```
1729 2007-06-29 09:05:56.512498 Cisco-Li f7:1d:51
                                                                                                                  Broadcast
                                                                                                                                                              802.11
                                                                                                                                                                                   183 Beacon frame, SN=3587, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
    1730 2007-06-29 09:05:56.512603 IntelCor_d1:b6:4f
                                                                                                                  Cisco-Li_f7:1d:51
                                                                                                                                                                                      54 QoS Null function (No data), SN=1604, FN=0, Flags=...P...TC
    1731 2007-06-29 09:05:56.512700
                                                                                                                  IntelCor_d1:b6:4f (... 802.11
                                                                                                                                                                                      38 Acknowledgement, Flags=...
     1732 2007-06-29 09:05:56.614938 Cisco-Li_f7:1d:51
                                                                                                                                                                                    183 Beacon frame, SN=3588, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
    1733 2007-06-29 09:05:56.656072 192.168.1.109
                                                                                                                  192.168.1.1
                                                                                                                                                                                    390 DHCP Release - Transaction ID 0xea5a526
                                                                                                                                                             DHCP
                                                                                                                 IntelCor_d1:b6:4f (... 802.11
Cisco-Li_f7:1d:51 802.11
IntelCor_d1:b6:4f (... 802.11
Broadcast 802.11
                                                                                                                                                                                     38 Acknowledgement, Flags=.....C
38 Acknowledgement, Flags=.....C
    1734 2007-06-29 09:05:56.656228
    1735 2007-06-29 09:05:56.682074 IntelCor d1:b6:4f
    1736 2007-06-29 09:05:56.682227
    1737 2007-06-29 09:05:56.686935 IntelCor d1:b6:4f
                                                                                                                                                                                      99 Probe Request, SN=1606, FN=0, Flags=......C, SSID=linksys_SES_24086
                                                                                                                                                              802.11
     1738 2007-06-29 09:05:56.688326
                                                                                                                  Cisco-Li_f5:ba:bb (...
                                                                                                                                                                                       38 Acknowledgement, Flags=......
    1739 2007-06-29 09:05:56.690170
                                                                                                                  Cisco-Li_f5:ba:bb (... 802.11
                                                                                                                                                                                      38 Acknowledgement, Flags=.....
    1740 2007-06-29 09:05:56.711314 IntelCor_d1:b6:4f
1741 2007-06-29 09:05:56.712157 IntelCor_d1:b6:4f
                                                                                                                 Cisco-Li_f5:ba:bb
Cisco-Li_f5:ba:bb
                                                                                                                                                                                      58 Authentication, SN=1606, FN=0, Flags=......C
58 Authentication, SN=1606, FN=0, Flags=...R...C
                                                                                                                                                              802.11
                                                                                                                                                              802.11
    1742 2007-06-29 09:05:56.713159 IntelCor_d1:b6:4f
1743 2007-06-29 09:05:56.714367
                                                                                                                 Cisco-Li_f5:ba:bb 802.11
Cisco-Li_f5:ba:bb (... 802.11
                                                                                                                                                                                      58 Authentication, SN=1606, FN=0, Flags=....R...C
                                                                                                                                                                                      38 Acknowledgement, Flags=.....C
    1744 2007-06-29 09:05:56.714772 IntelCor_d1:b6:4f
1745 2007-06-29 09:05:56.717167 Cisco-Li_f7:1d:51
                                                                                                                 Cisco-Li_f5:ba:bb
Broadcast
                                                                                                                                                                                   58 Authentication, SN=1606, FN=0, Flags=...R...C
183 Beacon frame, SN=3589, FN=0, Flags=.......C, BI=100, SSID=30 Munroe St
                                                                                                                                                              802 11
                                                                                                                                                              802.11
                                                                                                                                                                                     National Nat
                                                                                                                 Cisco-Li_f5:ba:bb 802.11
Cisco-Li_f5:ba:bb (... 802.11
    1746 2007-06-29 09:05:56.717776 IntelCor_d1:b6:4f
    1747 2007-06-29 09:05:56.719168
    1748 2007-06-29 09:05:56.720284
                                                                                                                  Cisco-Li_f5:ba:bb (... 802.11
    1749 2007-06-29 09:05:56.722162 IntelCor_d1:b6:4f
                                                                                                                  Cisco-Li_f5:ba:bb
                                                                                                                                                             802.11
    1750 2007-06-29 09:05:56.723535 IntelCor_d1:b6:4f
                                                                                                                 Cisco-Li_f5:ba:bb
Cisco-Li_f5:ba:bb
                                                                                                                                                             802.11
                                                                                                                                                                                    107 Association Request, SN=1607, FN=0, Flags=.......C, SSID=linksys_SES_24086 107 Association Request, SN=1607, FN=0, Flags=...R...C, SSID=linksys_SES_24086
    1751 2007-06-29 09:05:56.725675 IntelCor_d1:b6:4f
    1752 2007-06-29 09:05:56.735314
                                                                                                                 Cisco-Li_f5:ba:bb (... 802.11
                                                                                                                                                                                      38 Acknowledgement, Flags=.....C
Frame 1737: 99 bytes on wire (792 bits), 99 bytes captured (792 bits)
Radiotap Header v0, Length 24
802.11 radio information
IEEE 802.11 Probe Request, Flags: ......C
IEEE 802.11 Wireless Management
```

