

Data Communications Assignment 2

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21359035

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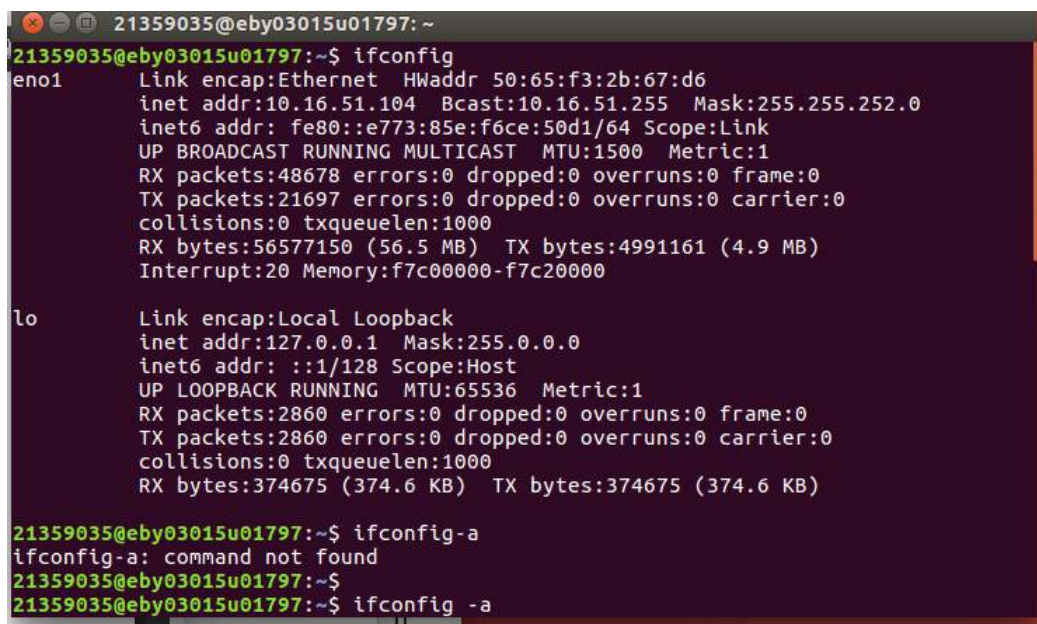
Element 1

This element is about network interfaces which are how the devices are connected to a network, whether they are wired or wireless.

Network interfaces can be detected by using prompts on a computer when the devices which have the interface are connected to a network. There are certain lines of prompts to use to pick up interfaces and have details of them displayed on the computer screen. This section focuses on typing these prompts as commands to find details of available network interfaces.

1.

A1. find out the MAC address and the allocated IP address for the active network interfaces.

A terminal window with a dark background and light text. The prompt is '21359035@eby03015u01797: ~'. The user enters 'ifconfig'. The output shows details for 'eno1' (Ethernet) and 'lo' (Local Loopback). For 'eno1', it lists HWaddr (MAC), inet addr (IP), inet6 addr, MTU, Metric, and statistics. For 'lo', it lists MTU, Metric, and statistics. The user then enters 'ifconfig-a' and 'ifconfig -a', both resulting in 'command not found'.

```
21359035@eby03015u01797: ~  
21359035@eby03015u01797:~$ ifconfig  
eno1      Link encap:Ethernet  HWaddr 50:65:f3:2b:67:d6  
          inet addr:10.16.51.104  Bcast:10.16.51.255  Mask:255.255.252.0  
          inet6 addr: fe80::e773:85e:f6ce:50d1/64  Scope:Link  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
          RX packets:48678  errors:0  dropped:0  overruns:0  frame:0  
          TX packets:21697  errors:0  dropped:0  overruns:0  carrier:0  
          collisions:0 txqueuelen:1000  
          RX bytes:56577150 (56.5 MB)  TX bytes:4991161 (4.9 MB)  
          Interrupt:20  Memory:f7c00000-f7c20000  
  
lo        Link encap:Local Loopback  
          inet addr:127.0.0.1  Mask:255.0.0.0  
          inet6 addr: ::1/128  Scope:Host  
          UP LOOPBACK RUNNING  MTU:65536  Metric:1  
          RX packets:2860  errors:0  dropped:0  overruns:0  frame:0  
          TX packets:2860  errors:0  dropped:0  overruns:0  carrier:0  
          collisions:0 txqueuelen:1000  
          RX bytes:374675 (374.6 KB)  TX bytes:374675 (374.6 KB)  
  
21359035@eby03015u01797:~$ ifconfig-a  
ifconfig-a: command not found  
21359035@eby03015u01797:~$  
21359035@eby03015u01797:~$ ifconfig -a
```

The MAC address is for the active network interface eno1 is 50:65:f3:2b:67:d6 as this is given as the HW address of the interface.

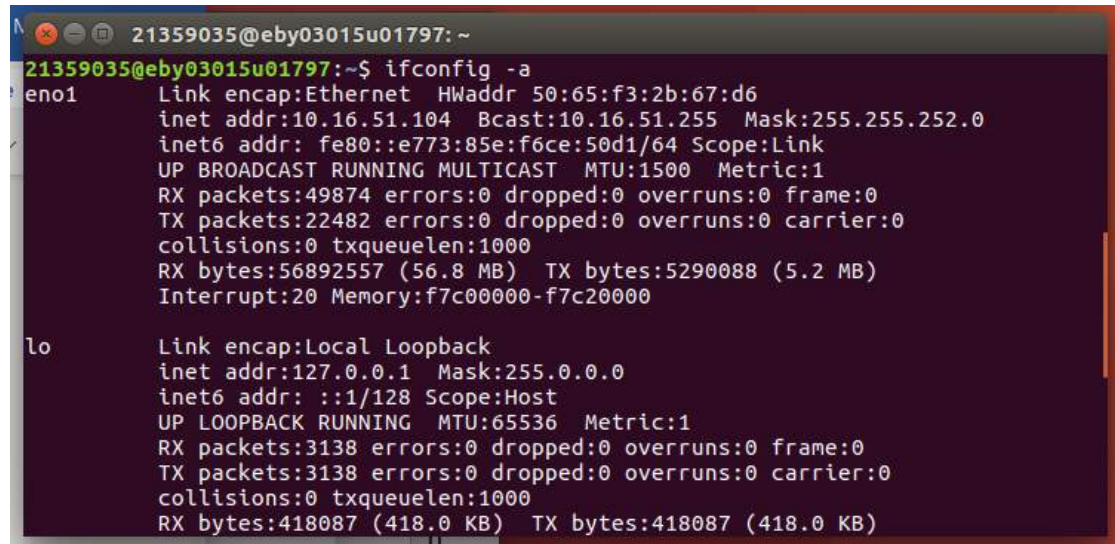
It's broadcast address might also count as the MAC address which is 10.16.51.255.

The allocated IP(Internet Protocol) address for eno1 is the inet address 10.16.51.104 since this is address is just numbers which an IP address usually consists of.

The inet6 address fe80::e773:85e:f6ce:50d1/64 may count as the allocated IP address although the allocated address is usually the first one.

The active network interface lo which is a loopback interface has a Mask address 255.0.0.0 which might also count as a MAC address.

The allocated IP address for lo is the inet address 127.0.0.1 since this is only numbers which an IP address usually consists of.

A terminal window with a dark purple background and white text. The prompt is '21359035@eby03015u01797: ~'. The command 'ifconfig -a' has been executed. The output shows details for two network interfaces: 'eno1' and 'lo'. For 'eno1', it shows an Ethernet link with MAC address 50:65:f3:2b:67:d6, IP address 10.16.51.104, broadcast address 10.16.51.255, and a subnet mask of 255.255.252.0. It also shows various statistics like RX/TX packets, errors, and MTU. For 'lo', it shows a Local Loopback link with IP address 127.0.0.1 and a subnet mask of 255.0.0.0. It also shows statistics for the loopback interface.

```
21359035@eby03015u01797: ~$ ifconfig -a
eno1      Link encap:Ethernet  HWaddr 50:65:f3:2b:67:d6
          inet addr:10.16.51.104  Bcast:10.16.51.255  Mask:255.255.252.0
          inet6 addr: fe80::e773:85e:f6ce:50d1/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:49874 errors:0 dropped:0 overruns:0 frame:0
          TX packets:22482 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:56892557 (56.8 MB)  TX bytes:5290088 (5.2 MB)
          Interrupt:20 Memory:f7c00000-f7c20000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:3138 errors:0 dropped:0 overruns:0 frame:0
          TX packets:3138 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:418087 (418.0 KB)  TX bytes:418087 (418.0 KB)
```

A2: Do you have a loopback interface being showed? If it is, explain

what are loopback interfaces and how they are used

The interface lo is a loopback interface which is being showed. A loopback interface is used to see whether or not a network can send or receive data i.e. in the form of packets using the protocols TCP and IP between devices such as a computer and a server. Loopbacks are also used to test how well the connection between a computer i.e. client and a server is such as when the client communicates with the server to request a web page.

A3:

UP : This keyword when used in the prompt line is used to activate a network interface which is not yet activated or ready for communication.

BROADCAST: This keyword is used for setting a broadcast address to an interface. The address is used as an address of a network so that any device connected to the network receives data in the form of datagrams.

MULTICAST: This is a semantic used by devices that connect devices to a network known as a router. It is used to by a router to route data to other routers on a network to make themselves known to each other on the network. MULTICAST is used to route packets of data to many devices or even many packets to many devices.

MTU: This is the maximum transmission unit used for setting a size limit of packets of data before they are transmitted through an interface at any specific time. It is linked to the Ethernet card.

A6:

A routing table lists the details of data packets being sent and received and where they will be routed to.

