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CST 311
Lab 5
June 1, 2015

No.	Time	Source	Destination
Protocol Length Info			
4	06:44:20.596858	192.168.1.102	128.119.245.12
619	[TCP segment of a reassembled PDU]		

TCP

Frame 4: 619 bytes on wire (4952 bits), 619 bytes captured (4952 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst:
LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst:
128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80),
Seq: 1, Ack: 1, Len: 565
Source Port: 1161 (1161)
Destination Port: 80 (80)
[Stream index: 0]
[TCP Segment Len: 565]
Sequence number: 1 (relative sequence number)
[Next sequence number: 566 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
Header Length: 20 bytes
.... 0000 0001 1000 = Flags: 0x018 (PSH, ACK)
000. = Reserved: Not set
...0 = Nonce: Not set
.... 0... = Congestion Window Reduced (CWR): Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... 1... = Push: Set
....0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x1fbd [validation disabled]
Urgent pointer: 0
[SEQ/ACK analysis]
TCP segment data (565 bytes)

1. 192.168.1.102; 1161
2. 128.119.245.12; 80

No.	Time	Source	Destination
Protocol Length Info			
34	18:13:30.879578000	10.0.0.10	128.119.245.12
1514	[TCP segment of a reassembled PDU]		

TCP

Frame 34: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface 0
Ethernet II, Src: LiteonTe_al:7d:de (ac:b5:7d:a1:7d:de), Dst: Netgear_c7:80:e8 (00:22:3f:c7:80:e8)
Internet Protocol Version 4, Src: 10.0.0.10 (10.0.0.10), Dst: 128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 50093 (50093), Dst Port: 80 (80), Seq: 614, Ack: 1, Len: 1460

3. 10.0.0.10; 50093

No.	Time	Source	Destination
Protocol Length Info			
1	06:44:20.570381	192.168.1.102	128.119.245.12
62	1161→80 [SYN]	Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1	TCP

Frame 1: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst: 128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80), Seq: 0, Len: 0

Source Port: 1161 (1161)
Destination Port: 80 (80)
[Stream index: 0]
[TCP Segment Len: 0]
Sequence number: 0 (relative sequence number)
Acknowledgment number: 0
Header Length: 28 bytes

.... 0000 0000 0010 = Flags: 0x002 (SYN)
000. = Reserved: Not set
...0 = Nonce: Not set
.... 0... = Congestion Window Reduced (CWR): Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...0 = Acknowledgment: Not set
.... 0... = Push: Not set
....0.. = Reset: Not set
....1. = Syn: Set
....0 = Fin: Not set

Window size value: 16384
[Calculated window size: 16384]
Checksum: 0xf6e9 [validation disabled]
Urgent pointer: 0
Options: (8 bytes), Maximum segment size, No-Operation (NOP), No-Operation (NOP), SACK permitted

4. 0; The SYN flag is set

No.	Time	Source	Destination
Protocol Length Info			
2	06:44:20.593553	128.119.245.12	192.168.1.102 TCP
62	80→1161 [SYN, ACK]	Seq=0 Ack=1 Win=5840 Len=0 MSS=1460 SACK_PERM=1	

Frame 2: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)
Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: Actionte_8a:70:1a (00:20:e0:8a:70:1a)
Internet Protocol Version 4, Src: 128.119.245.12 (128.119.245.12), Dst: 192.168.1.102 (192.168.1.102)
Transmission Control Protocol, Src Port: 80 (80), Dst Port: 1161 (1161), Seq: 0, Ack: 1, Len: 0
Source Port: 80 (80)
Destination Port: 1161 (1161)
[Stream index: 0]
[TCP Segment Len: 0]
Sequence number: 0 (relative sequence number)
Acknowledgment number: 1 (relative ack number)
Header Length: 28 bytes
.... 0000 0001 0010 = Flags: 0x012 (SYN, ACK)
000. = Reserved: Not set
...0 = Nonce: Not set
.... 0... = Congestion Window Reduced (CWR): Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... 0... = Push: Not set
....0.. = Reset: Not set
....1. = Syn: Set
....0 = Fin: Not set
Window size value: 5840
[Calculated window size: 5840]
Checksum: 0x774d [validation disabled]
Urgent pointer: 0
Options: (8 bytes), Maximum segment size, No-Operation (NOP), No-Operation (NOP), SACK permitted
[SEQ/ACK analysis]

5. 0; 1; the next number after the sequence number sent by the client; acknowledgement flag is set

No.	Time	Source	Destination
Protocol Length Info			
4	06:44:20.596858	192.168.1.102	128.119.245.12 TCP
619	[TCP segment of a reassembled PDU]		

Frame 4: 619 bytes on wire (4952 bits), 619 bytes captured (4952 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst: 128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80), Seq: 1, Ack: 1, Len: 565
Source Port: 1161 (1161)

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Destination Port: 80 (80)
[Stream index: 0]
[TCP Segment Len: 565]
Sequence number: 1 (relative sequence number)
[Next sequence number: 566 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
Header Length: 20 bytes
.... 0000 0001 1000 = Flags: 0x018 (PSH, ACK)
    000. .... .... = Reserved: Not set
    ...0 .... .... = Nonce: Not set
    .... 0... .... = Congestion Window Reduced (CWR): Not set
    .... .0.. .... = ECN-Echo: Not set
    .... ..0. .... = Urgent: Not set
    .... ...1 .... = Acknowledgment: Set
    .... .... 1... = Push: Set
    .... .... .0.. = Reset: Not set
    .... .... ..0. = Syn: Not set
    .... .... ...0 = Fin: Not set
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x1fbd [validation disabled]
Urgent pointer: 0
[SEQ/ACK analysis]
TCP segment data (565 bytes)

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No.	Time	Source	Destination	Protocol	Length	Info
5	06:44:20.612118	192.168.1.102	128.119.245.12	TCP		
1514		[TCP segment of a reassembled PDU]				

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Frame 5: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst:
LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst:
128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80),
Seq: 566, Ack: 1, Len: 1460
    Source Port: 1161 (1161)
    Destination Port: 80 (80)
    [Stream index: 0]
    [TCP Segment Len: 1460]
    Sequence number: 566 (relative sequence number)
    [Next sequence number: 2026 (relative sequence number)]
    Acknowledgment number: 1 (relative ack number)
    Header Length: 20 bytes
    .... 0000 0001 1000 = Flags: 0x018 (PSH, ACK)
        000. .... .... = Reserved: Not set
        ...0 .... .... = Nonce: Not set
        .... 0... .... = Congestion Window Reduced (CWR): Not set
        .... .0.. .... = ECN-Echo: Not set
        .... ..0. .... = Urgent: Not set
        .... ...1 .... = Acknowledgment: Set
        .... .... 1... = Push: Set

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..... .0.. = Reset: Not set
..... ..0. = Syn: Not set
..... ...0 = Fin: Not set
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x3be5 [validation disabled]
Urgent pointer: 0
[SEQ/ACK analysis]
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)

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No.	Time	Source	Destination	Protocol	Length	Info
7	06:44:20.624407	192.168.1.102	128.119.245.12	TCP		
1514		[TCP segment of a reassembled PDU]				

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Frame 7: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst:
LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst:
128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80),
Seq: 2026, Ack: 1, Len: 1460
Source Port: 1161 (1161)
Destination Port: 80 (80)
[Stream index: 0]
[TCP Segment Len: 1460]
Sequence number: 2026 (relative sequence number)
[Next sequence number: 3486 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
Header Length: 20 bytes
.... 0000 0001 0000 = Flags: 0x010 (ACK)
000. .... = Reserved: Not set
...0 .... = Nonce: Not set
.... 0... = Congestion Window Reduced (CWR): Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... .... 0... = Push: Not set
.... .... .0.. = Reset: Not set
.... .... ..0. = Syn: Not set
.... .... ...0 = Fin: Not set
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0xb98e [validation disabled]
Urgent pointer: 0
[SEQ/ACK analysis]
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)

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No.	Time	Source	Destination	Protocol	Length	Info
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8 06:44:20.625071 192.168.1.102 128.119.245.12 TCP
1514 [TCP segment of a reassembled PDU]

Frame 8: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst:
LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst:
128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80),
Seq: 3486, Ack: 1, Len: 1460
Source Port: 1161 (1161)
Destination Port: 80 (80)
[Stream index: 0]
[TCP Segment Len: 1460]
Sequence number: 3486 (relative sequence number)
[Next sequence number: 4946 (relative sequence number)]
Acknowledgment number: 1 (relative ack number)
Header Length: 20 bytes
.... 0000 0001 0000 = Flags: 0x010 (ACK)
000. = Reserved: Not set
...0 = Nonce: Not set
.... 0... = Congestion Window Reduced (CWR): Not set
.... .0.. = ECN-Echo: Not set
.... ..0. = Urgent: Not set
.... ...1 = Acknowledgment: Set
.... 0... = Push: Not set
....0.. = Reset: Not set
....0. = Syn: Not set
....0 = Fin: Not set
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0xdd01 [validation disabled]
Urgent pointer: 0
[SEQ/ACK analysis]
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)