They are linksys\_SES\_2486 and 30 Munroe St

# 2/

The intervals of time between the transmissions of the beacon frames the linksys\_ses\_24086 and the 30 Munroe St. access point are 0.1024.

```
DO MCKHOWIEUGEMENT, 1 Tags-.....
    1761 2007-06-29 09:05:56.757685
                                                            Cisco-Li_f5:ba:bb (... 802.11
                                                                                              38 Acknowledgement, Flags=......
    1762 2007-06-29 09:05:56.765563
                                                            Cisco-Li_f5:ba:bb (... 802.11
                                                                                             38 Acknowledgement, Flags=......C
185 Key (Message 2 of 4)
                                                            Cisco-Li_f5:ba:bb
    1763 2007-06-29 09:05:56.818562 IntelCor_d1:b6:4f
                                                                                  EAPOL
    1764 2007-06-29 09:05:56.820288 Cisco-Li_f7:1d:51
                                                            Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3590, FN=0, Flags=......C, BI=100, SSID=30 Munroe
    1765 2007-06-29 09:05:56.821910 IntelCor_d1:b6:4f
                                                           Cisco-Li_f5:ba:bb
Cisco-Li_f5:ba:bb
                                                                                  EAPOL
                                                                                             185 Key (Message 2 of 4)
185 Key (Message 2 of 4)
    1766 2007-06-29 09:05:56.826052 IntelCor_d1:b6:4f
                                                                                  EAPOL
    1767 2007-06-29 09:05:56.922070 Cisco-Li f7:1d:51
                                                            Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3591, FN=0, Flags=......C, BI=100, SSID=30 Munroe
    1768 2007-06-29 09:05:57.024435 Cisco-Li_f7:1d:51
                                                           Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3592, FN=0, Flags=.........C, BI=100, SSID=30 Munroe
    1769 2007-06-29 09:05:57.126819 Cisco-Li f7:1d:51
                                                                                             183 Beacon frame, SN=3593, FN=0, Flags=......C, BI=100, SSID=30 Munroe
                                                           Broadcast
                                                                                  802.11
    1770 2007-06-29 09:05:57.229186 Cisco-Li_f7:1d:51
                                                            Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3594, FN=0, Flags=......C, BI=100, SSID=30 Munroe
    1771 2007-06-29 09:05:57.331572 Cisco-Li_f7:1d:51
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3595, FN=0, Flags=......C, BI=100, SSID=30 Munroe
                                                            Broadcast
    1772 2007-06-29 09:05:57.433912 Cisco-Li f7:1d:51
                                                           Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3596, FN=0, Flags=......C, BI=100, SSID=30 Munroe
                                                                                             183 Beacon frame, SN=3597, FN=0, Flags=.......C, BI=100, SSID=30 Munroe
    1773 2007-06-29 09:05:57.536316 Cisco-Li f7:1d:51
                                                           Broadcast
                                                                                  802.11
∨ 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)
     Destination address: Broadcast (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
     1110 0000 0110 .... = Sequence number: 3590
      ff ff 00 16 b6 f7 1d 51 00 16 b6 f7 1d 51 60 e0
0030 3c 44 30 99 28 00 00 00 64 00 01 06 00 0c 33 30 0040 20 4d 75 6e 72 6f 65 20 53 74 01 04 82 84 8b 96
                                                             <D0·(··· d····30
Munroe St·····
                                                             .....USI.
0050 03 01 06 05 04 00 01 00 00 07 06 55 53 49 01 0b
0060 1a 0c 12 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e
Source Hardware Address (wlan.sa), 6 bytes
                                                                                                                                                       Packets: 2364 · Displaye
```

