In the name of beauty

10th problem set of ComNet course

Q1) Determine the following statements as true or false. (Use enough reasons and explanation to support your answer)

a- The hidden terminal problem disappears if no physical obstacle exists in the environment.

b- For a given modulation scheme, the higher the SNR of a service in physical layer is, the lower its bit error rate will be.

c- Like Ethernet, ARQ techniques are used in link-layer of a wireless network for coping with high bit error rates.

d- Addressing a mobile node residing in a foreign network with the approach that the foreign network advertise a highly specific route to the mobile node to the other domains, is a scalable solution that does not require significant changes to the network-layer infrastructure.

Q2) Mention two reasons that why should a **hand-off** take place in GSM during an ongoing call of a mobile node.

Q3) Figure 1 illustrates a schema for CDMA with two senders.

Each Sender transmits two bits, each of which coded with his own CDMA code (with a chipping rate of 8 times faster than the bit rate).

a- Find the strings of $Z^1_{i,m}$, $Z^2_{i,m}$ and $Z^*_{i,m}$.

b- Assuming that receiver 1 wishes to recover the two bits of sender 1, find d^1_1 and d^1_0.

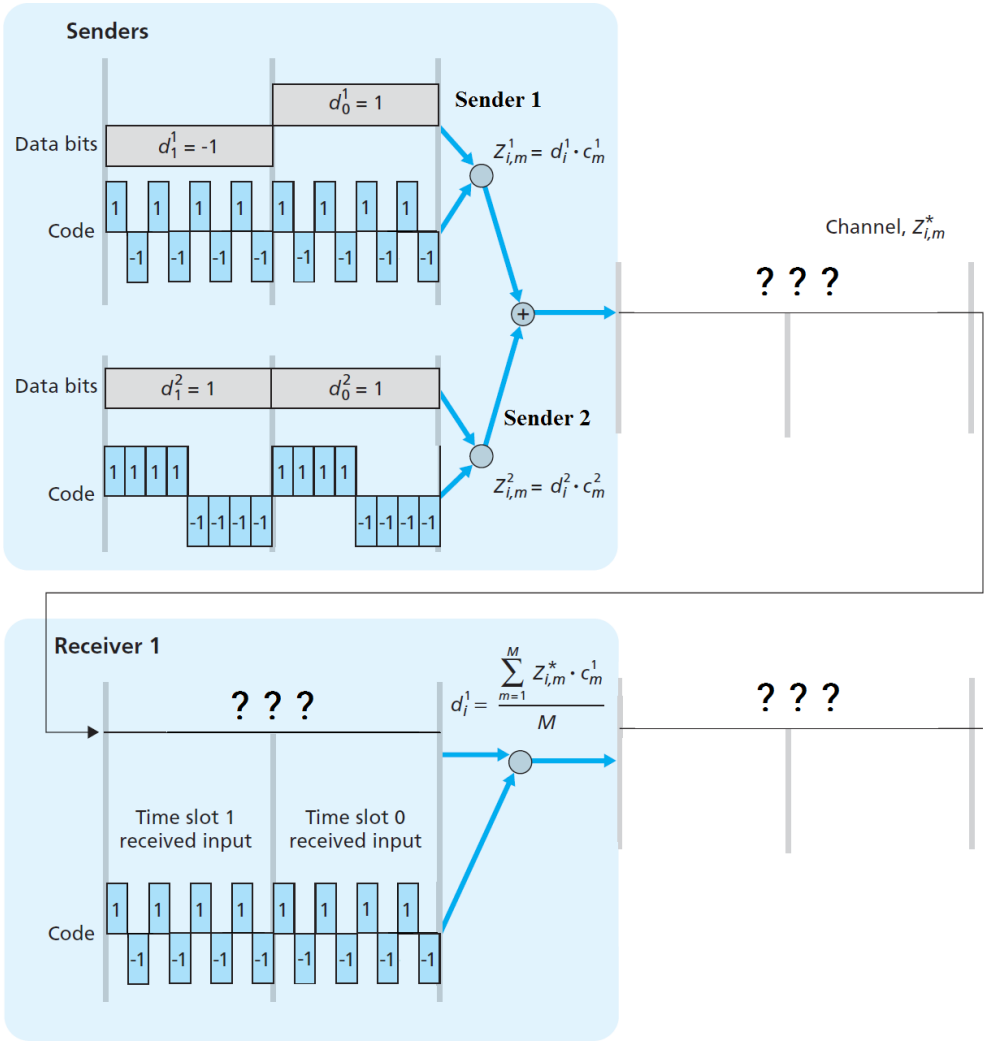
Senders
Data bits
Code
Sender 1
Sender 2
Channel, $Z^*_{i,m}$
? ? ?
Receiver 1
Time slot 1 received input
Time slot 0 received input

Figure 1:

(Hints:

The indices i and m in $Z^1_{i,m}$, denote the sender index and the CDMA code bit index, respectively. c^i_m is the CDMA code bit string of the i-th sender and the results of $Z^1_{i,m}$, $Z^2_{i,m}$ and $Z^*_{i,m}$ must be 8-bit strings each.

The summations denoted in the figure are NOT modulo-2. They are ordinary summations.

Read the subsection 6.2.1 (CDMA) and the figures 6.5 and 6.6 of the textbook for more explanations, if needed.)