Element 2

Intro

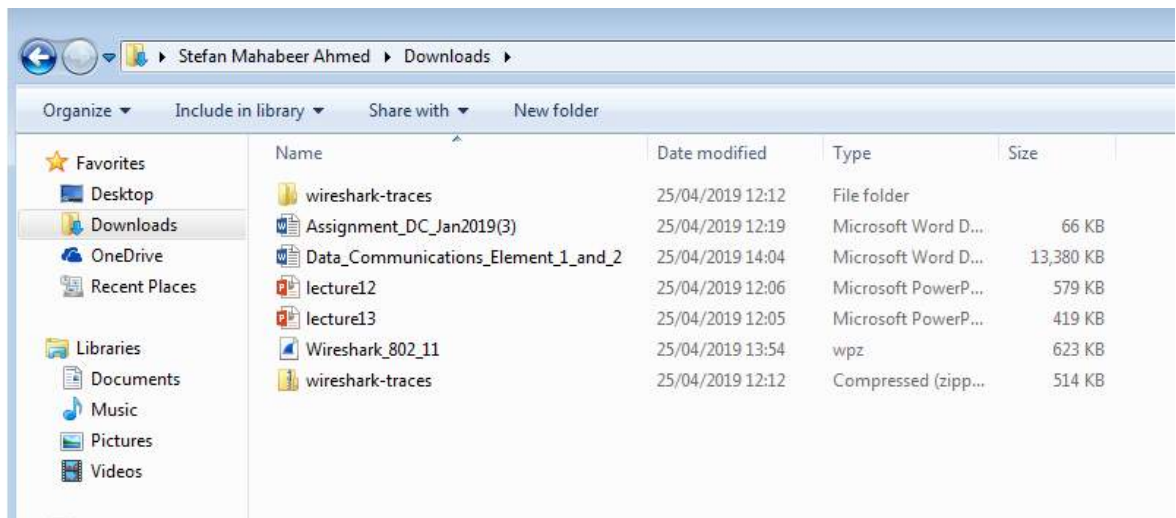
This element of the assignment is about wireless network connections. Devices connected as a network or to a network wirelessly, i.e. without wires. We have the wired network connections where devices are connected using wires and cables such as an Ethernet cable (that looks and works just like a telephone cable) as a network or to a network. This section focuses on wireless network connections working too with wired connections where devices such as computers, mobile phones and servers connect to larger networks through transmitters, devices known as access points and stations known as base stations.

There is the local area network (LAN) being wireless known as 802.11 wireless LAN. This is used for wireless network connectivity and works by sending data to and from devices and access points for wireless connections. Data being sent is in the form of packets and data frames. There are also protocols used to send data between devices. A device has to communicate with a station known as an access point and a router to connect to a larger network such as the internet.

Devices such as computers, mobile phones and servers connect to larger networks such as the internet through access points, stations or base stations and routers. This involves them picking up data from the access points (AP's) or stations and data being sent back and forth between the two. Data being sent back and forth is in the form of frames and protocols being used for the sending.

This section focuses on using the packet sniffing tool Wireshark on the computer to capture data packets during a live wireless network connection and study the captured packets by opening them. The packets captured contain data frames such as beacon frames with details of protocols, addresses, transmission and other necessary information.

1. What are the SSIDs of the two access points that are issuing most of the beacon frames in this trace?



First the downloaded trace file captured using Wireshark packet sniffing tool and Aircap is in stored in the downloads folder and opened from there.

Wireshark_802_11.pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
Apply a display filter ... <Ctrl-/>						
No.	Time	Source	Destination	Protocol	Length	Info
393	19.847780	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3071, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
10	0.294432	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3072, FN=0, Flags=.....C, BI=62, SSID=11\357\277\275\00
394	19.950179	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3072, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
395	20.052584	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3073, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
14	0.499197	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3074, FN=0, Flags=.....C, BI=100, SSID=Linksys12
396	20.154956	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3074, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
397	20.257290	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3075, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
16	0.601687	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3075, FN=0, Flags=.....C, BI=100, SSID=Linksys12
398	20.359743	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3076, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
399	20.462160	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3077, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
400	20.564530	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3078, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
21	1.010949	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3079, FN=0, Flags=.....C, BI=100, SSID=Linksys12
401	20.666931	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3079, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
23	1.113691	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3080, FN=0, Flags=.....C, BI=100, SSID=, \357\277\275nks
406	20.769352	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3080, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
407	20.871729	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3081, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
31	1.215947	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3081, FN=0, Flags=.....C, BI=100, SSID=Linksys12
408	20.974145	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3082, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
34	1.420565	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3083, FN=0, Flags=.....C, BI=20580, SSID=Linksys12
409	21.076548	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3083, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
410	21.178943	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3084, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
411	21.281326	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3085, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
412	21.383741	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3086, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
413	21.486083	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3087, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
414	21.588525	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3088, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
41	2.035064	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3089, FN=0, Flags=.....C, BI=100, SSID=Linksys12
415	21.690804	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3089, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St

Here is the trace file of all the packets that were captured from the wireless network connection. The packets are mostly shown as frames between the devices sending the data. Infact data being sent to and from devices and access points, is in the form off frames know as beacon frames shown in this trace.

No.	Time	Source	Destination	Protocol	Length	Info
393	19.847780	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3071, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
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34	1.420565	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3083, FN=0, Flags=....., BI=20580, SSID=linksys12
409	21.076548	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3083, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
410	21.178943	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3084, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
411	21.281326	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3085, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
412	21.383741	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3086, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
413	21.486083	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3087, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
414	21.588525	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3088, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
41	2.035064	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3089, FN=0, Flags=....., BI=100, SSID=linksys12
415	21.690804	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3089, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St

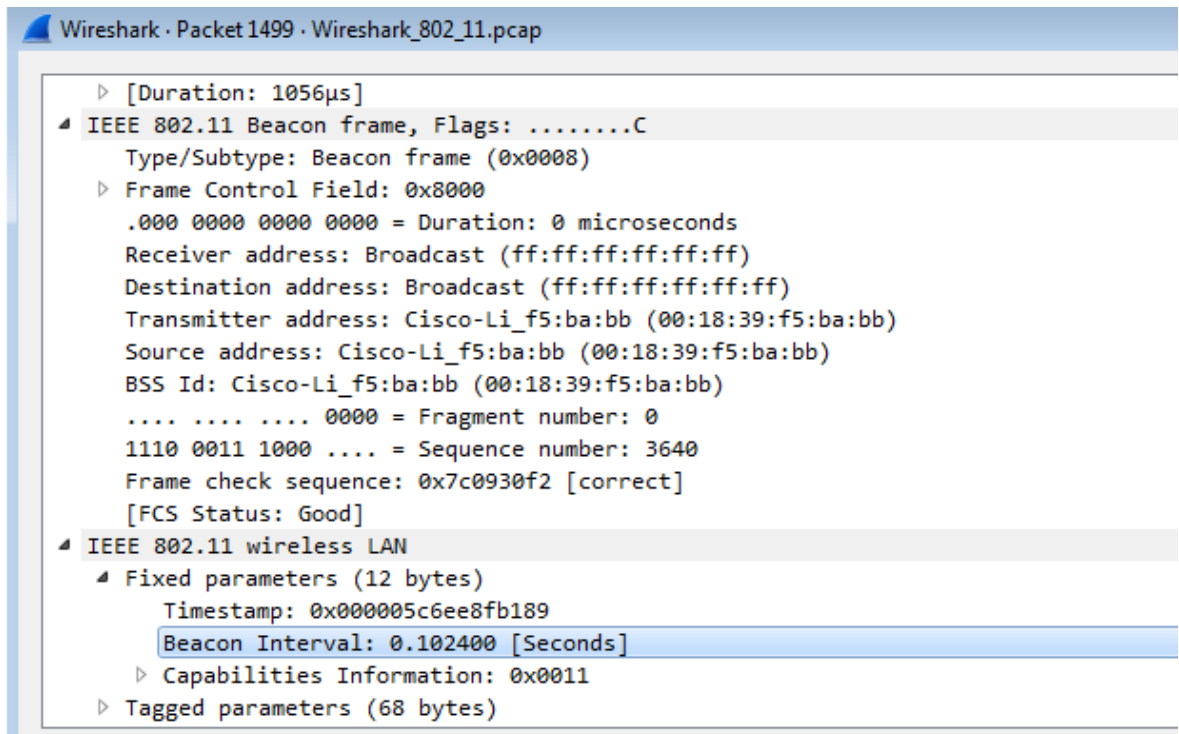
The SSID's of the two access points sending out most of the beacon frames to show they exist are 30 Munroe Street and *Linksys_SES_24086*.

SSID stands for service set identifier – an identifier given to an access point or wireless station to identify it when it shows that it exists and connected to devices such as a computer or mobile phone to connect these devices to a network such as the internet.

2. What are the intervals of time between the transmissions of the beacon frames the linksys_ses_24086 access point? From the 30 Munroe St. access point? (Hint: this interval of time is contained in the beacon frame itself).

No.	Time	Source	Destination	Protocol	Length	Info
1800	52.306984	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3615, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1801	52.409458	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3616, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1802	52.511865	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3617, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1803	52.614237	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3618, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1804	52.716594	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3619, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1809	52.818900	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3620, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1805	56.103885	LinksysG_67:22:94	Broadcast	802.11	90	Beacon frame, SN=3620, FN=0, Flags=....., BI=100, SSID=11\357\277\275\00
1810	52.921323	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3621, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1811	53.023843	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3622, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1812	53.126221	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3623, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1813	53.228606	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3624, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1814	53.330965	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3625, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1815	53.433332	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3626, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1816	53.535729	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3627, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1817	53.638203	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3628, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1818	53.740602	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3629, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1841	53.842947	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3630, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1842	53.945330	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3631, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1843	54.047713	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3632, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1844	54.150184	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3633, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1845	54.252616	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3634, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1846	54.354955	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3635, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1847	54.457361	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3636, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1848	54.559727	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3637, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1849	54.662085	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3638, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1850	54.764476	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3639, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1859	54.866594	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3640, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1499	42.532596	LinksysG_67:22:94	Broadcast	802.11	132	Beacon frame, SN=3640, FN=0, Flags=....., BI=100, SSID=linksys_SES_24086
1868	54.971071	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3641, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1873	55.072697	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3642, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1874	55.174099	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3643, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1513	42.839707	LinksysG_67:22:94	Broadcast	802.11	132	Beacon frame, SN=3643, FN=0, Flags=....., BI=100, SSID=linksys_SES_24086
1875	55.276451	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3644, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1876	55.378829	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3645, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1877	55.481339	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3646, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1878	55.583740	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3647, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St

So here the data has been transmitted in the form of frames which are beacon frames between the access points which takes an amount of time.