Sourse MAC address: 00:16:b6:f7:1d:51

```
.... ..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
     1110 0000 0110 .... = Sequence number: 3590
     Frame check sequence: 0x3516331c [unverified]
     [FCS Status: Unverified]
> IEEE 802.11 Wireless Management
0020 ff ff 00 16 b6 f7 1d 51
                               00 16 b6 f7 1d 51 60 e0
                                                         .....0 .....0`.
                                                         <D0-(--- d----30
0030 3c 44 30 99 28 00 00 00
                               64 00 01 06 00 0c 33 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...
                                                         -----BC^
0060 1a 0c 12 0f 00 03 a4 00
                              00 27 a4 00 00 42 43 5e

    Basic Service Set ID (wlan.bssid), 6 bytes
```

6/

```
Cisco-Li_f5:ba:bb (... 802.11
Cisco-Li_f5:ba:bb (... 802.11
    1757 2007-06-29 09:05:56.745906
                                                                                              38 Acknowledgement, Flags=.....C
    1758 2007-06-29 09:05:56.747485
                                                                                              38 Acknowledgement, Flags=......C
    1759 2007-06-29 09:05:56.749033
                                                           Cisco-Li_f5:ba:bb
                                                                                              38 Acknowledgement, Flags=.....C
                                                                                              38 Acknowledgement, Flags=......C
38 Acknowledgement, Flags=......C
    1760 2007-06-29 09:05:56.751194
                                                           Cisco-Li f5:ba:bb (... 802.11
    1761 2007-06-29 09:05:56.757685
                                                           Cisco-Li_f5:ba:bb (... 802.11
    1762 2007-06-29 09:05:56.765563
                                                           Cisco-Li_f5:ba:bb (... 802.11
                                                                                              38 Acknowledgement, Flags=.....C
    1763 2007-06-29 09:05:56.818562 IntelCor d1:b6:4f
                                                           Cisco-Li f5:ba:bb
                                                                                 EAPOL
                                                                                             185 Kev (Message 2 of 4)
    1764 2007-06-29 09:05:56.820288 Cisco-Li_f7:1d:51
                                                           Broadcast
                                                                                             183 Beacon frame, SN=3590, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
                                                                                 802.11
                                                           Cisco-Li_f5:ba:bb
Cisco-Li_f5:ba:bb
                                                                                            185 Key (Message 2 of 4)
185 Key (Message 2 of 4)
    1765 2007-06-29 09:05:56.821910 IntelCor_d1:b6:4f
                                                                                  EAPOL
    1766 2007-06-29 09:05:56.826052 IntelCor_d1:b6:4f
                                                                                 EAPOL
    1767 2007-06-29 09:05:56.922070 Cisco-Li_f7:1d:51
                                                           Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3591, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
                                                                                            183 Beacon frame, SN=3592, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
183 Beacon frame, SN=3593, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
    1768 2007-06-29 09:05:57.024435 Cisco-Li f7:1d:51
                                                           Broadcast
                                                                                  802.11
    1769 2007-06-29 09:05:57.126819 Cisco-Li_f7:1d:51
                                                           Broadcast
                                                                                  802.11
   1770 2007-06-29 09:05:57.229186 Cisco-Li_f7:1d:51 1771 2007-06-29 09:05:57.331572 Cisco-Li_f7:1d:51
                                                           Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3594, FN=0, Flags=........C, BI=100, SSID=30 Munroe St
                                                                                             183 Beacon frame, SN=3595, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
                                                           Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3596, FN=0, Flags=.......C, BI=100, SSID=30 Munroe St
    1772 2007-06-29 09:05:57.433912 Cisco-Li_f7:1d:51
                                                            Broadcast
    1773 2007-06-29 09:05:57.536316 Cisco-Li f7:1d:51
                                                           Broadcast
                                                                                  802.11
                                                                                             183 Beacon frame, SN=3597, FN=0, Flags=........C, BI=100, SSID=30 Munroe St
  802.11 radio information
  IEEE 802.11 Beacon frame, Flags: .......
 IEEE 802.11 Wireless Management
    Fixed parameters (12 bytes)
  Tagged parameters (119 bytes)
        Tag: SSID parameter set: 30 Munroe St
       Tag: Supported Rates 1(B), 2(B),
       Tag: DS Parameter set: Current Channel: 6
       Tag: Traffic Indication Map (TIM): DTIM 1 of 1 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/sed]
      > Tag: Vendor Specific: Airgo Networks, Inc.
     > Tag: Vendor Specific: Microsoft Corp.: WMM/WME: Parameter Element
0020 ff ff 00 16 b6 f7 1d 51 00 16 b6 f7 1d 51 60 e0
     .....USI...
      03 01 06 05 04 00 01 00 00 07 06 55 53 49 01 0b
      1a 0c 12 0f 00 03 a4 00 00 27 a4 00 00 42 43 5e
                                                                                                                                                      Dackote: 2264 - Dicplayed: 2264
```

The eight additional "extended supported rates" are 6.0, 9.0, 12.0, 18.0, 24.0, 36.0, 48.0, 54.0 Mbps Four data rates are 1.0, 2.0, 5.5, 11.0 Mb.

- Three MAC address fields in the 802.11 frame: BSS Id, source address and destination address
- MAC address in this frame corresponds to the wireless host: 00:13:02:d1:b6:4f
- To the first-hop router: 00:16:b6:f4:eb:a8 The IP address of the wireless host sending this TCP segment: 00:16:b6:f7:1d:51
- Destination Address: 128.119.245.12

```
478 2007-06-29 09:05:31.900481 192.168.1.109
                                                            128.119.245.12
                                                                                  TCP
                                                                                              102 2538 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
     479 2007-06-29 09:05:31.900597
                                                            IntelCor_d1:b6:4f (... 802.11
                                                                                               38 Acknowledgement, Flags=.....C
     480 2007-06-29 09:05:31.900710 192.168.1.109
                                                                     245.12
                                                                                   HTTP
                                                                                               537 GET /wireshark-labs/alice.txt HTTP/1.1
     481 2007-06-29 09:05:31.900809
                                                            IntelCor_d1:b6:4f (... 802.11
                                                                                               38 Acknowledgement, Flags=.....C
     482 2007-06-29 09:05:31.919355 128.119.245.12
                                                                                              108 80 → 2538 [ACK] Seq=1 Ack=436 Win=6432 Len=0
                                                            192.168.1.109
                                                                                   TCP
     483 2007-06-29 09:05:31 919515
                                                            Cisco-Li f7:1d:51 (... 802.11
                                                                                               38 Acknowledgement, Flags=.....C
    484 2007-06-29 09:05:31.919628 128.119.245.12
                                                            192.168.1.109
                                                                                               108 [TCP Dup ACK 482#1] 80 → 2538 [ACK] Seq=1 Ack=436 Win=6
     485 2007-06-29 09:05:31 919724
                                                            Cisco-Li f7:1d:51 (... 802.11
                                                                                               38 Acknowledgement, Flags=.....C
     486 2007-06-29 09:05:31.921286 128.119.245.12
                                                                                              415 80 → 2538 [PSH, ACK] Seq=1 Ack=436 Win=6432 Len=313 [TC
                                                             192.168.1.109
                                                                                   TCP
     487 2007-06-29 09:05:31.921407
                                                            Cisco-Li f7:1d:51 (... 802.11
                                                                                               38 Acknowledgement, Flags=.....C
     488 2007-06-29 09:05:31.922771 128.119.245.12
                                                                                             1562 80 → 2538 [ACK] Seg=314 Ack=436 Win=6432 Len=1460 [TCP
                                                                                   TCP
                                                             192.168.1.109
                                                                                             1562 [TCP Retransmission] 80 → 2538 [ACK] Seq=314 Ack=436
1562 [TCP Retransmission] 80 → 2538 [ACK] Seq=314 Ack=436
     489 2007-06-29 09:05:31.923266 128.119.245.12
490 2007-06-29 09:05:31.923847 128.119.245.12
                                                             192.168.1.109
192.168.1.109
                                                                                   ТСР
     491 2007-06-29 09:05:31.923963
                                                            Cisco-Li f7:1d:51 (... 802.11
                                                                                               38 Acknowledgement, Flags=.....C
  Radiotap Header v0. Length 24
  802.11 radio information
∨ 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 0011 .... = Sequence number: 51
     Frame check sequence: 0x147e6bd9 [unverified]
0010 5d 00 00 3e d9 6b 7e 14 88 01 2c 00 00 16 b6 f7
0020 1d 51 00 13 02 d1 b6 4f 00 16 b6 f4 eb a8 30 03
                                                             .0.....0 ......0.
0030 00 00 aa aa 03 00 00 00 08 00 45 00 01 db 13 26
                                                             0040 40 00 80 06 ae 5d c0 a8 01 6d 80 77 f5 0c 09 ea
0050 00 50 71 af cd 47 ae 8f de 40 50 18 44 70 4a 10
                                                             @----]-- -m-w--
