Franklin Nuth
Professor Ronny Bull
CSC323-A
28 October 2017

802.11

1. The SSID of the two access points that are issuing most of the beacon frames in this trace are 30 Munroe Street and linksys_ses_24086.
2. The intervals of time between the transmissions of the beacon frames from the linksys access point is 1.215947. From the 30 Munroe St. access point, it is 1.314223.
3. The source MAC address on the beacon frame from 30 Munroe Street is 00:16:b6:f7:1d:51.
4. The destination MAC address on the beacon frame from 30 Munroe Street is ff:ff:ff:ff:ff:ff.
5. The MAC BBS id on the beacon frame from 30 Munroe Street is 00:16:b6:f7:1d:51.
6. The four data rates are 1, 2, 5.5, and 11. The extended support rates are 6, 9, 12, 18, 24, 36, 48, and 54.
7. The three MAC addresses in the 802.11 frame is 00:12:02:41:b6:4f (Wireless host), 00:16:b6:f4:eb:a8 (access point), and 00:16:b6:f7:1d:51 (first-hop router). The IP address of the source is 192.168.1.109, and the destination IP is 128.119.25.12. The destination IP corresponds to the gaia.cs.umass.edu.
8. The three MAC addresses in the 802.11 frame is 00:13:02:d1:b6:4f (wireless host), 00:16:b6:f4:eb:a8 (access point), and 00:16:b6:f7:1d:51 (first-hop router). Yes, the sender MAC corresponds to the device that sent the the TCP segment is 128.119.245.12.
9. After t=49, the two actions taken to end the association with 30 Munroe Street is a DHCP protocol and a deauthentication protocol. One would have expected a disassociation protocol.
10. At least 3 authentication messages are sent from the linksys access point.
11. According to the authentication algorithm, the host wants to be open.
12. I can't find a reply authentication.
13. The time the authentication frame from the host to Monroe is 63.1698087, and the time the reply authentication was sent is 63.169.072.
14. The time for the association request from host to AP is 63.169910, and the reply was sent at 63.192072.
15. The rates the host is willing to work with are 1, 2, 5.5, and 11. The extended support rates are 6, 9, 12, 18, 24, 36, 48, and 54.
16. For the probe request, the sender MAC is 00:13:02:d1:b6:4f, the receiver MAC is ff:ff:ff:ff:ff:ff, and the BBS ID MAC is ff:ff:ff:ff:ff:ff. For the probe response, the sender MAC is 00:16:b6:f7:1d:51, the receiver MAC is 00:13:02:d1:b6:4f, and the BSS ID MAC is 00:16:6:f7:1d:51. They're both used for finding access points.

```
    1 0.000000            Cisco-Li_f7:1d:51     Broadcast               802.11     183     Beacon frame, SN=2854, FN=0, Flags=........C, BI=100,
SSID=30 Munroe St
Frame 1: 183 bytes on wire (1464 bits), 183 bytes captured (1464 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:05:07.072457000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082707.072457000 seconds
    [Time delta from previous captured frame: 0.000000000 seconds]
    [Time delta from previous displayed frame: 0.000000000 seconds]
    [Time since reference or first frame: 0.000000000 seconds]
    Frame Number: 1
    Frame Length: 183 bytes (1464 bits)
    Capture Length: 183 bytes (1464 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 1.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00a0, Complementary Code Keying (CCK), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..1. .... = Complementary Code Keying (CCK): True
        .... .... .0.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): False
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -29dBm
    SSI Noise: -100dBm
    Signal Quality: 82
    Antenna: 0
    SSI Signal: 71dB
    RX flags: 0x2608
802.11 radio information
    PHY type: 802.11b (4)
    Short preamble: False
    Data rate: 1.0 Mb/s
```

```
        Channel: 6
        Frequency: 2437MHz
        Signal strength (dBm): -29dBm
        Noise level (dBm): -100dBm
        [Duration: 1464µs]
            [Preamble: 192µs]
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
                .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
                .... .0.. = More Fragments: This is the last fragment
                .... 0... = Retry: Frame is not being retransmitted
                ...0 .... = PWR MGT: STA will stay up
                ..0. .... = More Data: No data buffered
                .0.. .... = Protected flag: Data is not protected
                0... .... = Order flag: Not strictly ordered
        .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 0010 0110 .... = Sequence number: 2854
        Frame check sequence: 0x057e2608 [correct]
        [FCS Status: Good]
IEEE 802.11 wireless LAN
        Fixed parameters (12 bytes)
            Timestamp: 0x000000289638e182
            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: AirgoNet
            Tag: Vendor Specific: Microsof: WMM/WME: Parameter Element
```

```
    31 1.215947         LinksysG_67:22:94     Broadcast               802.11    90        Beacon frame, SN=3081, FN=0, Flags=........C, BI=100,
SSID=linksys12
Frame 31: 90 bytes on wire (720 bits), 90 bytes captured (720 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:05:08.288404000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082708.288404000 seconds
    [Time delta from previous captured frame: 0.002907000 seconds]
    [Time delta from previous displayed frame: 0.002907000 seconds]
    [Time since reference or first frame: 1.215947000 seconds]
    Frame Number: 31
    Frame Length: 90 bytes (720 bits)
    Capture Length: 90 bytes (720 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 2.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00a0, Complementary Code Keying (CCK), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..1. .... = Complementary Code Keying (CCK): True
        .... .... .0.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): False
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -93dBm
    SSI Noise: -100dBm
    Signal Quality: 100
    Antenna: 0
    SSI Signal: 7dB
    RX flags: 0x97a7, Bad PLCP
802.11 radio information
    PHY type: 802.11b (4)
    Short preamble: False
    Data rate: 2.0 Mb/s
```

```
        Channel: 6
        Frequency: 2437MHz
        Signal strength (dBm): -93dBm
        Noise level (dBm): -100dBm
        [Duration: 456µs]
            [Preamble: 192µs]
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
                .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
                .... .0.. = More Fragments: This is the last fragment
