HW#4

34743-02 정보통신공학

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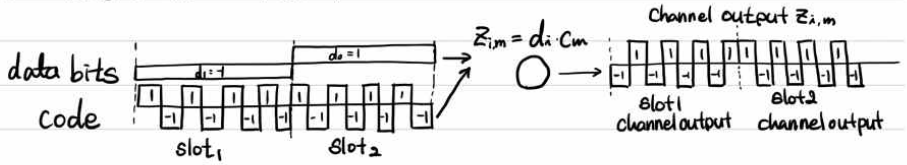
1. CDMA code : $(1, -1, 1, -1, 1, -1, 1, -1)$

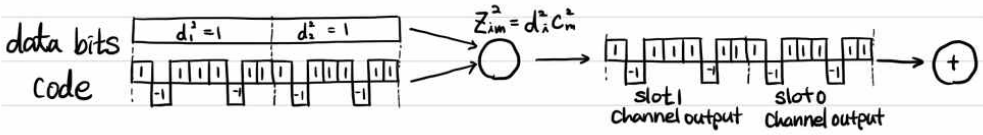
data bits : $d_1 = -1$, $d_0 = 1$



↳ encoding : (original data) × (chipping sequence)

A. Encoded results for $d_0 = (1, -1, 1, -1, 1, -1, 1, -1)$
Encoded results for $d_1 = (-1, 1, -1, 1, -1, 1, -1, 1)$

2. a) sender 2 code : $(1, -1, 1, 1, 1, -1, 1, 1)$



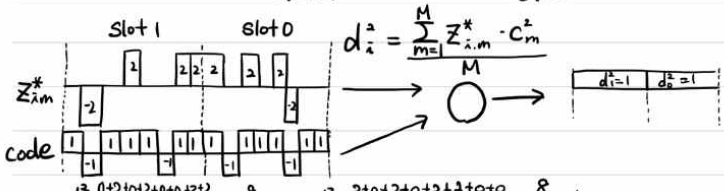
↳ encoding : (original data) × (chipping sequence)

A. $Z_{1,m}^2 = (1, -1, 1, 1, 1, -1, 1, 1)$
$Z_{0,m}^2 = (1, -1, 1, 1, 1, -1, 1, 1)$

b) sender 2 code : $(1, -1, 1, 1, 1, -1, 1, 1)$

$Z_{i,m}^* = (0, -2, 0, 2, 0, 0, 2, 2, 2, 0, 2, 0, 2, -2, 0, 0)$

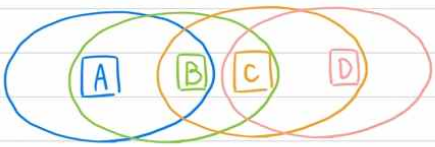
slot1 slot0



$d_1^2 = \frac{0+2+0+2+0+0+2+2}{8} = \frac{8}{8} = 1$, $d_0^2 = \frac{2+0+2+0+2+2+0+0}{8} = \frac{8}{8} = 1$

A: $d_1^2 = 1$, $d_0^2 = 1$

3.



a) data message transfer : C → A

↳ 경로 : C → B → A

(timeslot 1) A : silent B : recieve (from C) C : send (to B) D : silent

(timeslot 2) A : recieve (from B) B : send (to A) C : silent D : silent

∴ 1 message / 2 timeslots

b) data message transfer : A → B , D → C

(timeslot 1) A : send (to B) B : recieve (from A)

C : recieve (from D) D : send (to C)

∴ 2 messages / 1 timeslot

c) data message transfer : A → B , C → D

↳ B가 A의 data를 받는 도중 C가 D에 data를 전송하면 B가 C의 signal을 들을 수 있기 때문에 collision이 일어난다. 따라서 A의 transmission과 C의 transmission을 각각 다른 timeslot에 배치한다.

(timeslot 1) A : send (to B) B : recieve (from A) C : silent D : silent

(timeslot 2) A : silent B : silent C : send (to D) D : recieve (from C)

∴ 1 message / 1 timeslot (2 messages / 2 timeslots)

d) 

ⓐ C → A (경로 C → B → A) : A와 C는 direct connection이 없어 A에서 B를 한 번 거쳐 C까지 도달해야한다.

(timeslot 1) A : silent B : recieve (from C) C : send (to B) D : silent

(timeslot 2) A : recieve (from B) B : send (to A) C : silent D : silent

∴ 1 message / 2 timeslots

ⓑ A → B , D → C

(timeslot 1) A : send (to B) B : recieve (from A) C : recieve (from D) D : send (to C)

∴ 2 messages / 1 timeslot

ⓒ A→B, C→D : A,B,C,D가 각각 유선으로 직접 연결되어있으므로 A와 C가 동시에 전송할 때 B에서의 간섭을 고려할 필요가 없다.

(timeslot1) A:send(toB) B:recieve(fromA) C:send(toD), D:recieve(from C)

∴ 2 messages/ 1 timeslot

e) ⓐ C→B→A

(timeslot1) C sends msg to B

(timeslot2) B sends msg to A

(timeslot3) A sends ACK to B

(timeslot4) B sends ACK to C

∴ 1 message / 4 timeslots

ⓑ A→B , D→C

(timeslot1) A sends msg to B, D sends msg to C

(timeslot2) B sends ACK to A, (C는 B가 전송중이기 때문에 전송못함)

(timeslot3) C sends ACK to D

∴ 2 messages / 3 timeslots

ⓒ A→B, C→D

(timeslot1) A sends msg to B (C전송불가)

(timeslot2) C sends msg to D (B 전송불가)

(timeslot3) B sends ACK to A (C수신불가)

(timeslot4) D sends ACK to C

∴ 1 message / 2 timeslots (2messages/4timeslots)