                                                             ·Pa · · G · · · @P · Dp.]
IEEE 802.11 wireless LAN (wlan), 26 bytes
```

```
4/5 2007-06-29 09:05:31.883688
                                                         IntelCor_dl:bb:4+ (... 802.11
                                                                                         38 Acknowledgement, Flags=.....
     476 2007-06-29 09:05:31.900208 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 2007-06-29 09:05:31.900379
                                                        Cisco-Li_f7:1d:51 (... 802.11
                                                                                         38 Acknowledgement, Flags=.....C
     478 2007-06-29 09:05:31.900481 192.168.1.109
                                                                                        102 2538 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
                                                        128.119.245.12
                                                                             TCP
     479 2007-06-29 09:05:31.900597
                                                        IntelCor d1:b6:4f (... 802.11
                                                                                         38 Acknowledgement, Flags=.....C
     480 2007-06-29 09:05:31.900710 192.168.1.109
                                                         128.119.245.12
                                                                                        537 GET /wireshark-labs/alice.txt HTTP/1.1
     481 2007-06-29 09:05:31.900809
                                                         IntelCor_d1:b6:4f (... 802.11
                                                                                         38 Acknowledgement, Flags=......
     482 2007-06-29 09:05:31.919355 128.119.245.12
                                                        192.168.1.109
                                                                             TCP
                                                                                        108 80 → 2538 [ACK] Seq=1 Ack=436 Win=6432 Len=0
     483 2007-06-29 09:05:31 919515
                                                        Cisco-Li f7:1d:51 ( 802 11
                                                                                         38 Acknowledgement, Flags=.....C
                                                                                         108 [TCP Dup ACK 482#1] 80 → 2538 [ACK] Seq=1 Ack=436 Win=6432 Ler
     484 2007-06-29 09:05:31.919628 128.119.245.12
                                                        192.168.1.109
     485 2007-06-29 09:05:31.919724
                                                        Cisco-Li_f7:1d:51 (... 802.11
                                                                                         38 Acknowledgement, Flags=......
     486 2007-06-29 09:05:31.921286 128.119.245.12
                                                         192.168.1.109
                                                                                         415 80 → 2538 [PSH, ACK] Seq=1 Ack=436 Win=6432 Len=313 [TCP segmer
                                                                              TCP
                                                                                         38 Acknowledgement, Flags=.....C
     487 2007-06-29 09:05:31.921407
                                                        Cisco-Li_f7:1d:51 (... 802.11
                                                                                        1562 80 → 2538 [ACK] Seq=314 Ack=436 Win=6432 Len=1460 [TCP segment
     488 2007-06-29 09:05:31.922771 128.119.245.12
                                                        192,168,1,109
                                                                              TCP
                                                                                        1562 [TCP Retransmission] 80 → 2538 [ACK]
1562 [TCP Retransmission] 80 → 2538 [ACK]
     489 2007-06-29 09:05:31.923266 128.119.245.12
                                                         192.168.1.109
     491 2007-06-29 09:05:31.923963
                                                         Cisco-Li_f7:1d:51 (... 802.11
                                                                                         38 Acknowledgement, Flags=......
  Radiotap Header v0, Length 24
  802.11 radio information
 IEEE 802.11 QoS Data, Flags: ..mP..F.C
     Type/Subtype: QoS Data (0x0028)
   > Frame Control Field: 0x8832
    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 [unverified]
0010 52 00 00 3e 7d 40 dc ec 88 32 28 ad 91 2a b0 49
                                                                  ·2(··*·I
-0----0 -----@-
                                                                   ..F..0.
                                                         @ · 1 · · / · w · · · · · m · P
0050 09 ea ae 8f de 3f 71 af cd 47 70 12 16 d0 5e a5
IEEE 802.11 wireless LAN (wlan), 26 bytes
                                                                                                                                               Packets: 2364
```