The time interval of the transmission of the beacon frames - the linkisys_ses_24086 acCess point from the 30 munroe st access point is 0.102400 seconds. Shown above is this interval itself in the beacon frame in the 802.11 wireless LAN (local area network) section listed as a fixed parameter.

3.What (in hexadecimal notation) is the source MAC address on the beacon frame from 30 Munroe St? Recall from Figure 7.13 in the text that the source, destination, and BSS are three addresses used in an 802.11 frame. For a detailed discussion of the 802.11 frame structure, see section 7 in the IEEE 802.11 standards document (cited above).


```

IEEE 802.11 Beacon frame, Flags: .....C
  Type/Subtype: Beacon frame (0x0008)
  Frame Control Field: 0x8000
    .... ..00 = Version: 0
    .... 00.. = Type: Management frame (0)
    1000 .... = Subtype: 8
    ▷ Flags: 0x00
    .000 0000 0000 0000 = Duration: 0 microseconds
    Receiver address: Broadcast (ff:ff:ff:ff:ff:ff)
    Destination address: Broadcast (ff:ff:ff:ff:ff:ff)
    Transmitter address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
    Source address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
    BSS Id: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
    .... .... 0000 = Fragment number: 0
    1011 0011 0000 .... = Sequence number: 2864
    Frame check sequence: 0x7f8cf5af [correct]
    [FCS Status: Good]
  IEEE 802.11 wireless LAN
    Fixed parameters (12 bytes)
      Timestamp: 0x0000002896488182
      Beacon Interval: 0.102400 [Seconds]
      ▷ Capabilities Information: 0x0601
    Tagged parameters (119 bytes)
      Tagged parameter set: 30 Munroe St
0010 5e 00 00 47 af f5 8c 7f 80 00 00 00 ff ff ff ff ^..G....
0020 ff ff 00 16 b6 f7 1d 51 00 16 b6 f7 1d 51 00 b3 ..Q....
0030 82 81 48 96 28 00 00 00 64 00 01 06 00 0c 33 30 ..H.(...d...30
0040 20 4d 75 6e 72 6f 65 20 53 74 01 04 82 84 8b 96 Munroe St...
0050 03 01 06 05 04 00 01 00 00 07 06 55 53 49 01 0b .....USI..
0060 1a 0c 12 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e .....BC^
0070 00 62 32 2f 00 2a 01 00 32 08 8c 12 98 24 b0 48 .b2/.*. 2...$.H
0080 60 6c dd 15 00 0a f5 0a 02 40 c0 00 03 01 03 05 `l.....@.....
0090 0e 04 ff 00 03 00 11 01 01 dd 18 00 50 f2 02 01 .....P...
00a0 01 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e 00 62 .....BC^b
00b0 32 2f 00 af f5 8c 7f 2/.....

```

The source MAC address on the beacon frame from 30 Munroe St is 00 16 b6 f7 1d 51 in hexadecimal notation. The address is listed in the beacon frame in brackets and at the bottom of the window which shows all the captured packet data in hexadecimal and ascii.

Here a MAC address is used. This address like the internet protocol(IP address) identifies devices used for connections in a network that use a protocol known as medium access control. Hence the MAC address is the medium access control address of the device being used for connection.

4. What (in hexadecimal notation) is the destination MAC address on the beacon frame from 30 Munroe St??

IEEE 802.11 Beacon frame, Flags:C		
Type/Subtype: Beacon frame (0x0008)		
Frame Control Field: 0x8000		
.... ..00 = Version: 0		
.... 00.. = Type: Management frame (0)		
1000 = Subtype: 8		
Flags: 0x00		
.000 0000 0000 0000 = Duration: 0 microseconds		
Receiver address: Broadcast (ff:ff:ff:ff:ff:ff)		
Destination address: Broadcast (ff:ff:ff:ff:ff:ff)		
Transmitter address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)		
Source address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)		
BSS Id: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)		
.... 0000 = Fragment number: 0		
1011 0011 0000 = Sequence number: 2864		
Frame check sequence: 0x7f8cf5af [correct]		
[FCS Status: Good]		
IEEE 802.11 wireless LAN		
Fixed parameters (12 bytes)		
Timestamp: 0x0000002896488182		
Beacon Interval: 0.102400 [Seconds]		
Capabilities Information: 0x0601		
0000	00 00 18 00 ee 58 00 00 10 02 85 09 a0 00 e3 9cX.....
0010	5e 00 00 47 af f5 8c 7f 80 00 00 00 ff ff ff ff	^..G.....
0020	ff ff 00 16 b6 f7 1d 51 00 16 b6 f7 1d 51 00 b3Q.....Q..
0030	82 81 48 96 28 00 00 00 64 00 01 06 00 0c 33 30	..H.(...d....30
0040	20 4d 75 6e 72 6f 65 20 53 74 01 04 82 84 8b 96	Munroe St.....
0050	03 01 06 05 04 00 01 00 00 07 06 55 53 49 01 0bUSI..
0060	1a 0c 12 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e'...BC^
0070	00 62 32 2f 00 2a 01 00 32 08 8c 12 98 24 b0 48	..b2/.*...2....\$..H
0080	60 6c dd 15 00 0a f5 0a 02 40 c0 00 03 01 03 05	`l.....@.....
0090	0e 04 ff 00 03 00 11 01 01 dd 18 00 50 f2 02 01P...
00a0	01 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e 00 62'...BC^..b
00b0	32 2f 00 af f5 8c 7f	2/.....

The destination MAC address on the beacon frame from 30 Munroe St in hexadecimal notation is ff ff ff ff ff ff shown in the beacon frame as a broadcast and at the bottom of the window where the captured packet data is shown in hexadecimal and ascii notation. As it is a broadcast address it is only a pair of letter f's in this notation. This is an Ethernet broadcast.i.e.it was broadcast through the interface of an Ethernet connection.

5. What (in hexadecimal notation) is the MAC BSS id on the beacon frame from 30 Munroe St?

```

IEEE 802.11 Beacon frame, Flags: .....C
  Type/Subtype: Beacon frame (0x0008)
  Frame Control Field: 0x8000
    .... ..00 = Version: 0
    .... 00.. = Type: Management frame (0)
    1000 .... = Subtype: 8
  Flags: 0x00
  .000 0000 0000 0000 = Duration: 0 microseconds
  Receiver address: Broadcast (ff:ff:ff:ff:ff:ff)
  Destination address: Broadcast (ff:ff:ff:ff:ff:ff)
  Transmitter address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
  Source address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
  BSS Id: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
  .... .... 0000 = Fragment number: 0
  1011 0011 0000 .... = Sequence number: 2864
  Frame check sequence: 0x7f8cf5af [correct]
  [FCS Status: Good]
IEEE 802.11 wireless LAN
  Fixed parameters (12 bytes)
    Timestamp: 0x0000002896488182
    Beacon Interval: 0.102400 [Seconds]
  Capabilities Information: 0x0601
0000 00 00 18 00 ee 58 00 00 10 02 85 09 a0 00 e3 9c .....X.....
0010 5e 00 00 47 af f5 8c 7f 80 00 00 00 ff ff ff ff ^..G.....
0020 ff ff 00 16 b6 f7 1d 51 00 16 b6 f7 1d 51 00 b3 .....Q.....
0030 82 81 48 96 28 00 00 00 64 00 01 06 00 0c 33 30 ..H.(...d...30
0040 20 4d 75 6e 72 6f 65 20 53 74 01 04 82 84 8b 96 Munroe St....
0050 03 01 06 05 04 00 01 00 00 07 06 55 53 49 01 0b .....USI..
0060 1a 0c 12 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e .....BC^
0070 00 62 32 2f 00 2a 01 00 32 08 8c 12 98 24 b0 48 .b2/.*. 2...$.H
0080 60 6c dd 15 00 0a f5 0a 02 40 c0 00 03 01 03 05 `l.....@.....
0090 0e 04 ff 00 03 00 11 01 01 dd 18 00 50 f2 02 01 .....P...
00a0 01 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e 00 62 .....BC^b
00b0 32 2f 00 af f5 8c 7f 2/.....

```

The BSS id is the id of the basic service set which is one set of devices connected to a network through an access point or wireless station.

The MAC BSS id on the beacon frame from 30 Munroe St is 00 16 b6 f7 1d 51 in hexadecimal notation as shown in the frame and at the bottom of the window where captured packet data is shown in hexadecimal and Ascii notation.

6. The beacon frames from the 30 Munroe St access point advertise that the access point can support four data rates and eight additional “extended supported rates.” What are these rates?

```

Wireshark · Packet 20 · Wireshark_802_11.pcap

Frame check sequence: 0x7f8cf5af [correct]
[FCS Status: Good]
IEEE 802.11 wireless LAN
  Fixed parameters (12 bytes)
    Timestamp: 0x0000002896488182
    Beacon Interval: 0.102400 [Seconds]
    Capabilities Information: 0x0601
  Tagged parameters (119 bytes)
    Tag: SSID parameter set: 30 Munroe St
    Tag: Supported Rates 1(B), 2(B), 5.5(B), 11(B), [Mbit/sec]
    Tag: DS Parameter set: Current Channel: 6
    Tag: Traffic Indication Map (TIM): DTIM 0 of 0 bitmap
    Tag: Country Information: Country Code US, Environment Indoor
    Tag: EDCA Parameter Set
    Tag: ERP Information
    Tag: Extended Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
    Tag: Vendor Specific: Airgo Networks, Inc.
    Tag: Vendor Specific: Microsoft Corp.: WMM/WME: Parameter Element

0000 00 00 18 00 ee 58 00 00 10 02 85 09 a0 00 e3 9c .....X..
0010 5e 00 00 47 af f5 8c 7f 80 00 00 00 ff ff ff ff ^..G.....
0020 ff ff 00 16 b6 f7 1d 51 00 16 b6 f7 1d 51 00 b3 .....Q.....Q..
0030 82 81 48 96 28 00 00 00 64 00 01 06 00 0c 33 30 ..H.(...d....30
0040 20 4d 75 6e 72 6f 65 20 53 74 01 04 82 84 8b 96 Munroe St....
0050 03 01 06 05 04 00 01 00 00 07 06 55 53 49 01 0b .....USI..
0060 1a 0c 12 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e .....BC^
0070 00 62 32 2f 00 2a 01 00 32 08 8c 12 98 24 b0 48 ..b2/*..2...$.h
0080 60 6c dd 15 00 0a f5 0a 02 40 c0 00 03 01 03 05 ..1.....@.....
0090 0e 04 ff 00 03 00 11 01 01 dd 18 00 50 f2 02 01 .....P...
00a0 01 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e 00 62 .....BC^b
00b0 32 2f 00 af f5 8c 7f 2/.....

```

The supported data rates are parameters in this captured beacon frame. The four data rates are 1, 2, 5.5 and 11 Mbits/sec.

```

Wireshark · Packet 20 · Wireshark_802_11.pcap

1011 0011 0000 .... = Sequence number: 2864
Frame check sequence: 0x7f8cf5af [correct]
[FCS Status: Good]
IEEE 802.11 wireless LAN
  Fixed parameters (12 bytes)
    Timestamp: 0x0000002896488182
    Beacon Interval: 0.102400 [Seconds]
    Capabilities Information: 0x0601
  Tagged parameters (119 bytes)
    Tag: SSID parameter set: 30 Munroe St
    Tag: Supported Rates 1(B), 2(B), 5.5(B), 11(B), [Mbit/sec]
    Tag: DS Parameter set: Current Channel: 6
    Tag: Traffic Indication Map (TIM): DTIM 0 of 0 bitmap
    Tag: Country Information: Country Code US, Environment Indoor
    Tag: EDCA Parameter Set
    Tag: ERP Information
    Tag: Extended Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
    Tag: Vendor Specific: Airgo Networks, Inc.
    Tag: Vendor Specific: Microsoft Corp.: WMM/WME: Parameter Element

0000 00 00 18 00 ee 58 00 00 10 02 85 09 a0 00 e3 9c .....X..
0010 5e 00 00 47 af f5 8c 7f 80 00 00 00 ff ff ff ff ^..G.....
0020 ff ff 00 16 b6 f7 1d 51 00 16 b6 f7 1d 51 00 b3 .....Q.....Q..
0030 82 81 48 96 28 00 00 00 64 00 01 06 00 0c 33 30 ..H.(...d....30
0040 20 4d 75 6e 72 6f 65 20 53 74 01 04 82 84 8b 96 Munroe St....
0050 03 01 06 05 04 00 01 00 00 07 06 55 53 49 01 0b .....USI..
0060 1a 0c 12 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e .....BC^
0070 00 62 32 2f 00 2a 01 00 32 08 8c 12 98 24 b0 48 ..b2/*..2...$.h
0080 60 6c dd 15 00 0a f5 0a 02 40 c0 00 03 01 03 05 ..1.....@.....
0090 0e 04 ff 00 03 00 11 01 01 dd 18 00 50 f2 02 01 .....P...
00a0 01 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e 00 62 .....BC^b
00b0 32 2f 00 af f5 8c 7f 2/.....

```

Eight extra support data rates are 6, 9, 12, 18, 24, 36, 48 and 54 Mbits/sec.

7. Find the 802.11 frame containing the SYN TCP segment for this first TCP session (that downloads alice.txt). What are three MAC address fields in the 802.11 frame? Which MAC address in this frame corresponds to the wireless host (give the hexadecimal representation of the MAC address for the host)? To the access point? To the first-hop router? What is the IP address of the wireless host sending this TCP segment? What is the destination IP address? Does this destination IP address correspond to the host, access point, first-hop router, or some other network-attached device? Explain.

No.	Time	Source	Destination	Protocol	Length	Info
467	24.792793		IntelCor_d1:b6:4f (...	802.11	38	Acknowledgement, Flags=.....C
468	24.795431	Cisco-Li_f7:1d:51	Cisco-Li_f4:eb:e8	802.11	90	Fragmented IEEE 802.11 frame
469	24.795573		Cisco-Li_f7:1d:51 (...	802.11	38	Acknowledgement, Flags=.....C
470	24.795673	192.168.1.109	68.87.71.226	DNS	125	Standard query 0x7892 A gaia.cs.umass.edu
471	24.795769		IntelCor_d1:b6:4f (...	802.11	38	Acknowledgement, Flags=.....C
472	24.809325	68.87.71.226	192.168.1.109	DNS	141	Standard query response 0x7892 A gaia.cs.umass.edu A 128.119.245.12
473	24.809513		Cisco-Li_f7:1d:51 (...	802.11	38	Acknowledgement, Flags=.....C
474	24.811093	192.168.1.109	128.119.245.12	TCP	110	2538 → 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1
475	24.811231		IntelCor_d1:b6:4f (...	802.11	38	Acknowledgement, Flags=.....C
476	24.827751	128.119.245.12	192.168.1.109	TCP	110	80 → 2538 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 SACK_PERM=1
477	24.827922		Cisco-Li_f7:1d:51 (...	802.11	38	Acknowledgement, Flags=.....C
478	24.828024	192.168.1.109	128.119.245.12	TCP	102	2538 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
479	24.828140		IntelCor_d1:b6:4f (...	802.11	38	Acknowledgement, Flags=.....C
480	24.828253	192.168.1.109	128.119.245.12	HTTP	537	GET /wireshark-labs/alice.txt HTTP/1.1
481	24.828352		IntelCor_d1:b6:4f (...	802.11	38	Acknowledgement, Flags=.....C
482	24.846898	128.119.245.12	192.168.1.109	TCP	108	80 → 2538 [ACK] Seq=1 Ack=436 Win=6432 Len=0
483	24.847058		Cisco-Li_f7:1d:51 (...	802.11	38	Acknowledgement, Flags=.....C
484	24.847171	128.119.245.12	192.168.1.109	TCP	108	[TCP Dup ACK 482#1] 80 → 2538 [ACK] Seq=1 Ack=436 Win=6432 Len=0

The frame that used the transport control protocol TCP, which has the SYN segment for this first TCP session starts from packet no.474 as shown in the screenshot above.

<p>Internet Protocol Version 4, Src: 128.119.245.12, Dst: 192.168.1.109</p> <p>0100 = Version: 4</p> <p>.... 0101 = Header Length: 20 bytes (5)</p> <p>Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)</p> <p>Total Length: 48</p> <p>Identification: 0x0000 (0)</p> <p>Flags: 0x4000, Don't fragment</p> <p>Time to live: 49</p> <p>Protocol: TCP (6)</p> <p>Header checksum: 0x122f [validation disabled]</p> <p>[Header checksum status: Unverified]</p> <p>Source: 128.119.245.12</p> <p>Destination: 192.168.1.109</p>
<p>Transmission Control Protocol, Src Port: 80, Dst Port: 2538, Seq: 0, Ack: 1, Len</p> <p>Source Port: 80</p> <p>Destination Port: 2538</p> <p>[Stream index: 0]</p> <p>[TCP Segment Len: 0]</p> <p>Sequence number: 0 (relative sequence number)</p> <p>[Next sequence number: 0 (relative sequence number)]</p> <p>Acknowledgment number: 1 (relative ack number)</p> <p>0111 = Header Length: 28 bytes (7)</p>
<p>Flags: 0x012 (SYN, ACK)</p> <p>000. = Reserved: Not set</p> <p>...0 = Nonce: Not set</p> <p>.... 0... = Congestion Window Reduced (CWR): Not set</p> <p>.... .0.. = ECN-Echo: Not set</p> <p>.... ..0. = Urgent: Not set</p> <p>.... ...1 = Acknowledgment: Set</p> <p>....0... = Push: Not set</p> <p>....0.. = Reset: Not set</p> <p>▷1. = Syn: Set</p> <p>....0 = Fin: Not set</p> <p>[TCP Flags:A..S.]</p> <p>Window size value: 5840</p>

Wireshark · Packet 476 · Wireshark_802_11.pcap

▶ [Duration: 36µs]

IEEE 802.11 QoS Data, Flags: ..mP..F..

Type/Subtype: QoS Data (0x0028)

Frame Control Field: 0x8832

.... ..00 = Version: 0

.... 10.. = Type: Data frame (2)

1000 = Subtype: 8

▶ Flags: 0x32

Duration/ID: 11560 (reserved)

Receiver address: 91:2a:b0:49:b6:4f (91:2a:b0:49:b6:4f)

Transmitter address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)

Destination address: 91:2a:b0:49:b6:4f (91:2a:b0:49:b6:4f)

Source address: Cisco-Li_f4:eb:a8 (00:16:b6:f4:eb:a8)

BSS Id: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)

STA address: 91:2a:b0:49:b6:4f (91:2a:b0:49:b6:4f)

.... 0000 = Fragment number: 0

1100 0011 0100 = Sequence number: 3124

Frame check sequence: 0xecdc407d incorrect, should be 0x94d06e29

▶ [Expert Info (Error/Malformed): Bad checksum [should be 0x94d06e29]]

0000	00 00 18 00 ee 58 00 00 10 6c 85 09 c0 00 da 9cX...·1.....
0010	52 00 00 3e 7d 40 dc ec 88 32 28 ad 91 2a b0 49	R...>}@...·2(.·.*·I
0020	b6 4f 00 16 b6 f7 1d 51 00 16 b6 f4 eb a8 40 c3	·C.....Q.....@·
0030	00 01 aa aa 03 00 00 00 08 00 45 00 00 30 00 00·E·0·
0040	40 00 31 06 12 2f 80 77 f5 0c c0 a8 01 6d 00 50	@·1··/·w.....m·P
0050	09 ea ae 8f de 3f 71 af cd 47 70 12 16 d0 5e a5?q··Gp...^·
0060	00 d0 0d 04 05 b4 01 01 04 02 7d 40 dc ec··}@·

