CSC 249 HW 8 DUE April 12

## Wireless and Mobility Questions

**Problem 1**

In step 4 of the CSMA/CA protocol, a host that successfully transmits a frame begins the CSMA/CA protocol for a second frame at step 2, rather than at step 1. What rationale might the designers of CSMA/CA have had in mind by having such a host not transmit the second frame immediately (if the channel is sensed idle)?

Provide a 2 or 3 sentence explanation. (You could also think about SIFS and DIFS as introduced below.)

**Problem 2**

Suppose an 802.11b host is configured to always reserve the channel with the RTS/CTS sequence. Suppose this host suddenly wants to transmit 1,000 bytes of data, and all other hosts are idle at this time. As a function of SIFS and DIFS, and ignoring propagation delay and assuming no bit errors, calculate the time required to transmit the frame and receive the acknowledgment. **Recall:** a link layer frame without data is 32 bytes long. **Assume:** the transmission rate is 11 Mbps.

SIFS, Short Inter-Frame Space, is the time required for a host to sense end of a frame and start transmitting. DIFS, Distributed Inter-Frame Space, is the time to wait before starting the backoff interval, and is often set equal to SIFS + 2 slot times (where a slot time is the basic unit of backoff in the CSMA/CA algorithm; the time required for a host to sense the end of a frame, start transmitting, and the actual beginning time of the frame to propagate to others). **ALSO SEE** figure 7.10 and related discussion in the text for the SIFS – Short Inter-frame Spacing, and DISF – Distributed Inter-frame Space.