The TCP SYNACK is received at t = 24.827751 seconds into the trace.

The MAC address for the sender of the 802.11 frame containing the TCP SYNACK segment is 00:16:b6:f4:eb:a8, which is the 1st hop router to which the host is attached.

The MAC address for the destination, which the host itself, is 91:2a:b0:49:b6:4f.

### 9/

```
1/28 200/-00-29 09:05:50.502404
                                                       IntelCor_al:bb:4† (... 802.11
                                                                                         38 ACKNOWLEGGEMENT, Flags=.....
                                                                                       183 Beacon frame, SN=3587, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
1729 2007-06-29 09:05:56.512498 Cisco-Li_f7:1d:51
                                                      Broadcast
                                                                            802.11
                                                      Cisco-Li_f7:1d:51
1730 2007-06-29 09:05:56.512603 IntelCor_d1:b6:4f
                                                                            802.11
                                                                                         54 QoS Null function (No data), SN=1604, FN=0, Flags=...P...TC
1731 2007-06-29 09:05:56.512700
                                                                                        38 Acknowledgement, Flags=......C
183 Beacon frame, SN=3588, FN=0, Flags=......C, BI=100, SSID=30 Munroe St
                                                      IntelCor_d1:b6:4f (... 802.11
1732 2007-06-29 09:05:56.614938 Cisco-Li_f7:1d:51
                                                       Broadcast
                                                      192.168.1.1
1733 2007-06-29 09:05:56.656072 192.168.1.109
                                                                                        390 DHCP Release - Transaction ID 0xea5a526
                                                                            DHCP
1734 2007-06-29 09:05:56.656228
                                                      IntelCor_d1:b6:4f (... 802.11
                                                                                         38 Acknowledgement, Flags=.....C
1735 2007-06-29 09:05:56.682074 IntelCor_d1:b6:4f
                                                       Cisco-Li_f7:1d:51
                                                                            802.11
                                                                                         54 Deauthentication, SN=1605, FN=0, Flags=......C
                                                      IntelCor_d1:b6:4f (... 802.11
Broadcast 802.11
                                                                                        38 Acknowledgement, Flags=......C
99 Probe Request, SN=1606, FN=0, Flags=......C, SSID=linksys_SES_24086
1736 2007-06-29 09:05:56.682227
1737 2007-06-29 09:05:56.686935 IntelCor_d1:b6:4f
1738 2007-06-29 09:05:56.688326
                                                       Cisco-Li_f5:ba:bb (... 802.11
                                                                                         38 Acknowledgement, Flags=.....C
```

DHCP Release and a Deauthentication.