Wireshark · Packet 474 · Wireshark_802_11.pcap

▶ [Duration: 36μs]

■ IEEE 802.11 QoS Data, Flags:TC

Type/Subtype: QoS Data (0x0028)

▶ Frame Control Field: 0x8801

.000 0000 0010 1100 = Duration: 44 microseconds

Receiver address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)

Transmitter address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)

Destination address: Cisco-Li_f4:eb:a8 (00:16:b6:f4:eb:a8)

Source address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)

BSS Id: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)

STA address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)

.... 0000 = Fragment number: 0

0000 0011 0001 = Sequence number: 49

Frame check sequence: 0xad57fce0 [correct]

[FCS Status: Good]

▶ Qos Control: 0x0000

▶ Logical-Link Control

■ Internet Protocol Version 4, Src: 192.168.1.109, Dst: 128.119.245.12

0100 = Version: 4

.... 0101 = Header Length: 20 bytes (5)

▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

Total Length: 48

Identification: 0x1324 (4900)

▶ Flags: 0x4000, Don't fragment

Time to live: 128

Protocol: TCP (6)

Header checksum: 0xb00a [validation disabled]

[Header checksum status: Unverified]

Source: 192.168.1.109

Destination: 128.119.245.12

▶ Transmission Control Protocol, Src Port: 2538, Dst Port: 80, Seq: 0, Len: 0

0000 00 00 18 00 ee 58 00 00 10 60 85 09 c0 00 da 9cX..`.....

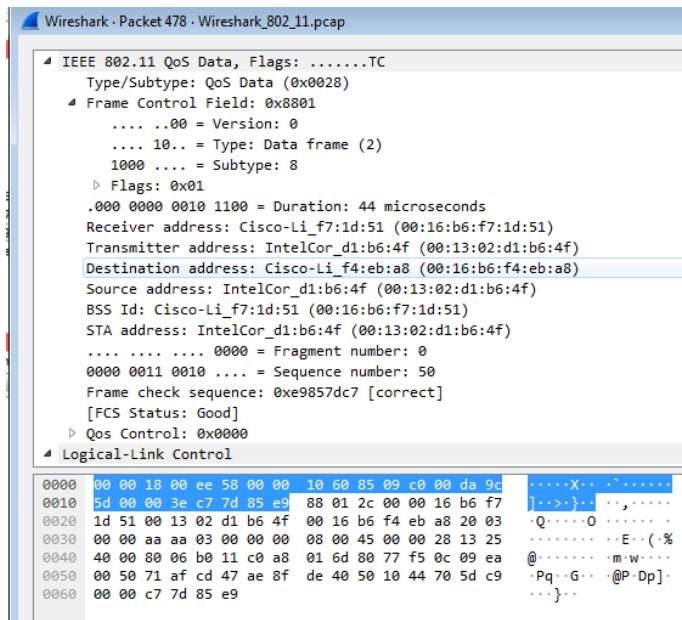
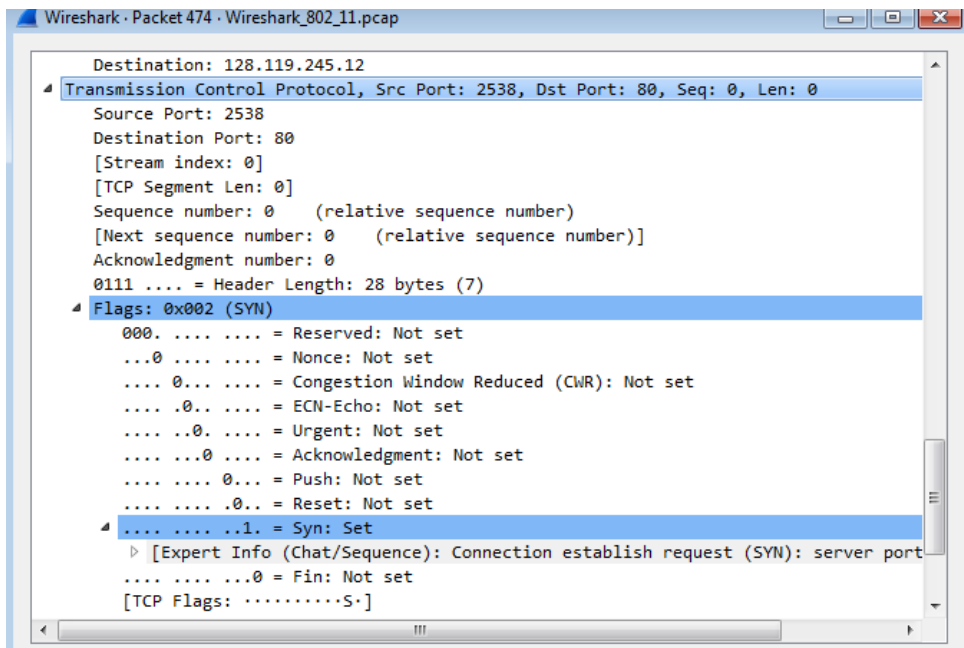
0010 60 00 00 3e e0 fc 57 ad 88 01 2c 00 00 16 b6 f7 `...>..W..,..

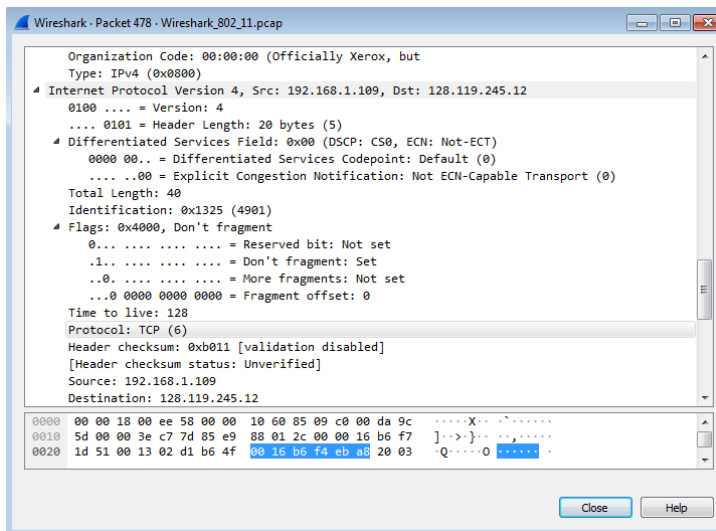
0020 1d 51 00 13 02 d1 b6 4f 00 16 b6 f4 eb a8 10 03 .Q.....O.....

0030 00 00 aa aa 03 00 00 00 08 00 45 00 00 30 13 24E..0..\$

0040 40 00 80 06 b0 0a c0 a8 01 6d 80 77 f5 0c 09 ea @.....m.W....

Close Help

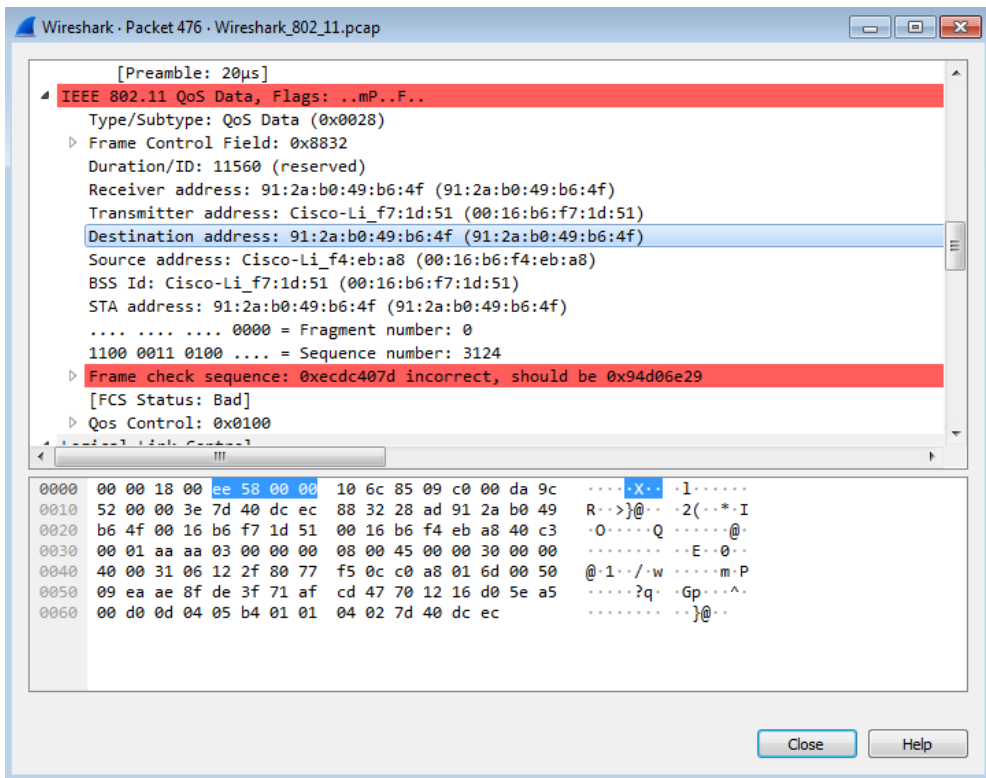
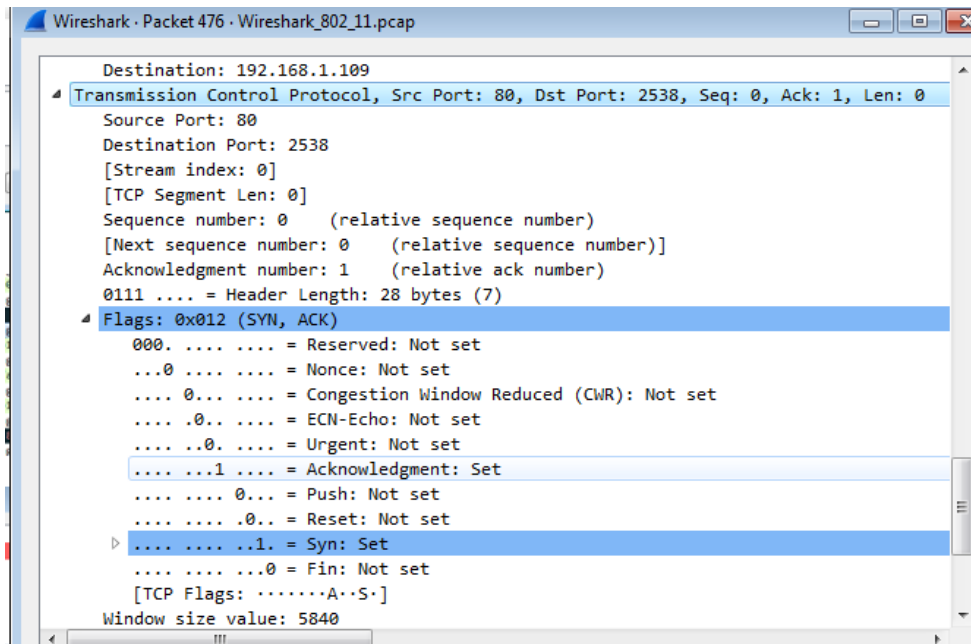