Q4)

a) Under Ethernet's CSMA/CD, multiple access protocol, a station begins transmitting as soon as the channel is sensed idle. With 802.11 CSMA/CA, however, the station refrains from transmitting while counting down, even when it senses the channel to be idle.Why do CSMA/CD and CDMA/CA take such different approaches here?

b) Consider the 802.11 CSMA/CA once again. Assume that two stations A and B want to send frames. If A and B have experienced n_A and n_B collisions respectively and both, simuletaneously execute the binary exponential back-off for a radom delay before retransmission, what is the probability that the stations A and B do not collide in transmission due to equally generated random delays?

Q5)

Consider Figure 2. Assume that a host $H1$ broadcasts an RTS control frame to all the nodes, including an AP, to further send a DATA frame to another host, say $H2$. The AP, having received the RTS control frame, broadcasts a CTS control frame to $H1$ which is correctly received by **all other nodes** in the network, but lost on its way back to

$H1$. The host $H1$ waits for a while, then retransmits the RTS control frame. The new RTS control frame is now errorneously detected as DATA in the AP. Explain what happens next.

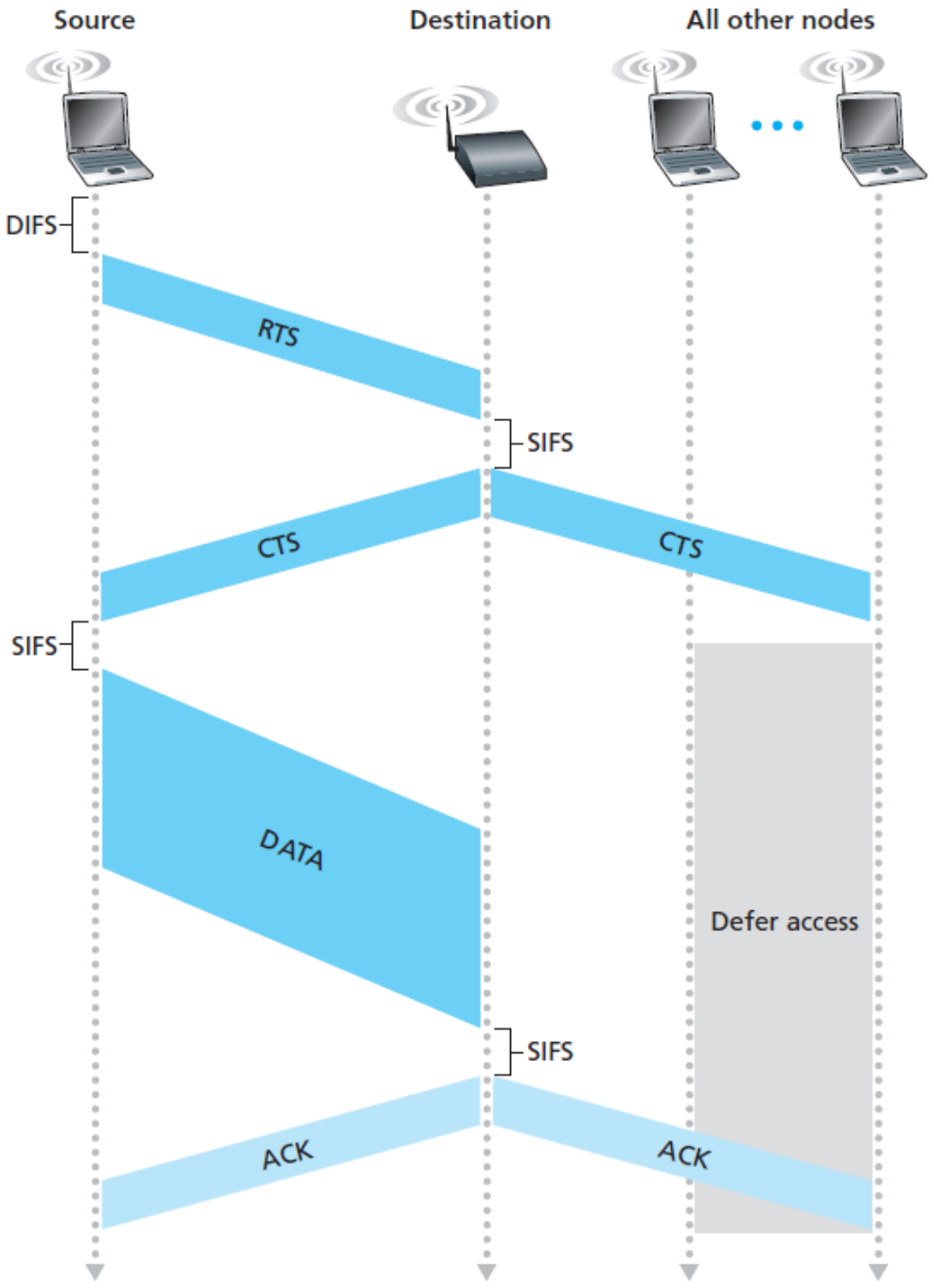
Source
Destination
All other nodes
DIFS
RTS
SIFS
CTS
CTS
SIFS
DATA
Defer access
SIFS
ACK
ACK

Figure 2: