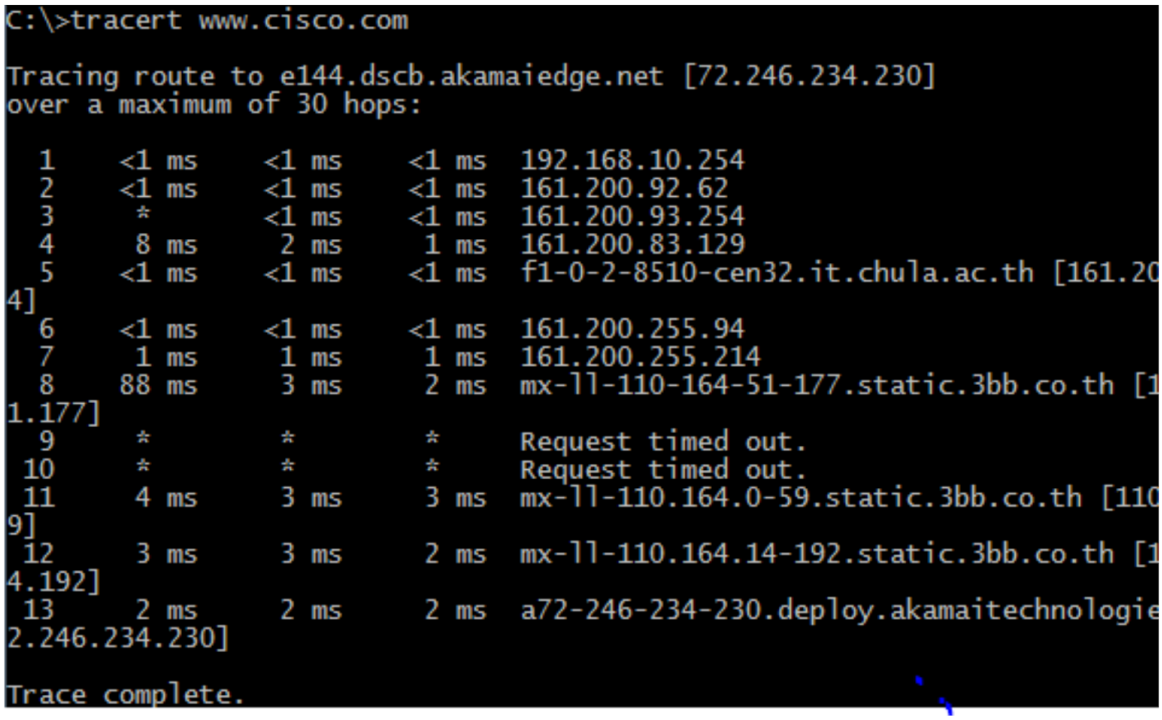

Figure 2 shows a traceroute results

Results and Discussion

Because computers talk in numbers, rather than words, routers are uniquely identified using IP addresses (numbers with the format x.x.x.x). The tracert tool shows you what path through the network a packet of information takes to reach its final destination. The tracert tool also gives you an idea of how fast traffic is going on each segment of the network. Three packets are sent to each router in the path, and the return time is measured in milliseconds. Now use this information to analyze the tracert results to www.cisco.com. Fig. 3 below is the entire traceroute result explanation.

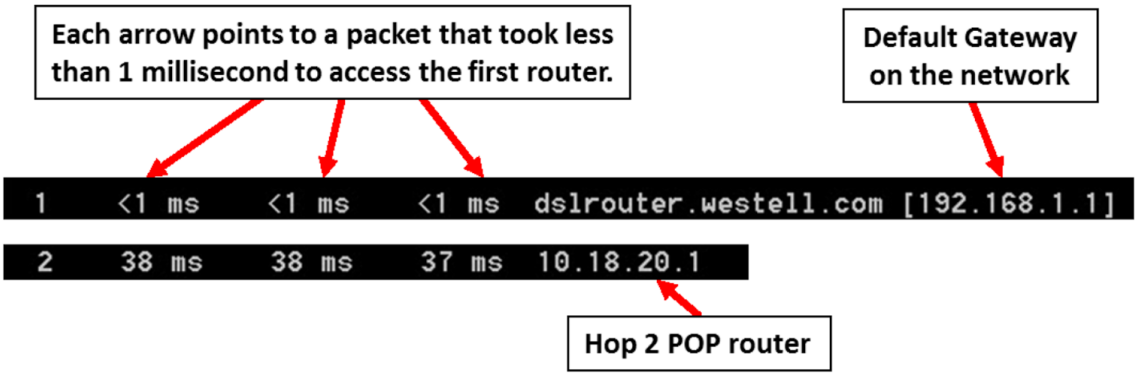

Figure 3 shows results meaning in each part

In the example output shown in Figure 3, the tracert packets travel from the source PC to the local router default gateway (hop 1: 192.168.1.1) and then to the ISPs Point of Presence (POP) router (hop 2: 10.18.20.1). Every ISP has numerous POP routers. These POP routers are at the edge of the ISP's network and are the means by which customers connect to the Internet. The packets travel along the Verizon network for two hops and then jump to a router that belongs to alter.net. This could mean that the packets have traveled to another ISP. This is significant because sometimes there is packet loss in the transition between ISPs, or sometimes one ISP is slower than another.

Next is to determine if alter.net is another ISP or the same ISP. To answer this question, the other internet tool called whois is used, the whois tool allows us to determine who owns a domain name. A web-based whois tool is found at http://whois.domaintools.com/. This domain is also owned by Verizon according to the web-based whois tool result shown in Fig. 4 below.

```
Registrant:
        Verizon Business Global LLC
        Verizon Business Global LLC
        One Verizon Way
         Basking Ridge NJ 07920
        US
         domainlegalcontact@verizon.com +1.7033513164 Fax: +1.7033513669

    Domain Name: alter.net
```

Figure 4 shows the whois results

After gathering all of these information, we can conclude that if we want to connect to cisco web server, the first computer has to send the request in packet format through the router and then router will pass the packets through the local ISP which is Chulalongkorn University. Then, the main router of local ISP will pass packets to the Country ISP which is 3BB in this lab. After that, the Country ISP will find the shortest path to travel from Thailand to United States of America, the destination country. The country ISP (USA) will find where cisco web server is and pass the packet request to that exact server. After the cisco server receive a request packet, it will send back the data to the request computer through the same path but in the opposite direction.

Conclusions

This study examines the internet pathway to the destination networks by using traceroute (or tracert) tool**.** From the results, the experiment shows that we can see how internet packet is traversed to the destination by traversing through the internet service provider (ISP) from local ISP to the country ISP then through the global ISP. At this point, the packet is already in another country and the country ISP will also do its job by passing the packet to the right way until it reaches the target destination. Once it reaches, it will travel back. This study is an evidence to prove that the internet is larger and more complex than we thought. It is the result of combining many parts of software and hardware to work together with accepted protocol or methodology.

References

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Microsoft Corporation. (2008, Oct 23). *How to Use TRACERT to Troubleshoot TCP/IP Problems in Windows*. [Online]. Available: https://support.microsoft.com/en-us/help/314868/how-to-use-tracert-to-troubleshoot-tcp-ip-problems-in-windows

Appendix

a) How to enter command-line-promp console

From your PC, click the Windows Start icon, type cmd in the Search programs and files box, and then press Enter.

Figure 7 shows cmd word in search box