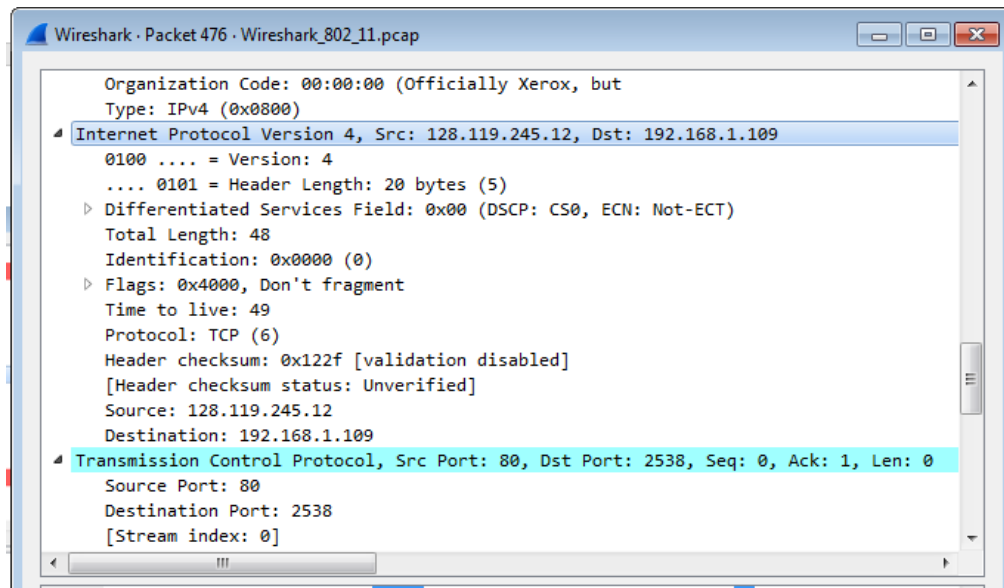
8. Find the 802.11 frame containing the SYNACK segment for this TCP session. What are three MAC address fields in the 802.11 frame? Which MAC address in this frame corresponds to the host? To the access point? To the first-hop router? Does the sender MAC address in the frame correspond to the IP address of the device that sent the TCP segment encapsulated within this datagram? (Hint: review Figure 6.19 in the text if you are unsure of how to answer this question, or the corresponding part of the previous question. It's particularly important that you understand this).

474	24.811093	192.168.1.109	128.119.245.12	TCP	110 2538 → 80 [SYN] Seq=0 Win=16384 Len=0 MSS=1460 SACK_PERM=1
475	24.811231		IntelCor_d1:b6:4f (.. 802.11	38	Acknowledgement, Flags=.....C
476	24.827751	128.119.245.12	192.168.1.109	TCP	110 80 → 2538 [SYN, ACK] Seq=0 Ack=1 Win=5840 Len=0 SACK_PERM=1
477	24.827922		Cisco-Li_f7:1d:51 (.. 802.11	38	Acknowledgement, Flags=.....C
478	24.828024	192.168.1.109	128.119.245.12	TCP	102 2538 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
479	24.828140		IntelCor_d1:b6:4f (.. 802.11	38	Acknowledgement, Flags=.....C
480	24.828253	192.168.1.109	128.119.245.12	HTTP	537 GET /wireshark-labs/alice.txt HTTP/1.1
481	24.828352		IntelCor_d1:b6:4f (.. 802.11	38	Acknowledgement, Flags=.....C
482	24.846898	128.119.245.12	192.168.1.109	TCP	108 80 → 2538 [ACK] Seq=1 Ack=436 Win=6432 Len=0
483	24.847058		Cisco-Li_f7:1d:51 (.. 802.11	38	Acknowledgement, Flags=.....C
484	24.847171	128.119.245.12	192.168.1.109	TCP	108 [TCP Dup ACK 482#1] 80 → 2538 [ACK] Seq=1 Ack=436 Win=6432 Len=0
485	24.847267		Cisco-Li_f7:1d:51 (.. 802.11	38	Acknowledgement, Flags=.....C

In the shot above the frame containing the SYNACK segment for this TCP session is captured at t=24.827751.



The three MAC address fields are the Source address, BSS Id and the Destination address. Source Address is the address of the sender which is MAC address 00:16:b6:f4:eb:a8 which corresponds to the host. The MAC address of the destination is 91:2a:b0:49:b6:4f. The MAC address of the BSS id is 00:16:b6:f7:1d:51.



The IP address of the sender is of the server, holding the live copy of the gaia.cs.umass.edu web page, which is 128.119.245.12. The sender MAC address does not correspond to the IP address of the sender.

9. What two actions are taken (i.e., frames are sent) by the host in the trace just after t=49, to end the association with the 30 Munroe St AP that was initially in place when trace collection began? (Hint: one is an IP-layer action, and one is an 802.11-layer action). Looking at the 802.11 specification, is there another frame that you might have expected to see, but don't see here?

10.

Wireshark_802.11.pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
Apply a display filter ... <Ctrl-/>						
No.	Time	Source	Destination	Protocol	Length	Info
1727	49.429849	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	54	QoS Null function (No data), SN=1603, FN=0, Flags=.....TC
1728	49.430007		IntelCor_d1:b6:4f (...)	802.11	38	Acknowledgement, Flags=.....C
1729	49.440041	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3587, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1730	49.440146	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	54	QoS Null function (No data), SN=1604, FN=0, Flags=...P...TC
1731	49.440243		IntelCor_d1:b6:4f (...)	802.11	38	Acknowledgement, Flags=.....C
1732	49.542481	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3588, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1733	49.583615	192.168.1.109	192.168.1.1	DHCP	390	DHCP Release - Transaction ID 0xea5a526
1734	49.583771		IntelCor_d1:b6:4f (...)	802.11	38	Acknowledgement, Flags=.....C
1735	49.609617	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	54	Deauthentication, SN=1605, FN=0, Flags=.....C
1736	49.609770		IntelCor_d1:b6:4f (...)	802.11	38	Acknowledgement, Flags=.....C
1737	49.614478	IntelCor_d1:b6:4f	Broadcast	802.11	99	Probe Request, SN=1606, FN=0, Flags=.....C, SSID=linksys_SES_24086
1738	49.615869		Cisco-Li_f5:ba:bb (...)	802.11	38	Acknowledgement, Flags=.....C
1739	49.617713		Cisco-Li_f5:ba:bb (...)	802.11	38	Acknowledgement, Flags=.....C
1740	49.638857	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=.....C
1741	49.639700	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1742	49.640702	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1743	49.641910		Cisco-Li_f5:ba:bb (...)	802.11	38	Acknowledgement, Flags=.....C
1744	49.642315	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1745	49.644710	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3589, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1746	49.645319	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1747	49.646711		Cisco-Li_f5:ba:bb (...)	802.11	38	Acknowledgement, Flags=.....C
1748	49.647827		Cisco-Li_f5:ba:bb (...)	802.11	38	Acknowledgement, Flags=.....C
1749	49.649705	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1750	49.651078	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=.....C, SSID=linksys_SES_24086
1751	49.653218	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=....R...C, SSID=linksys_SES_24086
1752	49.662857		Cisco-Li_f5:ba:bb (...)	802.11	38	Acknowledgement, Flags=.....C
1753	49.663950		Cisco-Li_f5:ba:bb (...)	802.11	38	Acknowledgement, Flags=.....C

11. Does the host want the authentication to require a key or be open?

Wireshark_802_11.pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
Apply a display filter ... <Ctrl-/>						
No.	Time	Source	Destination	Protocol	Length	Info
1751	49.653218	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=....R...C, SSID=linksys_SES_24086
1752	49.662857		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1753	49.663950		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1754	49.665704		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1755	49.669072		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1756	49.671321		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1757	49.673449		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1758	49.675028		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1759	49.676576		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1760	49.678737		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1761	49.685228		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1762	49.693106		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1763	49.746105	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	EAPOL	185	Key (Message 2 of 4)
1764	49.747831	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3590, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1765	49.749453	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	EAPOL	185	Key (Message 2 of 4)
1766	49.753595	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	EAPOL	185	Key (Message 2 of 4)
1767	49.849613	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3591, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1768	49.951978	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3592, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1769	50.054362	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3593, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1770	50.156729	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3594, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1771	50.259115	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3595, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1772	50.361455	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3596, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1773	50.463859	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3597, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1774	50.566342	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3598, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1775	50.668724	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3599, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1776	50.750964		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1777	50.752074		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1778	50.753072		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1779	50.754695	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	EAPOL	185	Key (Message 2 of 4)
1780	50.759321		Cisco-Li_f5:ba:bb (.. 802.11	38	Acknowledgement, Flags=.....C	
1781	50.771073	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3600, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St
1782	50.873457	Cisco-Li_f7:1d:51	Broadcast	802.11	183	Beacon frame, SN=3601, FN=0, Flags=.....C, BI=100, SSID=30 Munroe St

There are several key messages after the association so yes the host does want an authentication to have a key.

