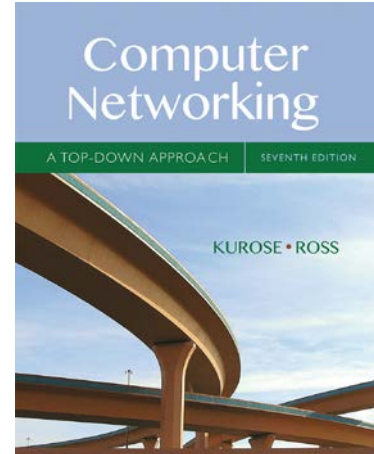


Wireshark Lab: SSL v7.0

Supplement to *Computer Networking: A Top-Down Approach*, 7th ed., J.F. Kurose and K.W. Ross

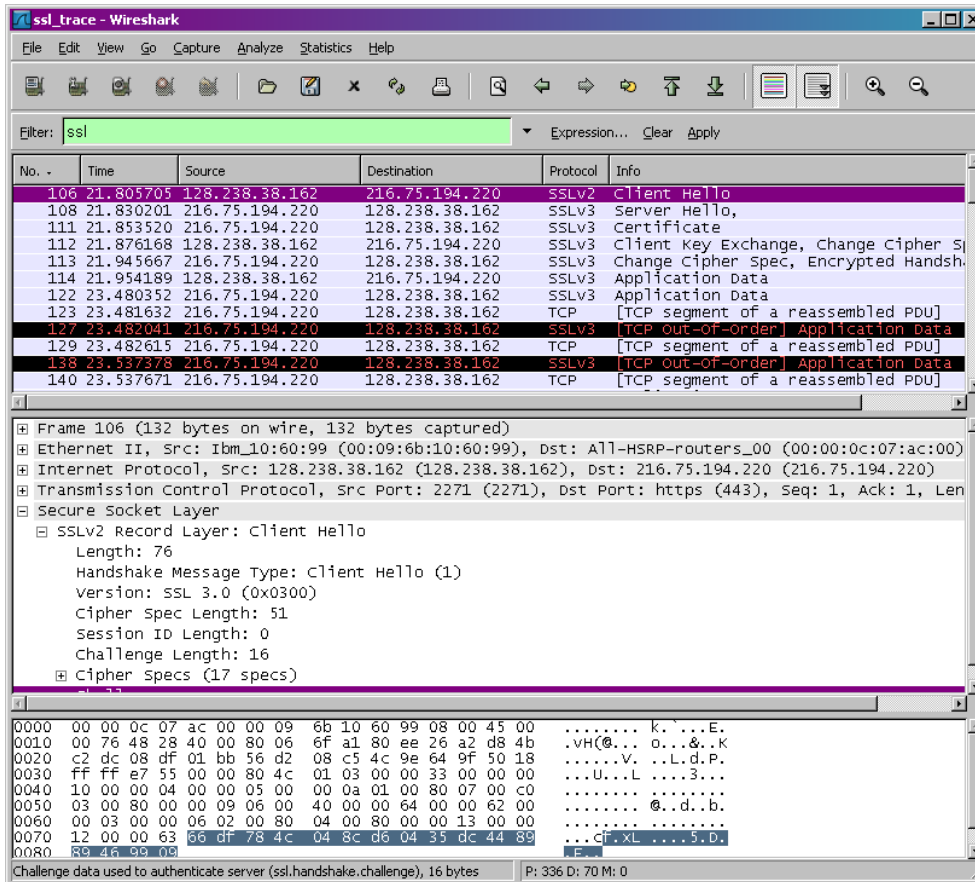
“Tell me and I forget. Show me and I remember. Involve me and I understand.” Chinese proverb

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In this lab, we'll investigate the Secure Sockets Layer (SSL) protocol, focusing on the SSL records sent over a TCP connection. We'll do so by analyzing a trace of the SSL records sent between your host and an e-commerce server. We'll investigate the various SSL record types as well as the fields in the SSL messages. You may want to review Section 8.6 in the text.¹

¹ References to figures and sections are for the 7th edition of our text, *Computer Networks, A Top-down Approach*, 7th ed., J.F. Kurose and K.W. Ross, Addison-Wesley/Pearson, 2016.



1. Capturing packets in an SSL session

The first step is to capture the packets in an SSL session. To do this, you should go to your favorite e-commerce site and begin the process of purchasing an item (but terminating before making the actual purchase!). After capturing the packets with Wireshark, you should set the filter so that it displays only the Ethernet frames that contain SSL records sent from and received by your host. (An SSL record is the same thing as an SSL message.) You should obtain something like screenshot on the previous page.

2. A look at the captured trace

Your Wireshark GUI should be displaying only the Ethernet frames that have SSL records. It is important to keep in mind that an Ethernet frame may contain one or more SSL records. (This is very different from HTTP, for which each frame contains either one complete HTTP message or a portion of a HTTP message.) Also, an SSL record may not completely fit into an Ethernet frame, in which case multiple frames will be needed to carry the record.

When answering a question below, you should hand in a printout or screen capture of the packet(s) within the trace that you used to answer the question asked. Annotate the screen capture to explain your answer. Instead of a screen capture, you can use *File->Print*, choose *Selected packet only*, choose *Packet summary line*, and select the packet detail that you need to answer the question.

1. For each of the first 8 Ethernet frames, specify the source of the frame (client or server), determine the number of SSL records that are included in the frame, and list the SSL record types that are included in the frame. Draw a timing diagram between client and server, with one arrow for each SSL record.

ClientHello Record:

2. Expand the ClientHello record. (If your trace contains multiple ClientHello records, expand the frame that contains the first one.) What is the value of the content type?
3. Does the ClientHello record contain a nonce (also known as a “challenge”)? If so, what is the value of the challenge in hexadecimal notation?
4. Does the ClientHello record advertise the cyber suites it supports? If so, in the first listed suite, what are the public-key algorithm, the symmetric-key algorithm, and the hash algorithm?

ServerHello Record:

5. Locate the ServerHello SSL record. Does this record specify a chosen cipher suite? What are the algorithms in the chosen cipher suite?

Application Data

6. Do the records containing application data include a MAC? Does Wireshark distinguish between the encrypted application data and the MAC?

Submit your assignment on ELMS before class on the date indicated in the syllabus.