                .... 0... = Retry: Frame is not being retransmitted
                ...0 .... = PWR MGT: STA will stay up
                ..0. .... = More Data: No data buffered
                .0.. .... = Protected flag: Data is not protected
                0... .... = Order flag: Not strictly ordered
        .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: LinksysG_67:22:94 (00:06:25:67:22:94)
        Source address: LinksysG_67:22:94 (00:06:25:67:22:94)
        BSS Id: LinksysG_67:22:94 (00:06:25:67:22:94)
        .... .... .... 0000 = Fragment number: 0
        1100 0000 1001 .... = Sequence number: 3081
        Frame check sequence: 0xb6ef97a7 [correct]
        [FCS Status: Good]
IEEE 802.11 wireless LAN
        Fixed parameters (12 bytes)
            Timestamp: 0x000008ac05ad72ad
            Beacon Interval: 0.102400 [Seconds]
            Capabilities Information: 0x0011
        Tagged parameters (26 bytes)
            Tag: SSID parameter set: linksys12
            Tag: Supported Rates 1(B), 2(B), 5.5, 11, [Mbit/sec]
            Tag: DS Parameter set: Current Channel: 6
            Tag: Traffic Indication Map (TIM): DTIM 1 of 0 bitmap
```

```
    32 1.314223        Cisco-Li_f7:1d:51      Broadcast                802.11      183      Beacon frame, SN=2868, FN=0, Flags=........C, BI=100,
SSID=30 Munroe St
Frame 32: 183 bytes on wire (1464 bits), 183 bytes captured (1464 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:05:08.386680000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082708.386680000 seconds
    [Time delta from previous captured frame: 0.098276000 seconds]
    [Time delta from previous displayed frame: 0.098276000 seconds]
    [Time since reference or first frame: 1.314223000 seconds]
    Frame Number: 32
    Frame Length: 183 bytes (1464 bits)
    Capture Length: 183 bytes (1464 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 1.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00a0, Complementary Code Keying (CCK), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..1. .... = Complementary Code Keying (CCK): True
        .... .... .0.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): False
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -28dBm
    SSI Noise: -100dBm
    Signal Quality: 100
    Antenna: 0
    SSI Signal: 72dB
    RX flags: 0x1310
802.11 radio information
    PHY type: 802.11b (4)
    Short preamble: False
    Data rate: 1.0 Mb/s
```

```
    Channel: 6
    Frequency: 2437MHz
    Signal strength (dBm): -28dBm
    Noise level (dBm): -100dBm
    [Duration: 1464µs]
        [Preamble: 192µs]
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
            .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
            .... .0.. = More Fragments: This is the last fragment
            .... 0... = Retry: Frame is not being retransmitted
            ...0 .... = PWR MGT: STA will stay up
            ..0. .... = More Data: No data buffered
            .0.. .... = Protected flag: Data is not protected
            0... .... = Order flag: Not strictly ordered
    .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 0100 .... = Sequence number: 2868
    Frame check sequence: 0x880b1310 [correct]
    [FCS Status: Good]
IEEE 802.11 wireless LAN
    Fixed parameters (12 bytes)
        Timestamp: 0x00000028964d3182
        Beacon Interval: 0.102400 [Seconds]
        Capabilities Information: 0x0601
    Tagged parameters (119 bytes)
        Tag: SSID parameter set: 30 Munroe St
            Tag Number: SSID parameter set (0)
            Tag length: 12
            SSID: 30 Munroe St
        Tag: Supported Rates 1(B), 2(B), 5.5(B), 11(B), [Mbit/sec]
            Tag Number: Supported Rates (1)
            Tag length: 4
            Supported Rates: 1(B) (0x82)
            Supported Rates: 2(B) (0x84)
            Supported Rates: 5.5(B) (0x8b)
            Supported Rates: 11(B) (0x96)
        Tag: DS Parameter set: Current Channel: 6
            Tag Number: DS Parameter set (3)
            Tag length: 1
            Current Channel: 6
        Tag: Traffic Indication Map (TIM): DTIM 0 of 0 bitmap
            Tag Number: Traffic Indication Map (TIM) (5)
            Tag length: 4
            DTIM count: 0
            DTIM period: 1
            Bitmap control: 0x00
            Partial Virtual Bitmap: 00
        Tag: Country Information: Country Code US, Environment Indoor
            Tag Number: Country Information (7)
            Tag length: 6
            Code: US
            Environment: Indoor (0x49)
            Country Info: First Channel Number: 1, Number of Channels: 11, Maximum Transmit Power Level: 26 dBm
        Tag: EDCA Parameter Set
            Tag Number: EDCA Parameter Set (12)
            Tag length: 18
            WME QoS Info: 0x0f
            Reserved: 00
            Ac Parameters ACI 0 (Best Effort), ACM no, AIFSN 3, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
            Ac Parameters ACI 1 (Background), ACM no, AIFSN 7, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
            Ac Parameters ACI 2 (Video), ACM no, AIFSN 2, ECWmin/max 3/4 (CWmin/max 7/15), TXOP 94
            Ac Parameters ACI 3 (Voice), ACM no, AIFSN 2, ECWmin/max 2/3 (CWmin/max 3/7), TXOP 47
        Tag: ERP Information
            Tag Number: ERP Information (42)
            Tag length: 1
            ERP Information: 0x00
        Tag: Extended Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
            Tag Number: Extended Supported Rates (50)
            Tag length: 8
```

```
            Extended Supported Rates: 6(B) (0x8c)
            Extended Supported Rates: 9 (0x12)
            Extended Supported Rates: 12(B) (0x98)
            Extended Supported Rates: 18 (0x24)
            Extended Supported Rates: 24(B) (0xb0)
            Extended Supported Rates: 36 (0x48)
            Extended Supported Rates: 48 (0x60)
            Extended Supported Rates: 54 (0x6c)
    Tag: Vendor Specific: AirgoNet
        Tag Number: Vendor Specific (221)
        Tag length: 21
        OUI: 00-0a-f5 (AirgoNet)
        Vendor Specific OUI Type: 10
        Vendor Specific Data: 0a0240c000030103050e04ff000300110101
    Tag: Vendor Specific: Microsof: WMM/WME: Parameter Element
        Tag Number: Vendor Specific (221)
        Tag length: 24
        OUI: 00-50-f2 (Microsof)
        Vendor Specific OUI Type: 2
        Type: WMM/WME (0x02)
        WME Subtype: Parameter Element (1)
        WME Version: 1
        WME QoS Info: 0x0f