12. I have looked through the trace from between t=49.638857 and t= 53 and I do not see a reply authentication from linkys_24086 AP .

13.

Wireshark_802_11 (1).pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
wlan.fc.subtype == 11 and wlan.fc.type == 0						
No.	Time	Source	Destination	Protocol	Length	Info
1740	49.638857	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=.....C
1741	49.639700	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1742	49.640702	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1744	49.642315	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1746	49.645319	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1749	49.649705	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1821	53.785833	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1612, FN=0, Flags=.....C
1822	53.787070	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1612, FN=0, Flags=....R...C
1921	57.889232	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=.....C
1922	57.890325	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=....R...C
1923	57.891321	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=....R...C
1924	57.896970	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=....R...C
2122	62.171951	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1644, FN=0, Flags=.....C
2123	62.172946	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1644, FN=0, Flags=....R...C
2124	62.174070	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1644, FN=0, Flags=....R...C
2156	63.168087	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	58	Authentication, SN=1647, FN=0, Flags=.....C
2158	63.169071	Cisco-Li_f7:1d:51	IntelCor_d1:b6:4f	802.11	58	Authentication, SN=3726, FN=0, Flags=.....C
2160	63.169707	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	58	Authentication, SN=1647, FN=0, Flags=....R...C
2164	63.170692	Cisco-Li_f7:1d:51	IntelCor_d1:b6:4f	802.11	58	Authentication, SN=3727, FN=0, Flags=.....C

At the times 63.168087 an authentication frame is sent from the host to the Access Point and at 63.169071 an authentication reply frame is sent from that Access Point.

Wireshark_802.11 (1).pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
wlan.fc.subtype == 11 and wlan.fc.type == 0						
No.	Time	Source	Destination	Protocol	Length	Info
1740	49.638857	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=.....C
1741	49.639700	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1742	49.640702	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1744	49.642315	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1746	49.645319	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1749	49.649705	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=....R...C
1821	53.785833	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1612, FN=0, Flags=.....C
1822	53.787070	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1612, FN=0, Flags=....R...C
1921	57.889232	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=.....C
1922	57.890325	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=....R...C
1923	57.891321	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=....R...C
1924	57.896970	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1619, FN=0, Flags=....R...C
2122	62.171951	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1644, FN=0, Flags=.....C
2123	62.172946	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1644, FN=0, Flags=....R...C
2124	62.174070	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1644, FN=0, Flags=....R...C
2156	63.168087	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	58	Authentication, SN=1647, FN=0, Flags=.....C
2158	63.169071	Cisco-Li_f7:1d:51	IntelCor_d1:b6:4f	802.11	58	Authentication, SN=3726, FN=0, Flags=.....C
2160	63.169707	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	58	Authentication, SN=1647, FN=0, Flags=....R...C
2164	63.170692	Cisco-Li_f7:1d:51	IntelCor_d1:b6:4f	802.11	58	Authentication, SN=3727, FN=0, Flags=.....C

14.

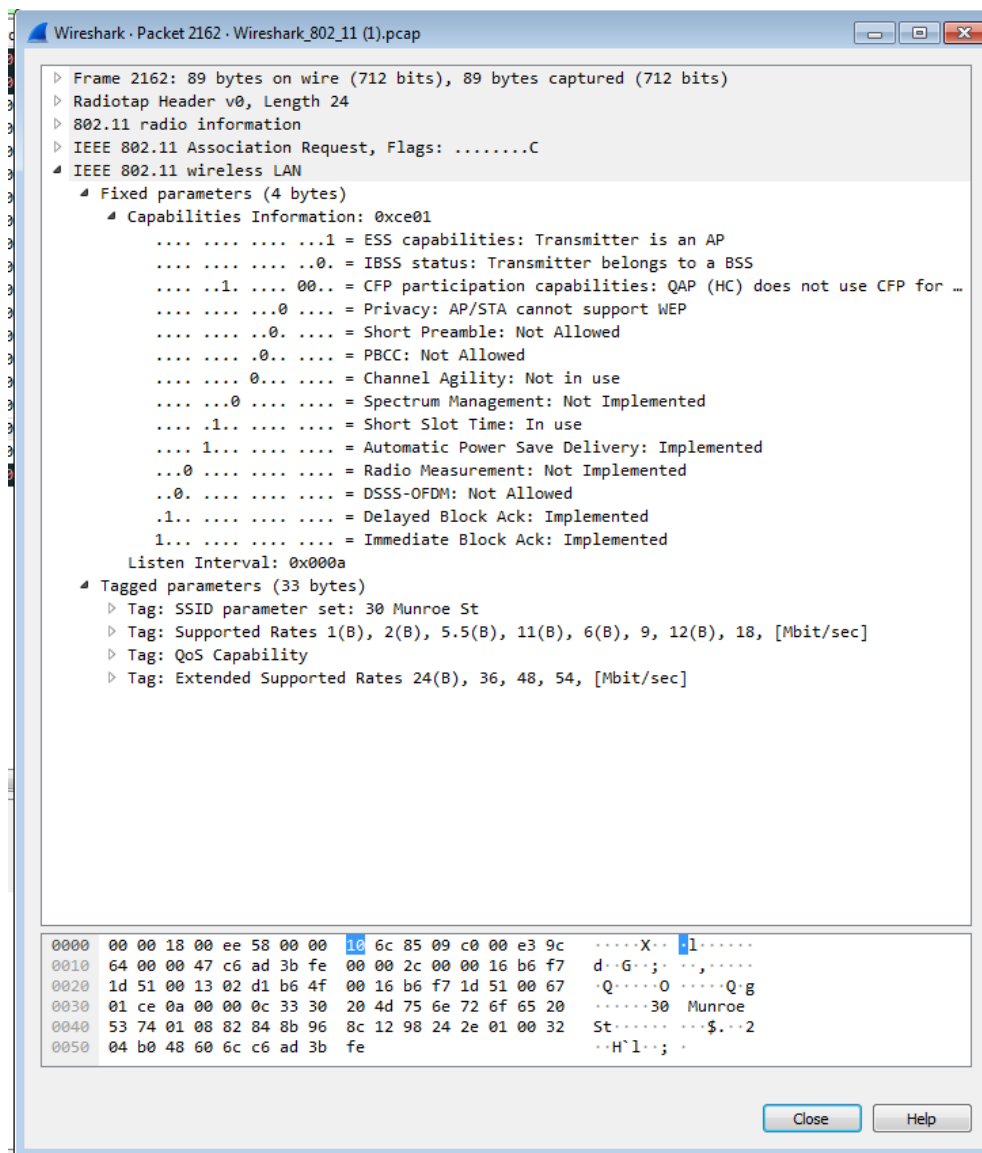
Wireshark_802.11 (1).pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
wlan.fc.subtype < 2 and wlan.fc.type == 0						
No.	Time	Source	Destination	Protocol	Length	Info
12	0.396690	00:ae:93:3d:0a:4a	ff:ff:ff:ff:bf:4a	802.11	90	Association Response, SN=3073, FN=0, Flags=.....C
1227	33.079714	d1:b6:4f:00:16:b6	MS-NLB-PhysServer-32_08:00:00:13:02	802.11	111	Association Request, SN=3775, FN=4, Flags=pm...f...
1750	49.651078	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=.....C, SSID=linksys_SES_24086
1751	49.653218	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=.....C, SSID=linksys_SES_24086
1824	53.789944	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1825	53.790943	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1827	53.793568	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1926	57.903699	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1927	57.904945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1932	57.911195	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1933	57.915945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1934	57.924199	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1935	57.936216	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1937	57.939196	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
2126	62.176945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1645, FN=0, Flags=.....C, SSID=linksys_SES_24086
2127	62.178194	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1645, FN=0, Flags=.....C, SSID=linksys_SES_24086
2162	63.169910	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	89	Association Request, SN=1648, FN=0, Flags=.....C, SSID=30 Munroe St
2166	63.192101	Cisco-Li_f7:1d:51	IntelCor_d1:b6:4f	802.11	94	Association Response, SN=3728, FN=0, Flags=.....C
2307	70.179949	Cisco-Li_f5:ba:7b	f9:ff:ff:ff:ff:ff	802.11	132	Fragmented IEEE 802.11 frame

Wireshark_802.11 (1).pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
wlan.fc.subtype < 2 and wlan.fc.type == 0						
No.	Time	Source	Destination	Protocol	Length	Info
12	0.396690	00:ae:93:3d:0a:4a	ff:ff:ff:ff:bf:4a	802.11	90	Association Response, SN=3073, FN=0, Flags=.....C
1227	33.079714	d1:b6:4f:00:16:b6	MS-NLB-PhysServer-32_08:00:00:13:02	802.11	111	Association Request, SN=3775, FN=4, Flags=pm...f...
1750	49.651078	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=.....C, SSID=linksys_SES_24086
1751	49.653218	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=.....C, SSID=linksys_SES_24086
1824	53.789944	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1825	53.790943	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1827	53.793568	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1926	57.903699	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1927	57.904945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1932	57.911195	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1933	57.915945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1934	57.924199	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1935	57.936216	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1937	57.939196	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
2126	62.176945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1645, FN=0, Flags=.....C, SSID=linksys_SES_24086
2127	62.178194	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1645, FN=0, Flags=.....C, SSID=linksys_SES_24086
2162	63.169910	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	89	Association Request, SN=1648, FN=0, Flags=.....C, SSID=30 Munroe St
2166	63.192101	Cisco-Li_f7:1d:51	IntelCor_d1:b6:4f	802.11	94	Association Response, SN=3728, FN=0, Flags=.....C
2307	70.179949	Cisco-Li_f5:ba:7b	f9:ff:ff:ff:ff:ff	802.11	132	Fragmented IEEE 802.11 frame