No.	Time	Source	Destination
Protocol Length Info			
10	06:44:20.647786	192.168.1.102	128.119.245.12
1514			TCP
			[TCP segment of a reassembled PDU]

Frame 10: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst:
LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst:
128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80),
Seq: 4946, Ack: 1, Len: 1460
Source Port: 1161 (1161)
Destination Port: 80 (80)
[Stream index: 0]

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[TCP Segment Len: 1460]
Sequence number: 4946      (relative sequence number)
[Next sequence number: 6406      (relative sequence number)]
Acknowledgment number: 1      (relative ack number)
Header Length: 20 bytes
.... 0000 0001 0000 = Flags: 0x010 (ACK)
    000. .... .... = Reserved: Not set
    ...0 .... .... = Nonce: Not set
    .... 0... .... = Congestion Window Reduced (CWR): Not set
    .... .0.. .... = ECN-Echo: Not set
    .... ..0. .... = Urgent: Not set
    .... ...1 .... = Acknowledgment: Set
    .... .... 0... = Push: Not set
    .... .... .0.. = Reset: Not set
    .... .... ..0. = Syn: Not set
    .... .... ...0 = Fin: Not set
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x908e [validation disabled]
Urgent pointer: 0
[SEQ/ACK analysis]
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)

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No.	Time	Source	Destination	Protocol	Length	Info
11	06:44:20.648538	192.168.1.102	128.119.245.12	TCP		
1514	[TCP segment of a reassembled PDU]					