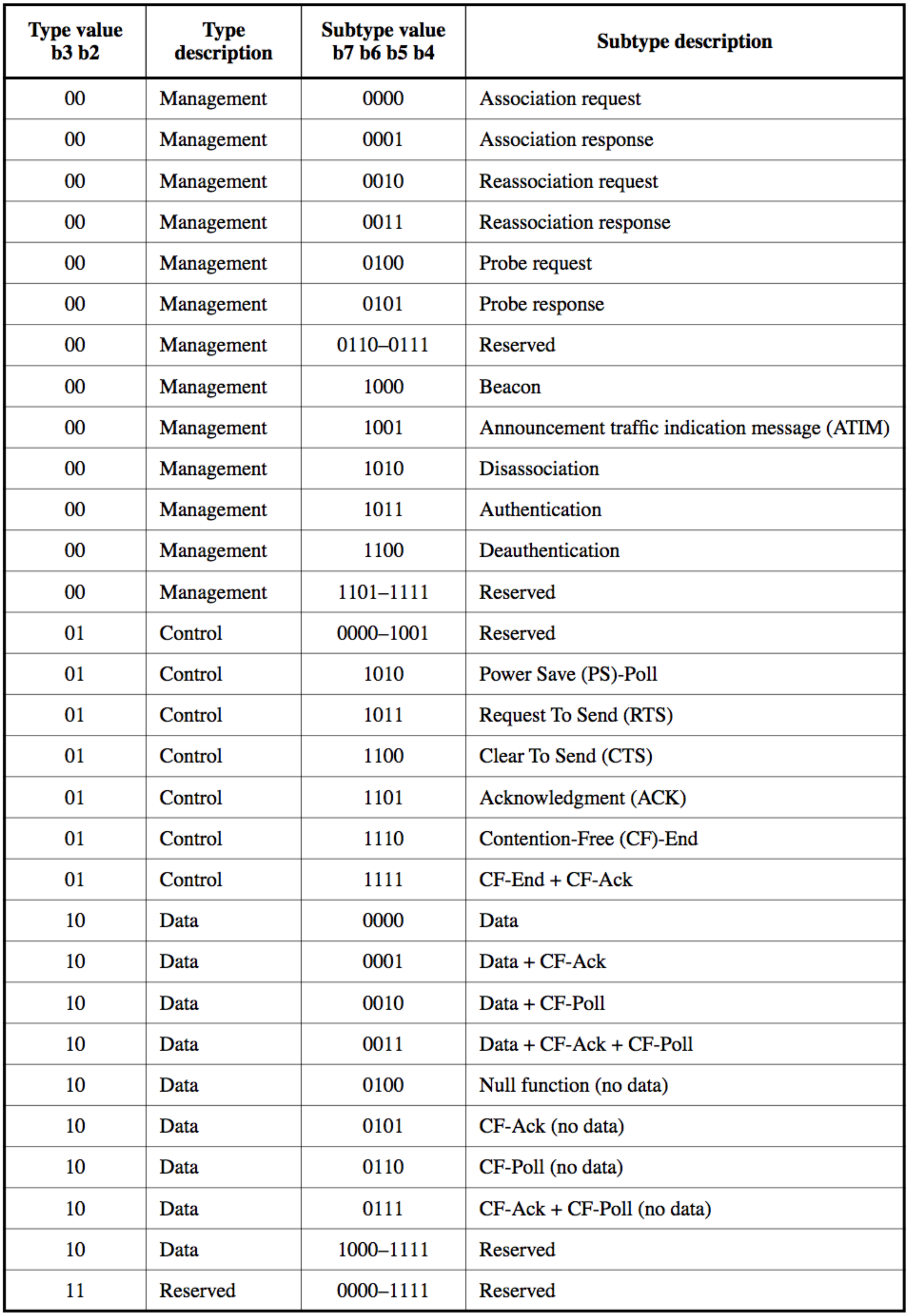
**Problem 3**

Suppose the correspondent in Figure 7.23 were mobile. Sketch the additional network-layer infrastructure that would be needed to route the datagram from the original mobile user to the (now mobile) correspondent. Show the structure of the datagram(s) between the original mobile user and the (now mobile) correspondent, as in Figure 7.24.

## Wireshark Lab: 802.11 Protocol

Investigate the 802.11 protocol with the Wireshark lab. Note that this lab specifically assumes you will use the provided traces, rather than being able to capture packets yourself. As stated in the lab, you are of course welcome to use packets you capture if you are able to do so.

The table referred to in the introduction of the lab, from the IEEE 802.11 standard is copied below.



| Type value b3 b2 | Type description | Subtype value b7 b6 b5 b4 | Subtype description |
|---|---|---|---|
| 00 | Management | 0000 | Association request |
| 00 | Management | 0001 | Association response |
| 00 | Management | 0010 | Reassociation request |
| 00 | Management | 0011 | Reassociation response |
| 00 | Management | 0100 | Probe request |
| 00 | Management | 0101 | Probe response |
| 00 | Management | 0110–0111 | Reserved |
| 00 | Management | 1000 | Beacon |
| 00 | Management | 1001 | Announcement traffic indication message (ATIM) |
| 00 | Management | 1010 | Disassociation |
| 00 | Management | 1011 | Authentication |
| 00 | Management | 1100 | Deauthentication |
| 00 | Management | 1101–1111 | Reserved |
| 01 | Control | 0000–1001 | Reserved |
| 01 | Control | 1010 | Power Save (PS)-Poll |
| 01 | Control | 1011 | Request To Send (RTS) |
| 01 | Control | 1100 | Clear To Send (CTS) |
| 01 | Control | 1101 | Acknowledgment (ACK) |
| 01 | Control | 1110 | Contention-Free (CF)-End |
| 01 | Control | 1111 | CF-End + CF-Ack |
| 10 | Data | 0000 | Data |
| 10 | Data | 0001 | Data + CF-Ack |
| 10 | Data | 0010 | Data + CF-Poll |
| 10 | Data | 0011 | Data + CF-Ack + CF-Poll |
| 10 | Data | 0100 | Null function (no data) |
| 10 | Data | 0101 | CF-Ack (no data) |
| 10 | Data | 0110 | CF-Poll (no data) |
| 10 | Data | 0111 | CF-Ack + CF-Poll (no data) |
| 10 | Data | 1000–1111 | Reserved |
| 11 | Reserved | 0000–1111 | Reserved |