We expected to see a Disassociation reques.

#### 10/

<u> </u>						
No.	Time ^	Source	Destination	Protocol	Length	Info
	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=RC
	1742 49.640702	IntelCor_d1:b6:4f	Cisco-Li_f5:ba:bb	802.11	58	Authentication, SN=1606, FN=0, Flags=RC
	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=RC
	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=RC
	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=RC
	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=RC, 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

The first AUTHENTICATION from the host to the AP is at t = 49.638857

11/ open

12/ No, I don't

There is an AUTHENTICATION frame from 00:13:02:d1:b6:4f to 00:16:b7:f7:1d:51 when t = 63.168087. The AUTHENTICATION sent back at t = 63.169071.

### 14/

```
2161 63.169814
                                       IntelCor d1:b6:4f (... 802.11
                                                                       38 Acknowledgement, Flags=.....C
    89 Association Request, SN=1648, FN=0, Flags=......C, SSID=30 Munroe St
    2163 63.170008
                                       IntelCor_d1:b6:4f (... 802.11
                                                                       38 Acknowledgement, Flags=.....C
    2164 63.170692 Cisco-Li_f7:1d:51
                                      IntelCor_d1:b6:4f
                                                           802.11
                                                                       58 Authentication, SN=3727, FN=0, Flags=.....C
    2165 63.171000
                                      Cisco-Li_f7:1d:51 (... 802.11
                                                                      38 Acknowledgement, Flags=.....C
    2166 63.192101 Cisco-Li_f7:1d:51
                                      IntelCor_d1:b6:4f
                                                           802.11
                                                                      94 Association Response, SN=3728, FN=0, Flags=......C
    2167 63.192956
                                       Cisco-Li_f7:1d:51 (... 802.11
                                                                      38 Acknowledgement, Flags=......
   2168 63.194842 0.0.0.0
                                      255.255.255.255
                                                         DHCP
                                                                    390 DHCP Discover - Transaction ID 0x101b218a
                                      IntelCor_d1:b6:4f (... 802.11 255.255.255.255 DHCP
    2169 63.194971
                                                                      38 Acknowledgement, Flags=.....C
                                                                   390 DHCP Discover - Transaction ID 0x2733a47c
                                                           DHCP
DHCP
   2170 63.201481 0.0.0.0
                                                                    390 DHCP Discover - Transaction ID 0x2733a47c 38 Acknowledgement, Flags=......C
   2171 63.201639 0.0.0.0
                                      255.255.255.255
                                      IntelCor_d1:b6:4f (... 802.11
    2172 63.201736
 Frame 2162: 89 bytes on wire (712 bits), 89 bytes captured (712 bits)
> Radiotap Header v0, Length 24
 802.11 radio information
Type/Subtype: Association Request (0x0000)
  > Frame Control Field: 0x0000
    .000 0000 0010 1100 = Duration: 44 microseconds
    Receiver address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
    Destination address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
     Transmitter address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
    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)
         .... 0000 = Fragment number: 0
    0110 0111 0000 .... = Sequence number: 1648
    Frame check sequence: 0xfe3badc6 [unverified]
0010 64 00 00 47 c6 ad 3b fe 00 00 2c 00 00 16 b6 f7 0020 1d 51 00 13 02 d1 b6 4f 00 16 b6 f7 1d 51 00 67
                                                        d..G..;. ..,....
.Q.....Q.g
0030 01 ce 0a 00 00 0c 33 30 20 4d 75 6e 72 6f 65 20
                                                          ----30 Munroe
0040 53 74 01 08 82 84 8b 96 8c 12 98 24 2e 01 00 32
                                                        St.....$...2
                                                         ..H`1..; .
0050 04 b0 48 60 6c c6 ad 3b fe

    Source Hardware Address (wlan.sa), 6 bytes

                                                                                                                                             Packets
```

ASSOCIATE REQUEST from host to the 30 Munroe St AP at t = 63.169910 and replied at t = 63.192101

## 15/

The possible rates are 1, 2, 5.5, 11, 6, 9, 12, 18, 24, 32, 48, 54 Mbps.