        Reserved: 00
        Ac Parameters ACI 0 (Best Effort), ACM no, AIFSN 3, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
        Ac Parameters ACI 1 (Background), ACM no, AIFSN 7, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
        Ac Parameters ACI 2 (Video), ACM no, AIFSN 2, ECWmin/max 3/4 (CWmin/max 7/15), TXOP 94
        Ac Parameters ACI 3 (Voice), ACM no, AIFSN 2, ECWmin/max 2/3 (CWmin/max 3/7), TXOP 47
```

```
   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
Frame 474: 110 bytes on wire (880 bits), 110 bytes captured (880 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:05:31.883550000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082731.883550000 seconds
    [Time delta from previous captured frame: 0.001580000 seconds]
    [Time delta from previous displayed frame: 0.001580000 seconds]
    [Time since reference or first frame: 24.811093000 seconds]
    Frame Number: 474
    Frame Length: 110 bytes (880 bits)
    Capture Length: 110 bytes (880 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan:llc:ip:tcp]
    [Coloring Rule Name: HTTP]
    [Coloring Rule String: http || tcp.port == 80 || http2]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 48.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00c0, Orthogonal Frequency-Division Multiplexing (OFDM), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..0. .... = Complementary Code Keying (CCK): False
        .... .... .1.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): True
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -38dBm
    SSI Noise: -100dBm
    Signal Quality: 96
    Antenna: 0
    SSI Signal: 62dB
    RX flags: 0xfce0
        .... .... .... .... .... ..0. = Bad PLCP: False
802.11 radio information
```

```
     PHY type: 802.11g (6)
     Short preamble: False
     Proprietary mode: None (0)
     Data rate: 48.0 Mb/s
     Channel: 6
     Frequency: 2437MHz
     Signal strength (dBm): -38dBm
     Noise level (dBm): -100dBm
     [Duration: 36µs]
         [Preamble: 20µs]
IEEE 802.11 QoS Data, Flags: .......TC
     Type/Subtype: QoS Data (0x0028)
     Frame Control Field: 0x8801
           .... ..00 = Version: 0
           .... 10.. = Type: Data frame (2)
           1000 .... = Subtype: 8
         Flags: 0x01
             .... ..01 = DS status: Frame from STA to DS via an AP (To DS: 1 From DS: 0) (0x1)
             .... .0.. = More Fragments: This is the last fragment
             .... 0... = Retry: Frame is not being retransmitted
             ...0 .... = PWR MGT: STA will stay up
             ..0. .... = More Data: No data buffered
             .0.. .... = Protected flag: Data is not protected
             0... .... = Order flag: Not strictly ordered
     .000 0000 0010 1100 = Duration: 44 microseconds
     Receiver address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
     Destination address: Cisco-Li_f4:eb:a8 (00:16:b6:f4:eb:a8)
     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)
     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
           .... .... .... 0000 = TID: 0
           [.... .... .... .000 = Priority: Best Effort (Best Effort) (0)]
           .... .... ...0 .... = QoS bit 4: Bits 8-15 of QoS Control field are TXOP Duration Requested
           .... .... .00. .... = Ack Policy: Normal Ack (0x0)
           .... .... 0... .... = Payload Type: MSDU
           0000 0000 .... .... = TXOP Duration Requested: 0 (no TXOP requested)
Logical-Link Control
     DSAP: SNAP (0xaa)
     SSAP: SNAP (0xaa)
     Control field: U, func=UI (0x03)
     Organization Code: Encapsulated Ethernet (0x000000)
     Type: IPv4 (0x0800)
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: 0x02 (Don't Fragment)
     Fragment offset: 0
     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
     [Source GeoIP: Unknown]
     [Destination GeoIP: Unknown]
Transmission Control Protocol, Src Port: 2538, Dst Port: 80, Seq: 0, Len: 0
```

```
    478 24.828024        192.168.1.109        128.119.245.12        TCP        102   2538 → 80 [ACK] Seq=1 Ack=1 Win=17520 Len=0
Frame 478: 102 bytes on wire (816 bits), 102 bytes captured (816 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:05:31.900481000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082731.900481000 seconds
    [Time delta from previous captured frame: 0.000102000 seconds]
    [Time delta from previous displayed frame: 0.000102000 seconds]
    [Time since reference or first frame: 24.828024000 seconds]
    Frame Number: 478
    Frame Length: 102 bytes (816 bits)
    Capture Length: 102 bytes (816 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan:llc:ip:tcp]
    [Coloring Rule Name: HTTP]
    [Coloring Rule String: http || tcp.port == 80 || http2]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 48.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00c0, Orthogonal Frequency-Division Multiplexing (OFDM), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..0. .... = Complementary Code Keying (CCK): False
        .... .... .1.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): True
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -38dBm
    SSI Noise: -100dBm
    Signal Quality: 93
    Antenna: 0
    SSI Signal: 62dB
    RX flags: 0x7dc7, Bad PLCP
        .... .... .... .... .... ..1. = Bad PLCP: True
802.11 radio information
    PHY type: 802.11g (6)
```

```
        Short preamble: False
        Proprietary mode: None (0)
        Data rate: 48.0 Mb/s
        Channel: 6
        Frequency: 2437MHz
        Signal strength (dBm): -38dBm
        Noise level (dBm): -100dBm
        [Duration: 36µs]
            [Preamble: 20µs]
IEEE 802.11 QoS Data, Flags: .......TC
    Type/Subtype: QoS Data (0x0028)
    Frame Control Field: 0x8801
        .... ..00 = Version: 0
        .... 10.. = Type: Data frame (2)
        1000 .... = Subtype: 8
        Flags: 0x01
            .... ..01 = DS status: Frame from STA to DS via an AP (To DS: 1 From DS: 0) (0x1)
            .... .0.. = More Fragments: This is the last fragment
            .... 0... = Retry: Frame is not being retransmitted
            ...0 .... = PWR MGT: STA will stay up
            ..0. .... = More Data: No data buffered
            .0.. .... = Protected flag: Data is not protected
            0... .... = Order flag: Not strictly ordered
    .000 0000 0010 1100 = Duration: 44 microseconds
    Receiver address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
