University of Sydney

ELEC3506 Data Communications and Internet – Lab Report 3

Mengzhen Chen 480462613

Gaurav Agarwal 470404557

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Introduction

In the first experiment, we investigate the behavior of the TCP protocol by analyzing traces of TCP segments sent and received when a 150KB file is transferred to a remote server. In Lab 2, we explored HTTP by downloading an HTML file.

Phase I: Transmission Control Protocol (TCP)

I.1 A First Look at the Captured Trace

In the experiment, the IP address used by the client computer is: xx and the TCP port number is: xxx to transfer the file to gaia.umass.edu. The IP address of gaia.umass.edu is the TCP segment that sends and accepts this connection on port number xx, the IP address used by the client computer (source) to transfer the file to gaia.cs.umass.edu is xx, TCP port number is xx

I.2 TCP Basics

I.3 TCP Congestion Control in Action

Phase II: Hypertext Transfer Protocol(HTTP)

II.1The Basic HTTP GET/Response Interaction

My browser is running HTTP version 1.1, the server is running HTTP version 1.1, the browser said it can accept the server language is Chinese, the IP address of my computer is 192.168.0.27, Gaia.cs.umass.edu The address of the server is 128.119.245.12, the status code returned from the server to the browser is 200, the last HTML file modified on the server is 24 OCT 2022 05:59:02 GMT, there are 128 bytes of content returned to the browser device.The following figure is the result graph of request and response.

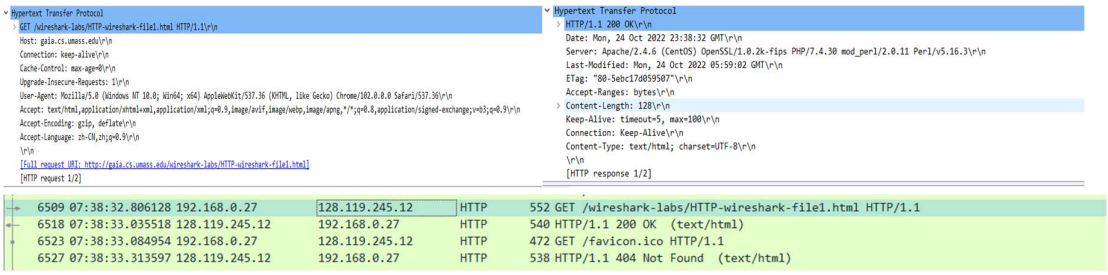

figure1 The result graph of request and response

II.2 The HTTP CONDITIONAL GET/Response Interaction

The "IF-MODIFIED-SINCE" line is not visible in the content of the first HTTP GET request from the browser to the server. The contents of the returned file are specified in the server. The first time a file is requested from the server(Figure 2), the server sends the content to the browser. In the content of the second HTTP GET request(Figure 3), I see the line "IF-MODIFIED-SINCE" in the HTTP GET, which shows the last modification time . For this HTTP status code and phrase returned from the server is not modified. The server did not return the content, because the cache has already stored the file in the first HTTP GET.

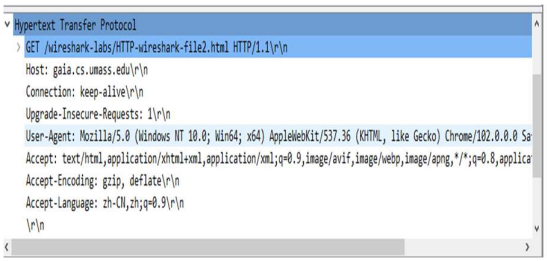

Figure2 First GET request

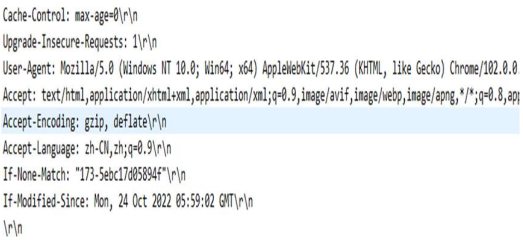

Figure3 Second GET request

II.3 Retrieving Long Documents

The browser sent 1 HTTP GET request message, 45, 46, 47, 49 packets containing the GET message. Packet 40 in the trace contains the status code and phrase related to the response to the HTTP GET request, the status code in the reply is 200, phrase is HTTP/1.1 200 OK\r\n(Figure 4), 4 TCP segments containing data are required to carry a single HTTP Reply and the text of the Bill of Rights(Figure 5).

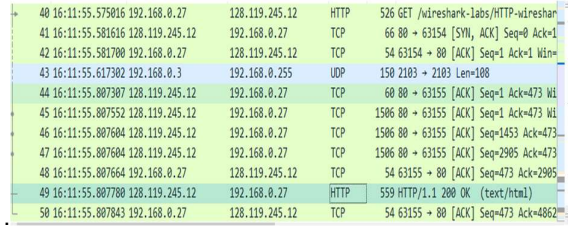

Figure4 All the packet

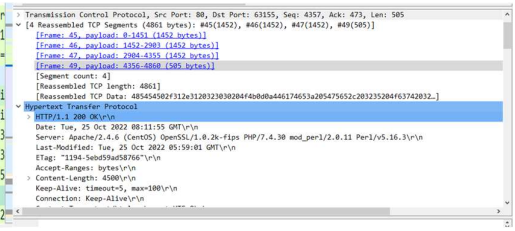

Figure5 Respond messages

II.4 HTML Documents with Embedded Objects

My browser sent two HTTP GETs to 128.119.245.12/178.79.137.69 and the browser downloaded the two images consecutively because the two images were transmitted over two TCP connections(Figure6).

No.	Time	Source	Destination	Protocol	Length	Info
36	0.001066	192.168.128.69	128.119.245.12	HTTP	568	GET /wireshark-labs/HTTP-wireshark-fil
40	0.000002	128.119.245.12	192.168.128.69	HTTP	1367	HTTP/1.1 200 OK (text/html)
44	0.035744	192.168.128.69	128.119.245.12	HTTP	514	GET /pearson.png HTTP/1.1
50	0.000307	192.168.128.69	178.79.137.164	HTTP	481	GET /8E_cover_small.jpg HTTP/1.1
53	0.000004	128.119.245.12	192.168.128.69	HTTP	781	HTTP/1.1 200 OK (PNG)

Figure6 HTTP packets

II.5 HTTP Authentication

The server's response to the initial HTTP GET message from the browser is 401 HTTP/1.1 401 Unauthorized (text/html). When the browser sends the HTTP GET message for the second time, the HTTP GET message contains the Authorization field(Figure7).

```
> Authorization: Basic d2lyZXNoYXJrLXN0dWRlbnRzOm5ldHdvcms=\r\n
  Upgrade-Insecure-Requests: 1\r\n
  User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/102.0.0.0 Sa
  Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,applica
  Accept-Encoding: gzip, deflate\r\n
  Accept-Language: zh-CN,zh;q=0.9\r\n
  \r\n
  [Full request URI: http://gaia.cs.umass.edu/wireshark-labs/protected_pages/HTTP-wireshark-file5.html]
  [HTTP request 1/1]
```

Figure7 second GET message

Conclusion and Contribution

From lab 3 , we learn the basic principle of how data go through the router and finally find out the complete route of data transfer by using traceroute. Then we use same method to analyse IP datagram. And find out the detail information of each packets.

As for this lab , Qi Liu is responsible for phase 1, and Ryan responsible for Phase 2, and Yingcong Cui conclude all the experiments results and write the report. Every one has 33.3% contribution to this lab.