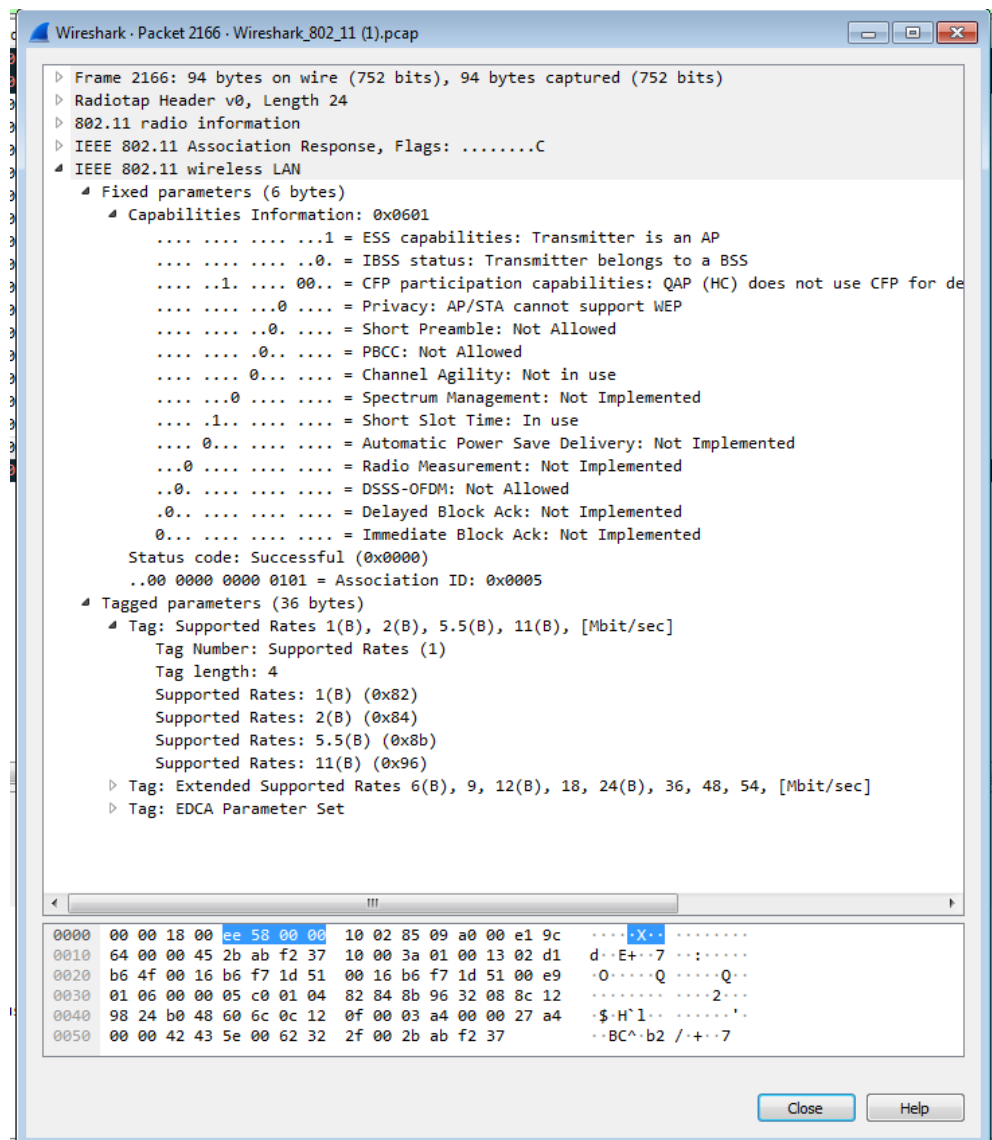
Wireshark_802.11 (1).pcap						
File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help						
wlan.fc.subtype < 2 and wlan.fc.type == 0						
No.	Time	Source	Destination	Protocol	Length	Info
12	0.396690	00:ae:93:3d:0a:4a	ff:ff:ff:ff:bf:4a	802.11	90	Association Response, SN=3073, FN=0, Flags=.....
1227	33.079714	d1:b6:4f:00:16:b6	MS-NLB-PhysServer-32_08:00:00:13:02	802.11	111	Association Request, SN=3775, FN=4, Flags=pm...F...
1750	49.651078	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=.....C, SSID=linksys_SES_24086
1751	49.653218	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1607, FN=0, Flags=.....C, SSID=linksys_SES_24086
1824	53.789944	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1825	53.790943	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1827	53.793568	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1613, FN=0, Flags=.....C, SSID=linksys_SES_24086
1926	57.903699	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1927	57.904945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1932	57.911195	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1933	57.915945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1934	57.924199	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1935	57.936216	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
1937	57.939196	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1620, FN=0, Flags=.....C, SSID=linksys_SES_24086
2126	62.176945	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1645, FN=0, Flags=.....C, SSID=linksys_SES_24086
2127	62.178194	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	107	Association Request, SN=1645, FN=0, Flags=.....C, SSID=linksys_SES_24086
2162	63.169910	IntelCor_d1:b6:4f	Cisco-Li_f7:1d:51	802.11	89	Association Request, SN=1648, FN=0, Flags=.....C, SSID=30 Munroe St
2166	63.192101	Cisco-Li_f7:1d:51	IntelCor_d1:b6:4f	802.11	94	Association Response, SN=3728, FN=0, Flags=.....C
2307	70.179949	Cisco-Li_f5:ba:7b	f9:ff:ff:ff:ff:ff	802.11	132	Fragmented IEEE 802.11 frame

At the time 63.169910 an association request frame is sent from the host to the 30 munroe st access point. At t= 63.192101 a response is then sent back to the host from the access point.

15.

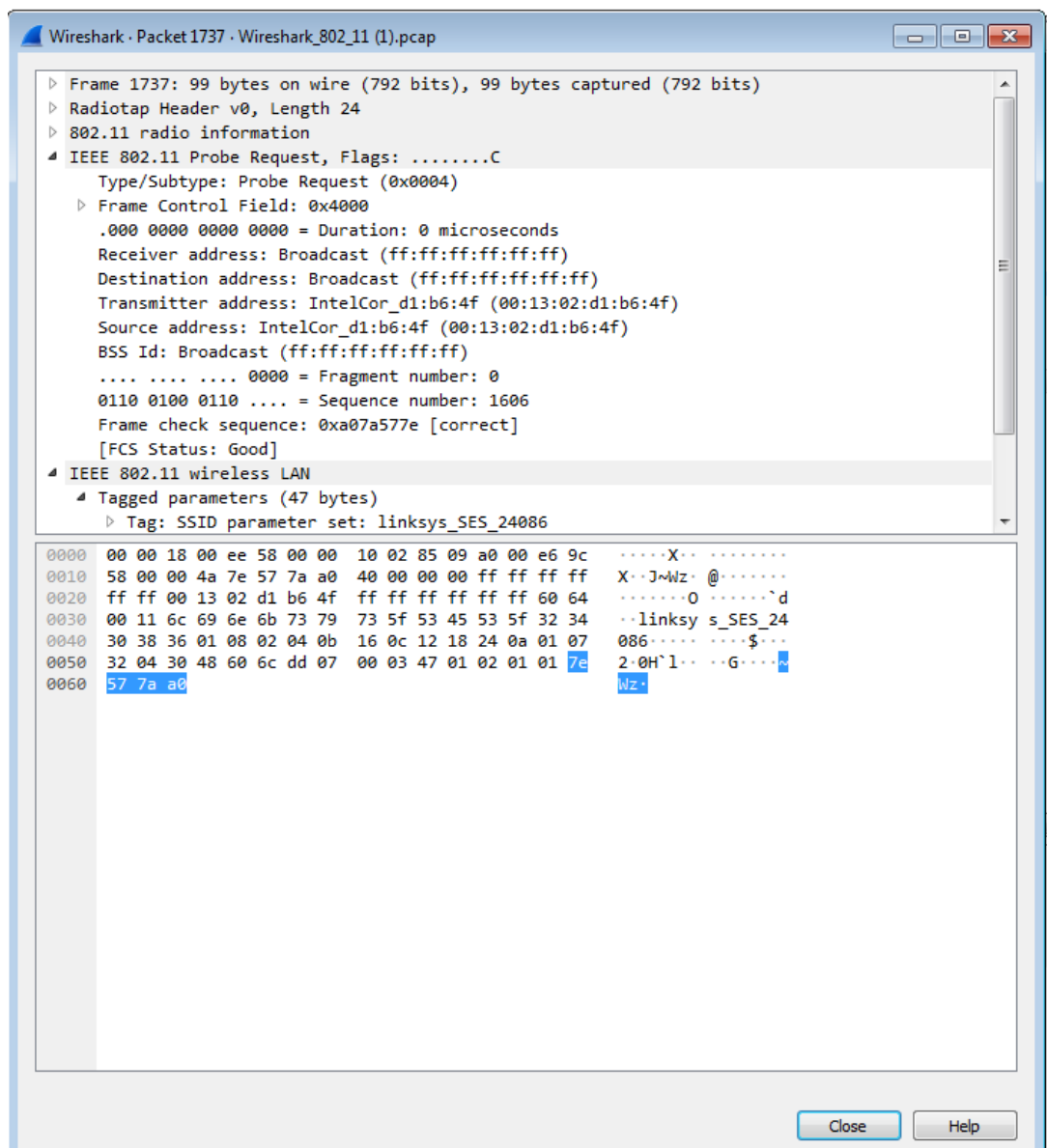


The transmission rates the host is willing to use are in Mbits/sec which are 1,2,5.5,11,6,9,12 and 18 Mbits/sec.



The transmission rates the access point is willing to use are 1,2,5.5,11 which are the supported rates in Mb/s and the additional supported rates 6,9,18,24,36,48 and 54 Mb/s. These rates that the access point is willing to use are the same as the rates the host is trying to use.

16.



The sender MAC address in these frames is 00:13:02:d1:b6:4f, receiver MAC address is ff:ff:ff:ff:ff:ff and the BSS id MAC address is ff:ff:ff:ff:ff:ff