    Destination address: Cisco-Li_f4:eb:a8 (00:16:b6:f4:eb:a8)
    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)
    STA address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
    .... .... .... 0000 = Fragment number: 0
    0000 0011 0010 .... = Sequence number: 50
    Frame check sequence: 0xe9857dc7 [correct]
    [FCS Status: Good]
    Qos Control: 0x0000
        .... .... .... 0000 = TID: 0
        [.... .... .... .000 = Priority: Best Effort (Best Effort) (0)]
        .... .... ...0 .... = QoS bit 4: Bits 8-15 of QoS Control field are TXOP Duration Requested
        .... .... .00. .... = Ack Policy: Normal Ack (0x0)
        .... .... 0... .... = Payload Type: MSDU
        0000 0000 .... .... = TXOP Duration Requested: 0 (no TXOP requested)
Logical-Link Control
    DSAP: SNAP (0xaa)
    SSAP: SNAP (0xaa)
    Control field: U, func=UI (0x03)
    Organization Code: Encapsulated Ethernet (0x000000)
    Type: IPv4 (0x0800)
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: 40
    Identification: 0x1325 (4901)
    Flags: 0x02 (Don't Fragment)
    Fragment offset: 0
    Time to live: 128
    Protocol: TCP (6)
    Header checksum: 0xb011 [validation disabled]
    [Header checksum status: Unverified]
    Source: 192.168.1.109
    Destination: 128.119.245.12
    [Source GeoIP: Unknown]
    [Destination GeoIP: Unknown]
Transmission Control Protocol, Src Port: 2538, Dst Port: 80, Seq: 1, Ack: 1, Len: 0
```

```
   1733 49.583615      192.168.1.109        192.168.1.1          DHCP      390    DHCP Release  - Transaction ID 0xea5a526
Frame 1733: 390 bytes on wire (3120 bits), 390 bytes captured (3120 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:05:56.656072000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082756.656072000 seconds
    [Time delta from previous captured frame: 0.041134000 seconds]
    [Time delta from previous displayed frame: 0.041134000 seconds]
    [Time since reference or first frame: 49.583615000 seconds]
    Frame Number: 1733
    Frame Length: 390 bytes (3120 bits)
    Capture Length: 390 bytes (3120 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan:llc:ip:udp:bootp]
    [Coloring Rule Name: UDP]
    [Coloring Rule String: udp]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
                .... .... .... .... .... .... .... ...0 = TSFT: Absent
                .... .... .... .... .... .... .... ..1. = Flags: Present
                .... .... .... .... .... .... .... .1.. = Rate: Present
                .... .... .... .... .... .... .... 1... = Channel: Present
                .... .... .... .... .... .... ...0 .... = FHSS: Absent
                .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
                .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
                .... .... .... .... .... .... 1... .... = Lock Quality: Present
                .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
                .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
                .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
                .... .... .... .... .... 1... .... .... = Antenna: Present
                .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
                .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
                .... .... .... .... .1.. .... .... .... = RX flags: Present
                .... .... .... .0.. .... .... .... .... = Channel+: Absent
                .... .... .... 0... .... .... .... .... = MCS information: Absent
                .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
                .... .... ..0. .... .... .... .... .... = VHT information: Absent
                .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
                ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
                ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
                .0.. .... .... .... .... .... .... .... = Vendor NS next: False
                0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 54.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00c0, Orthogonal Frequency-Division Multiplexing (OFDM), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..0. .... = Complementary Code Keying (CCK): False
        .... .... .1.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): True
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -27dBm
    SSI Noise: -100dBm
    Signal Quality: 96
    Antenna: 0
    SSI Signal: 73dB
    RX flags: 0x1791
        .... .... .... .... .... ..0. = Bad PLCP: False
802.11 radio information
    PHY type: 802.11g (6)
```

```
      Short preamble: False
      Proprietary mode: None (0)
      Data rate: 54.0 Mb/s
      Channel: 6
      Frequency: 2437MHz
      Signal strength (dBm): -27dBm
      Noise level (dBm): -100dBm
      [Duration: 76µs]
          [Preamble: 20µs]
IEEE 802.11 QoS Data, Flags: .......TC
    Type/Subtype: QoS Data (0x0028)
    Frame Control Field: 0x8801
          .... ..00 = Version: 0
          .... 10.. = Type: Data frame (2)
          1000 .... = Subtype: 8
          Flags: 0x01
              .... ..01 = DS status: Frame from STA to DS via an AP (To DS: 1 From DS: 0) (0x1)
              .... .0.. = More Fragments: This is the last fragment
              .... 0... = Retry: Frame is not being retransmitted
              ...0 .... = PWR MGT: STA will stay up
              ..0. .... = More Data: No data buffered
              .0.. .... = Protected flag: Data is not protected
              0... .... = Order flag: Not strictly ordered
    .000 0000 0010 1100 = Duration: 44 microseconds
    Receiver address: Cisco-Li_f7:1d:51 (00:16:b6:f7:1d:51)
    Destination address: Cisco-Li_f4:eb:a8 (00:16:b6:f4:eb:a8)
    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)
    STA address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
    .... .... .... 0000 = Fragment number: 0
    0000 1011 1000 .... = Sequence number: 184
    Frame check sequence: 0x90381791 [correct]
    [FCS Status: Good]
    Qos Control: 0x0000
          .... .... .... 0000 = TID: 0
          [.... .... .... .000 = Priority: Best Effort (Best Effort) (0)]
          .... .... ...0 .... = QoS bit 4: Bits 8-15 of QoS Control field are TXOP Duration Requested
          .... .... .00. .... = Ack Policy: Normal Ack (0x0)
          .... .... 0... .... = Payload Type: MSDU
          0000 0000 .... .... = TXOP Duration Requested: 0 (no TXOP requested)
Logical-Link Control
    DSAP: SNAP (0xaa)