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Frame 11: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112
bits)
Ethernet II, Src: Actionte_8a:70:1a (00:20:e0:8a:70:1a), Dst:
LinksysG_da:af:73 (00:06:25:da:af:73)
Internet Protocol Version 4, Src: 192.168.1.102 (192.168.1.102), Dst:
128.119.245.12 (128.119.245.12)
Transmission Control Protocol, Src Port: 1161 (1161), Dst Port: 80 (80),
Seq: 6406, Ack: 1, Len: 1460
    Source Port: 1161 (1161)
    Destination Port: 80 (80)
    [Stream index: 0]
    [TCP Segment Len: 1460]
    Sequence number: 6406      (relative sequence number)
    [Next sequence number: 7866      (relative sequence number)]
    Acknowledgment number: 1      (relative ack number)
    Header Length: 20 bytes
    .... 0000 0001 0000 = Flags: 0x010 (ACK)
        000. .... .... = Reserved: Not set
        ...0 .... .... = Nonce: Not set
        .... 0... .... = Congestion Window Reduced (CWR): Not set
        .... .0.. .... = ECN-Echo: Not set
        .... ..0. .... = Urgent: Not set
        .... ...1 .... = Acknowledgment: Set
        .... .... 0... = Push: Not set

```

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..... .0.. = Reset: Not set
..... ..0. = Syn: Not set
..... ...0 = Fin: Not set
Window size value: 17520
[Calculated window size: 17520]
[Window size scaling factor: -2 (no window scaling used)]
Checksum: 0x9583 [validation disabled]
Urgent pointer: 0
[SEQ/ACK analysis]
[Reassembled PDU in frame: 199]
TCP segment data (1460 bytes)

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6. 1

7.

Seq Number	Time Sent	Time Acknowledged	RTT value	Estimated RTT
1	6:44:20:596858	6:44:20:624318	.02746 sec	.02746 sec.
566	6:44:20:612118	6:44:20:647675	.035557 sec	.028472125 sec.
2026	6:44:20:624407	6:44:20:694466	.070059 sec	.033670484375 sec.
3486	6:44:20:625071	6:44:20:739499	.114428 sec	.043765173828125 sec.
4946	6:44:20:647786	6:44:20:787680	.138894 sec	.055656277099609375 sec.
6406	6:44:20:648538	6:44:20:838183	.189645 sec	.055652772590332025

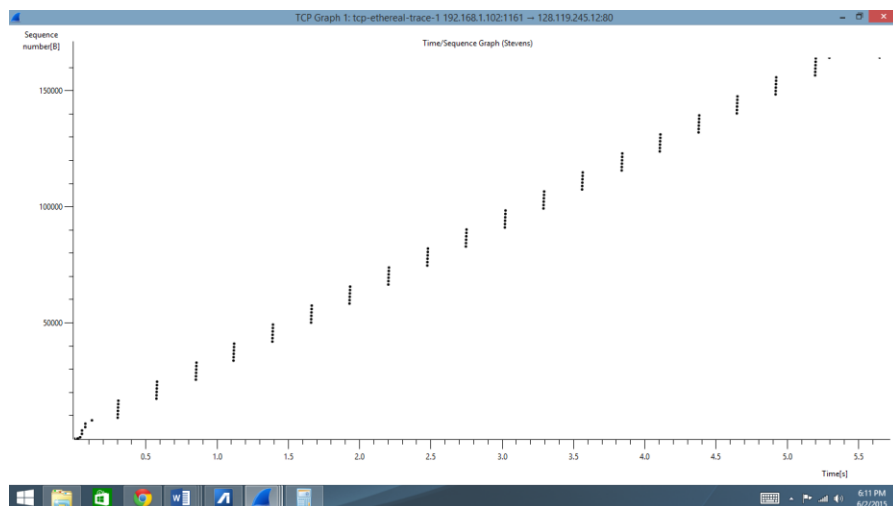
8. 565, 1460, 1460, 1460, 1460

9. 17520; no

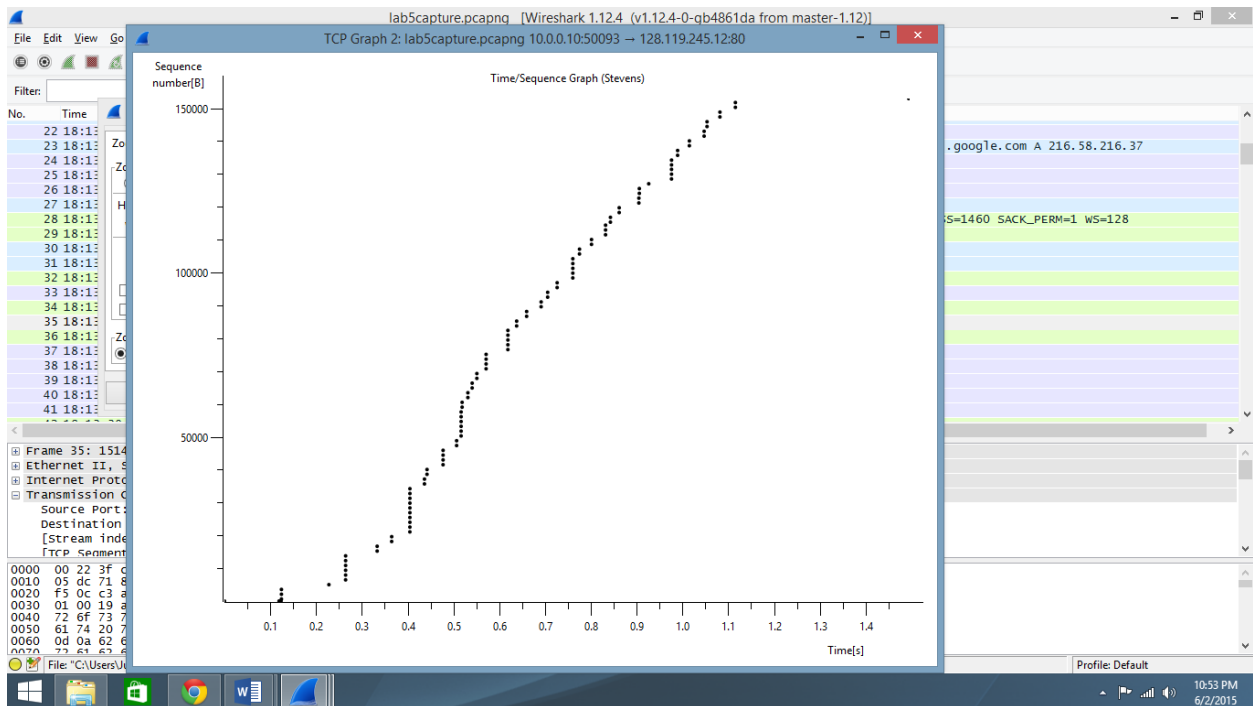
10. no; 3 duplicate acknowledgements or acknowledgements out of sequential order

11. 1460; yes, at the beginning

12. 24726.88 B/sec.; I chose a packet sent and it's corresponding acknowledgement. I added the size of each in bytes and divided by the time it took to accomplish that round trip.



13. I think so; in the slow start phase the shape does not go up perfectly exponentially. It's a little more back and forth.



14. No, I can't tell on this one; The main difference is that the window size seems to vary much more.