    SSAP: SNAP (0xaa)
    Control field: U, func=UI (0x03)
    Organization Code: Encapsulated Ethernet (0x000000)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src: 192.168.1.109, Dst: 192.168.1.1
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 328
    Identification: 0x141c (5148)
    Flags: 0x00
    Fragment offset: 0
    Time to live: 128
    Protocol: UDP (17)
    Header checksum: 0xa1ca [validation disabled]
    [Header checksum status: Unverified]
    Source: 192.168.1.109
    Destination: 192.168.1.1
    [Source GeoIP: Unknown]
    [Destination GeoIP: Unknown]
User Datagram Protocol, Src Port: 68, Dst Port: 67
Bootstrap Protocol (Release)
```

```
   1735 49.609617      IntelCor_d1:b6:4f    Cisco-Li_f7:1d:51      802.11   54       Deauthentication, SN=1605, FN=0, Flags=........C
Frame 1735: 54 bytes on wire (432 bits), 54 bytes captured (432 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:05:56.682074000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082756.682074000 seconds
    [Time delta from previous captured frame: 0.025846000 seconds]
    [Time delta from previous displayed frame: 0.025846000 seconds]
    [Time since reference or first frame: 49.609617000 seconds]
    Frame Number: 1735
    Frame Length: 54 bytes (432 bits)
    Capture Length: 54 bytes (432 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 54.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00c0, Orthogonal Frequency-Division Multiplexing (OFDM), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..0. .... = Complementary Code Keying (CCK): False
        .... .... .1.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): True
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -27dBm
    SSI Noise: -100dBm
    Signal Quality: 85
    Antenna: 0
    SSI Signal: 73dB
    RX flags: 0x8b9c
        .... .... .... .... .... ..0. = Bad PLCP: False
802.11 radio information
    PHY type: 802.11g (6)
    Short preamble: False
    Proprietary mode: None (0)
```

```
       Data rate: 54.0 Mb/s
       Channel: 6
       Frequency: 2437MHz
       Signal strength (dBm): -27dBm
       Noise level (dBm): -100dBm
       [Duration: 28µs]
           [Preamble: 20µs]
IEEE 802.11 Deauthentication, Flags: ........C
       Type/Subtype: Deauthentication (0x000c)
       Frame Control Field: 0xc000
           .... ..00 = Version: 0
           .... 00.. = Type: Management frame (0)
           1100 .... = Subtype: 12
           Flags: 0x00
               .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
               .... .0.. = More Fragments: This is the last fragment
               .... 0... = Retry: Frame is not being retransmitted
               ...0 .... = PWR MGT: STA will stay up
               ..0. .... = More Data: No data buffered
               .0.. .... = Protected flag: Data is not protected
               0... .... = Order flag: Not strictly ordered
       .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 0100 0101 .... = Sequence number: 1605
       Frame check sequence: 0x3b4a8b9c [correct]
       [FCS Status: Good]
IEEE 802.11 wireless LAN
       Fixed parameters (2 bytes)
           Reason code: Unspecified reason (0x0001)
```

```
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
```

```
   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
Frame 2162: 89 bytes on wire (712 bits), 89 bytes captured (712 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:06:10.242367000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082770.242367000 seconds
    [Time delta from previous captured frame: 0.000096000 seconds]
    [Time delta from previous displayed frame: 0.000096000 seconds]
    [Time since reference or first frame: 63.169910000 seconds]
    Frame Number: 2162
    Frame Length: 89 bytes (712 bits)
    Capture Length: 89 bytes (712 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 54.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00c0, Orthogonal Frequency-Division Multiplexing (OFDM), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..0. .... = Complementary Code Keying (CCK): False
        .... .... .1.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): True
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -29dBm
    SSI Noise: -100dBm
    Signal Quality: 100
    Antenna: 0
    SSI Signal: 71dB
    RX flags: 0xadc6, Bad PLCP
        .... .... .... .... .... ..1. = Bad PLCP: True
802.11 radio information
    PHY type: 802.11g (6)
    Short preamble: False
```

```
    Proprietary mode: None (0)
    Data rate: 54.0 Mb/s
    Channel: 6
    Frequency: 2437MHz
    Signal strength (dBm): -29dBm
    Noise level (dBm): -100dBm
    [Duration: 32µs]
        [Preamble: 20µs]
IEEE 802.11 Association Request, Flags: ........C
    Type/Subtype: Association Request (0x0000)
    Frame Control Field: 0x0000
        .... ..00 = Version: 0
        .... 00.. = Type: Management frame (0)
        0000 .... = Subtype: 0
        Flags: 0x00
            .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
            .... .0.. = More Fragments: This is the last fragment
            .... 0... = Retry: Frame is not being retransmitted
            ...0 .... = PWR MGT: STA will stay up
            ..0. .... = More Data: No data buffered
            .0.. .... = Protected flag: Data is not protected
            0... .... = Order flag: Not strictly ordered
    .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 [correct]
    [FCS Status: Good]
IEEE 802.11 wireless LAN
    Fixed parameters (4 bytes)
        Capabilities Information: 0xce01
        Listen Interval: 0x000a
    Tagged parameters (33 bytes)
        Tag: SSID parameter set: 30 Munroe St
            Tag Number: SSID parameter set (0)
            Tag length: 12
            SSID: 30 Munroe St
        Tag: Supported Rates 1(B), 2(B), 5.5(B), 11(B), 6(B), 9, 12(B), 18, [Mbit/sec]
            Tag Number: Supported Rates (1)
            Tag length: 8
            Supported Rates: 1(B) (0x82)
            Supported Rates: 2(B) (0x84)
            Supported Rates: 5.5(B) (0x8b)
            Supported Rates: 11(B) (0x96)
            Supported Rates: 6(B) (0x8c)
            Supported Rates: 9 (0x12)
            Supported Rates: 12(B) (0x98)
            Supported Rates: 18 (0x24)
        Tag: QoS Capability
            Tag Number: QoS Capability (46)
            Tag length: 1
            QoS Information (STA): 0x00
        Tag: Extended Supported Rates 24(B), 36, 48, 54, [Mbit/sec]
            Tag Number: Extended Supported Rates (50)
            Tag length: 4
            Extended Supported Rates: 24(B) (0xb0)
            Extended Supported Rates: 36 (0x48)
            Extended Supported Rates: 48 (0x60)
            Extended Supported Rates: 54 (0x6c)
```

```
   2166 63.192101       Cisco-Li_f7:1d:51       IntelCor_d1:b6:4f       802.11      94       Association Response, SN=3728, FN=0, Flags=........C
Frame 2166: 94 bytes on wire (752 bits), 94 bytes captured (752 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:06:10.264558000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082770.264558000 seconds
    [Time delta from previous captured frame: 0.021101000 seconds]
    [Time delta from previous displayed frame: 0.021101000 seconds]
    [Time since reference or first frame: 63.192101000 seconds]
    Frame Number: 2166
    Frame Length: 94 bytes (752 bits)
    Capture Length: 94 bytes (752 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 1.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00a0, Complementary Code Keying (CCK), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..1. .... = Complementary Code Keying (CCK): True
        .... .... .0.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): False
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -31dBm
    SSI Noise: -100dBm
    Signal Quality: 100
    Antenna: 0
    SSI Signal: 69dB
    RX flags: 0xab2b, Bad PLCP
        .... .... .... .... .... ..1. = Bad PLCP: True
802.11 radio information
    PHY type: 802.11b (4)
    Short preamble: False
    Data rate: 1.0 Mb/s
```

```
        Channel: 6
        Frequency: 2437MHz
        Signal strength (dBm): -31dBm
        Noise level (dBm): -100dBm
        [Duration: 752µs]
            [Preamble: 192µs]
IEEE 802.11 Association Response, Flags: ........C
    Type/Subtype: Association Response (0x0001)
    Frame Control Field: 0x1000
        .... ..00 = Version: 0
        .... 00.. = Type: Management frame (0)
        0001 .... = Subtype: 1
        Flags: 0x00
            .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
            .... .0.. = More Fragments: This is the last fragment
            .... 0... = Retry: Frame is not being retransmitted
            ...0 .... = PWR MGT: STA will stay up
            ..0. .... = More Data: No data buffered
            .0.. .... = Protected flag: Data is not protected
            0... .... = Order flag: Not strictly ordered
    .000 0001 0011 1010 = Duration: 314 microseconds
    Receiver address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
    Destination address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
    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 1001 0000 .... = Sequence number: 3728
    Frame check sequence: 0x37f2ab2b [correct]
    [FCS Status: Good]
IEEE 802.11 wireless LAN
    Fixed parameters (6 bytes)
        Capabilities Information: 0x0601
        Status code: Successful (0x0000)
        ..00 0000 0000 0101 = Association ID: 0x0005
    Tagged parameters (36 bytes)
        Tag: Supported Rates 1(B), 2(B), 5.5(B), 11(B), [Mbit/sec]
            Tag Number: Supported Rates (1)
            Tag length: 4
            Supported Rates: 1(B) (0x82)
            Supported Rates: 2(B) (0x84)
            Supported Rates: 5.5(B) (0x8b)
            Supported Rates: 11(B) (0x96)
        Tag: Extended Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
            Tag Number: Extended Supported Rates (50)
            Tag length: 8
            Extended Supported Rates: 6(B) (0x8c)
            Extended Supported Rates: 9 (0x12)
            Extended Supported Rates: 12(B) (0x98)
            Extended Supported Rates: 18 (0x24)
            Extended Supported Rates: 24(B) (0xb0)
            Extended Supported Rates: 36 (0x48)
            Extended Supported Rates: 48 (0x60)
            Extended Supported Rates: 54 (0x6c)
        Tag: EDCA Parameter Set
            Tag Number: EDCA Parameter Set (12)
            Tag length: 18
            WME QoS Info: 0x0f
            Reserved: 00
            Ac Parameters ACI 0 (Best Effort), ACM no, AIFSN 3, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
            Ac Parameters ACI 1 (Background), ACM no, AIFSN 7, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
            Ac Parameters ACI 2 (Video), ACM no, AIFSN 2, ECWmin/max 3/4 (CWmin/max 7/15), TXOP 94
            Ac Parameters ACI 3 (Voice), ACM no, AIFSN 2, ECWmin/max 2/3 (CWmin/max 3/7), TXOP 47
```

```
   2152 63.140106        IntelCor_d1:b6:4f      Broadcast            802.11    94       Probe Request, SN=1647, FN=0, Flags=........C,
SSID=30 Munroe St
Frame 2152: 94 bytes on wire (752 bits), 94 bytes captured (752 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:06:10.212563000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082770.212563000 seconds
    [Time delta from previous captured frame: 0.004744000 seconds]
    [Time delta from previous displayed frame: 0.004744000 seconds]
    [Time since reference or first frame: 63.140106000 seconds]
    Frame Number: 2152
    Frame Length: 94 bytes (752 bits)
    Capture Length: 94 bytes (752 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
                .... .... .... .... .... .... .... ...0 = TSFT: Absent
                .... .... .... .... .... .... .... ..1. = Flags: Present
                .... .... .... .... .... .... .... .1.. = Rate: Present
                .... .... .... .... .... .... .... 1... = Channel: Present
                .... .... .... .... .... .... ...0 .... = FHSS: Absent
                .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
                .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
                .... .... .... .... .... .... 1... .... = Lock Quality: Present
                .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
                .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
                .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
                .... .... .... .... .... 1... .... .... = Antenna: Present
                .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
                .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
                .... .... .... .... .1.. .... .... .... = RX flags: Present
                .... .... .... .0.. .... .... .... .... = Channel+: Absent
                .... .... .... 0... .... .... .... .... = MCS information: Absent
                .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
                .... .... ..0. .... .... .... .... .... = VHT information: Absent
                .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
                ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
                ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
                .0.. .... .... .... .... .... .... .... = Vendor NS next: False
                0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 1.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00a0, Complementary Code Keying (CCK), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..1. .... = Complementary Code Keying (CCK): True
        .... .... .0.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): False
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -27dBm
    SSI Noise: -100dBm
    Signal Quality: 100
    Antenna: 0
    SSI Signal: 73dB
    RX flags: 0x2db8
        .... .... .... .... .... ..0. = Bad PLCP: False
802.11 radio information
    PHY type: 802.11b (4)
    Short preamble: False
```

```
          Data rate: 1.0 Mb/s
          Channel: 6
          Frequency: 2437MHz
          Signal strength (dBm): -27dBm
          Noise level (dBm): -100dBm
          [Duration: 752µs]
              [Preamble: 192µs]
IEEE 802.11 Probe Request, Flags: ........C
      Type/Subtype: Probe Request (0x0004)
      Frame Control Field: 0x4000
            .... ..00 = Version: 0
            .... 00.. = Type: Management frame (0)
            0100 .... = Subtype: 4
            Flags: 0x00
                  .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
                  .... .0.. = More Fragments: This is the last fragment
                  .... 0... = Retry: Frame is not being retransmitted
                  ...0 .... = PWR MGT: STA will stay up
                  ..0. .... = More Data: No data buffered
                  .0.. .... = Protected flag: Data is not protected
                  0... .... = Order flag: Not strictly ordered
            .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: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
      Source address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
      BSS Id: Broadcast (ff:ff:ff:ff:ff:ff)
      .... .... .... 0000 = Fragment number: 0
      0110 0110 1111 .... = Sequence number: 1647
      Frame check sequence: 0xec462db8 [correct]
      [FCS Status: Good]
IEEE 802.11 wireless LAN
      Tagged parameters (42 bytes)
            Tag: SSID parameter set: 30 Munroe St
                  Tag Number: SSID parameter set (0)
                  Tag length: 12
                  SSID: 30 Munroe St
            Tag: Supported Rates 1, 2, 5.5, 11, 6, 9, 12, 18, [Mbit/sec]
                  Tag Number: Supported Rates (1)
                  Tag length: 8
                  Supported Rates: 1 (0x02)
                  Supported Rates: 2 (0x04)
                  Supported Rates: 5.5 (0x0b)
                  Supported Rates: 11 (0x16)
                  Supported Rates: 6 (0x0c)
                  Supported Rates: 9 (0x12)
                  Supported Rates: 12 (0x18)
                  Supported Rates: 18 (0x24)
            Tag: Request
                  Tag Number: Request (10)
                  Tag length: 1
                  Requested Element ID: Country Information (7)
            Tag: Extended Supported Rates 24, 36, 48, 54, [Mbit/sec]
                  Tag Number: Extended Supported Rates (50)
                  Tag length: 4
                  Extended Supported Rates: 24 (0x30)
                  Extended Supported Rates: 36 (0x48)
                  Extended Supported Rates: 48 (0x60)
                  Extended Supported Rates: 54 (0x6c)
            Tag: Vendor Specific: Intel
                  Tag Number: Vendor Specific (221)
                  Tag length: 7
                  OUI: 00-03-47 (Intel)
                  Vendor Specific OUI Type: 1
                  Vendor Specific Data: 01020101
```

```
   2153 63.142451          Cisco-Li_f7:1d:51     IntelCor_d1:b6:4f         802.11     177        Probe Response, SN=3724, FN=0, Flags=........C,
BI=100, SSID=30 Munroe St
Frame 2153: 177 bytes on wire (1416 bits), 177 bytes captured (1416 bits)
    Encapsulation type: IEEE 802.11 plus radiotap radio header (23)
    Arrival Time: Jun 28, 2007 22:06:10.214908000 Eastern Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1183082770.214908000 seconds
    [Time delta from previous captured frame: 0.002345000 seconds]
    [Time delta from previous displayed frame: 0.002345000 seconds]
    [Time since reference or first frame: 63.142451000 seconds]
    Frame Number: 2153
    Frame Length: 177 bytes (1416 bits)
    Capture Length: 177 bytes (1416 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: radiotap:wlan_radio:wlan]
Radiotap Header v0, Length 24
    Header revision: 0
    Header pad: 0
    Header length: 24
    Present flags
        Present flags word: 0x000058ee
            .... .... .... .... .... .... .... ...0 = TSFT: Absent
            .... .... .... .... .... .... .... ..1. = Flags: Present
            .... .... .... .... .... .... .... .1.. = Rate: Present
            .... .... .... .... .... .... .... 1... = Channel: Present
            .... .... .... .... .... .... ...0 .... = FHSS: Absent
            .... .... .... .... .... .... ..1. .... = dBm Antenna Signal: Present
            .... .... .... .... .... .... .1.. .... = dBm Antenna Noise: Present
            .... .... .... .... .... .... 1... .... = Lock Quality: Present
            .... .... .... .... .... ...0 .... .... = TX Attenuation: Absent
            .... .... .... .... .... ..0. .... .... = dB TX Attenuation: Absent
            .... .... .... .... .... .0.. .... .... = dBm TX Power: Absent
            .... .... .... .... .... 1... .... .... = Antenna: Present
            .... .... .... .... ...1 .... .... .... = dB Antenna Signal: Present
            .... .... .... .... ..0. .... .... .... = dB Antenna Noise: Absent
            .... .... .... .... .1.. .... .... .... = RX flags: Present
            .... .... .... .0.. .... .... .... .... = Channel+: Absent
            .... .... .... 0... .... .... .... .... = MCS information: Absent
            .... .... ...0 .... .... .... .... .... = A-MPDU Status: Absent
            .... .... ..0. .... .... .... .... .... = VHT information: Absent
            .... .... .0.. .... .... .... .... .... = frame timestamp: Absent
            ...0 0000 0... .... .... .... .... .... = Reserved: 0x00
            ..0. .... .... .... .... .... .... .... = Radiotap NS next: False
            .0.. .... .... .... .... .... .... .... = Vendor NS next: False
            0... .... .... .... .... .... .... .... = Ext: Absent
    Flags: 0x10
        .... ...0 = CFP: False
        .... ..0. = Preamble: Long
        .... .0.. = WEP: False
        .... 0... = Fragmentation: False
        ...1 .... = FCS at end: True
        ..0. .... = Data Pad: False
        .0.. .... = Bad FCS: False
        0... .... = Short GI: False
    Data Rate: 1.0 Mb/s
    Channel frequency: 2437 [BG 6]
    Channel flags: 0x00a0, Complementary Code Keying (CCK), 2 GHz spectrum
        .... .... ...0 .... = Turbo: False
        .... .... ..1. .... = Complementary Code Keying (CCK): True
        .... .... .0.. .... = Orthogonal Frequency-Division Multiplexing (OFDM): False
        .... .... 1... .... = 2 GHz spectrum: True
        .... ...0 .... .... = 5 GHz spectrum: False
        .... ..0. .... .... = Passive: False
        .... .0.. .... .... = Dynamic CCK-OFDM: False
        .... 0... .... .... = Gaussian Frequency Shift Keying (GFSK): False
        ...0 .... .... .... = GSM (900MHz): False
        ..0. .... .... .... = Static Turbo: False
        .0.. .... .... .... = Half Rate Channel (10MHz Channel Width): False
        0... .... .... .... = Quarter Rate Channel (5MHz Channel Width): False
    SSI Signal: -28dBm
    SSI Noise: -100dBm
    Signal Quality: 100
    Antenna: 0
    SSI Signal: 72dB
    RX flags: 0xe2af, Bad PLCP
        .... .... .... .... .... ..1. = Bad PLCP: True
802.11 radio information
    PHY type: 802.11b (4)
    Short preamble: False
```

```
     Data rate: 1.0 Mb/s
     Channel: 6
     Frequency: 2437MHz
     Signal strength (dBm): -28dBm
     Noise level (dBm): -100dBm
     [Duration: 1416µs]
         [Preamble: 192µs]
IEEE 802.11 Probe Response, Flags: ........C
     Type/Subtype: Probe Response (0x0005)
     Frame Control Field: 0x5000
         .... ..00 = Version: 0
         .... 00.. = Type: Management frame (0)
         0101 .... = Subtype: 5
         Flags: 0x00
             .... ..00 = DS status: Not leaving DS or network is operating in AD-HOC mode (To DS: 0 From DS: 0) (0x0)
             .... .0.. = More Fragments: This is the last fragment
             .... 0... = Retry: Frame is not being retransmitted
             ...0 .... = PWR MGT: STA will stay up
             ..0. .... = More Data: No data buffered
             .0.. .... = Protected flag: Data is not protected
             0... .... = Order flag: Not strictly ordered
     .000 0001 0011 1010 = Duration: 314 microseconds
     Receiver address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
     Destination address: IntelCor_d1:b6:4f (00:13:02:d1:b6:4f)
     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 1000 1100 .... = Sequence number: 3724
     Frame check sequence: 0xcf29e2af [correct]
     [FCS Status: Good]
IEEE 802.11 wireless LAN
     Fixed parameters (12 bytes)
         Timestamp: 0x0000002899fca997
         Beacon Interval: 0.102400 [Seconds]
         Capabilities Information: 0x0601
     Tagged parameters (113 bytes)
         Tag: SSID parameter set: 30 Munroe St
             Tag Number: SSID parameter set (0)
             Tag length: 12
             SSID: 30 Munroe St
         Tag: Supported Rates 1(B), 2(B), 5.5(B), 11(B), [Mbit/sec]
             Tag Number: Supported Rates (1)
             Tag length: 4
             Supported Rates: 1(B) (0x82)
             Supported Rates: 2(B) (0x84)
             Supported Rates: 5.5(B) (0x8b)
             Supported Rates: 11(B) (0x96)
         Tag: DS Parameter set: Current Channel: 6
             Tag Number: DS Parameter set (3)
             Tag length: 1
             Current Channel: 6
         Tag: Country Information: Country Code US, Environment Indoor
             Tag Number: Country Information (7)
             Tag length: 6
             Code: US
             Environment: Indoor (0x49)
             Country Info: First Channel Number: 1, Number of Channels: 11, Maximum Transmit Power Level: 26 dBm
         Tag: EDCA Parameter Set
             Tag Number: EDCA Parameter Set (12)
             Tag length: 18
             WME QoS Info: 0x0f
             Reserved: 00
             Ac Parameters ACI 0 (Best Effort), ACM no, AIFSN 3, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
             Ac Parameters ACI 1 (Background), ACM no, AIFSN 7, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
             Ac Parameters ACI 2 (Video), ACM no, AIFSN 2, ECWmin/max 3/4 (CWmin/max 7/15), TXOP 94
             Ac Parameters ACI 3 (Voice), ACM no, AIFSN 2, ECWmin/max 2/3 (CWmin/max 3/7), TXOP 47
         Tag: ERP Information
             Tag Number: ERP Information (42)
             Tag length: 1
             ERP Information: 0x00
         Tag: Extended Supported Rates 6(B), 9, 12(B), 18, 24(B), 36, 48, 54, [Mbit/sec]
             Tag Number: Extended Supported Rates (50)
             Tag length: 8
             Extended Supported Rates: 6(B) (0x8c)
             Extended Supported Rates: 9 (0x12)
             Extended Supported Rates: 12(B) (0x98)
             Extended Supported Rates: 18 (0x24)
             Extended Supported Rates: 24(B) (0xb0)
             Extended Supported Rates: 36 (0x48)
```

Extended Supported Rates: 48 (0x60)
            Extended Supported Rates: 54 (0x6c)
    Tag: Vendor Specific: AirgoNet
        Tag Number: Vendor Specific (221)
        Tag length: 21
        OUI: 00-0a-f5 (AirgoNet)
        Vendor Specific OUI Type: 10
        Vendor Specific Data: 0a0240c000030103050e04ff000300110101
    Tag: Vendor Specific: Microsof: WMM/WME: Parameter Element
        Tag Number: Vendor Specific (221)
        Tag length: 24
        OUI: 00-50-f2 (Microsof)
        Vendor Specific OUI Type: 2
        Type: WMM/WME (0x02)
        WME Subtype: Parameter Element (1)
        WME Version: 1
        WME QoS Info: 0x0f
        Reserved: 00
        Ac Parameters ACI 0 (Best Effort), ACM no, AIFSN 3, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
        Ac Parameters ACI 1 (Background), ACM no, AIFSN 7, ECWmin/max 4/10 (CWmin/max 15/1023), TXOP 0
        Ac Parameters ACI 2 (Video), ACM no, AIFSN 2, ECWmin/max 3/4 (CWmin/max 7/15), TXOP 94
        Ac Parameters ACI 3 (Voice), ACM no, AIFSN 2, ECWmin/max 2/3 (CWmin/max 3/7), TXOP 47