1. Decoding Logical bit 1 and 0 by the best station.

(i) Suppose sation A (Code a) static B (Code b) static C (Code c) static D (Code d) station E (Code e) sends following logical bits: A : Logical 1, B: Logical 0, C: logical 1, D: logical 0 and E does not send any thing

(ii) Base station shall give the tick signal and A, B, C, D transmit their data

(iii) Base station then calculate the sum signal S chip by chip

$$S = a + \bar{b} + c + \bar{d}$$

Near base stn knows codes allocated to A, B, C, D, E are a, b, c, d e.

Base station shall parallelly

(vi) If the any of the above value = 1 : station has transmitted logical 1
= -1 : ——— do ——— logical 0
= 0 : station has not transmitted anything

(vii) Decoding
Let us take the above example
for A : $S \cdot a = (a + \bar{b} + c + \bar{d}) \cdot a$
$= a \cdot a + \bar{b} \cdot a + c \cdot a + \bar{d} \cdot a = 1 + 0 + 0 + 0$
$= 1 \Rightarrow$ A has sent logical 1

$S \cdot b = -1 \Rightarrow$ logical 0
$S \cdot c = 1 \Rightarrow$ Logical 1
$S \cdot e = 0$
$S \cdot f = 0$
$S \cdot h = 0$
} All has not sent anything

02 Control channels are also created in CDMA: Similar (not exactly same) to TDMA

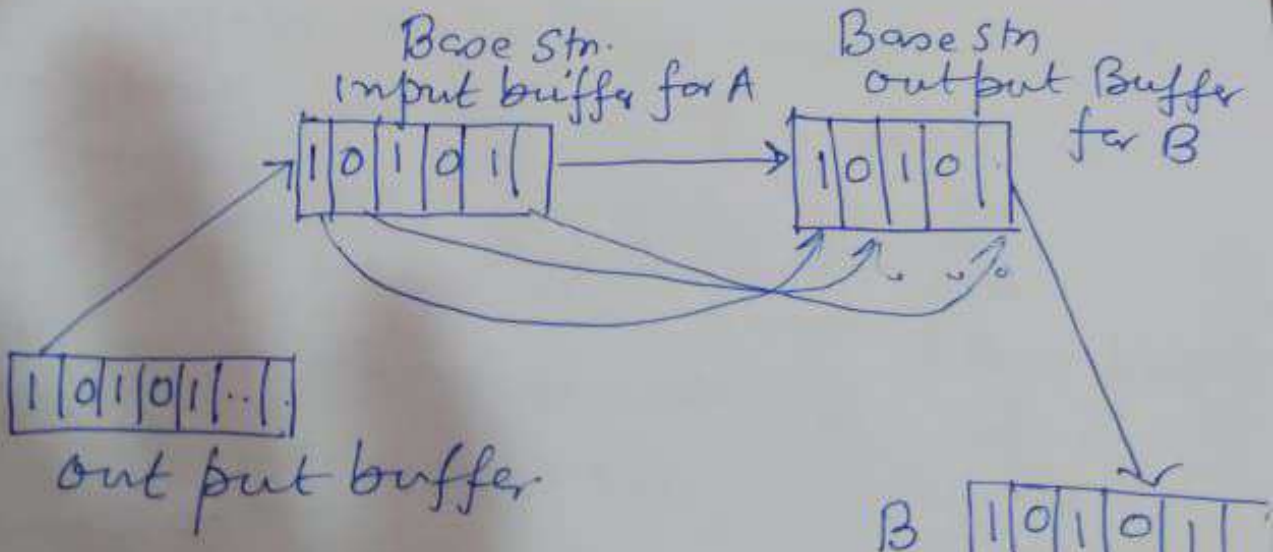
03 (i) To make a call from mobile A to B, A sends a call request to base stn giving his and B's number through request channel

(ii) Base shall check if A has sufficient Balance, B is not busy and has one uplink and down link code free than it will connect the call allocating and uplink and down link code (= channel to A and B. Base stn shall register

(iii) B station shall not a connection A → B. Base Sb.

(iv) Actual Route A to BS to B

(v)



A and B shall have their out put buffer to transmit and input buffer to receive. receive respectively.

(vi) on making connection from A to B, Base stn other than channel allocation to A, & B like above page 3(ii), shall also allocate an input buffer for A and output buffer for B in Base stn's data base.

(vii) - Now suppose A sends logical 1 bit (first bit in his input buffer)

- Base stn shall decode it like page (2/ vii) and find it as logical 1 and store it in A's input buffer in his database.

(viii) As base stn shall note that for A, the connection is to B, it will trasfer that bit from input buffer of A to output buffer of B.

(ix) Now Assume there are other connections also.

A → B

C → E

F → G

K ⇒ L

(x) So in similar manner all first first bits will be transferred from input buffer of A to B output buffer; input buffer C → E, F → G output buffer, input buffer K to output buffer L

(xi) Base stn shall note the bit content of current bits of B, E, G, L

suppose B ⇒ 1 E ⇒ 0 G ⇒ 1, L ⇒ 0

Now base stn shall make at sum S = $\overline{B} + \overline{E} + G + \overline{L}$ (chip by chip)

and send it in the down link.

(x) All stations B, E, G, L and also others will receive S through

their corresponding downlink channels.

(xi) After receiving S, sum signal each station who are in connection shall decode their received by as follows

B · b
E · e
G · g
K · e

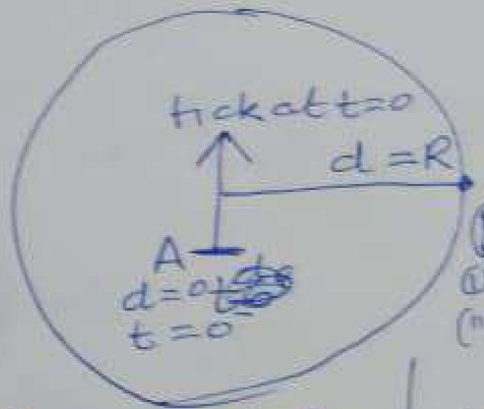
} b, e, g, e are downlink codes assigned to b, e, g, l.

04 Synchronization problems in uplink channels.

(i) The assumption was that after giving the tick signal at t = 0, all stations shall receive it at t = 0 and send their codes in uplink channel at t = 0 and base stn gets all codes at t = 0 so that the first chip of all codes as will reach at t = 0 and other chips will also reach simulta

for all

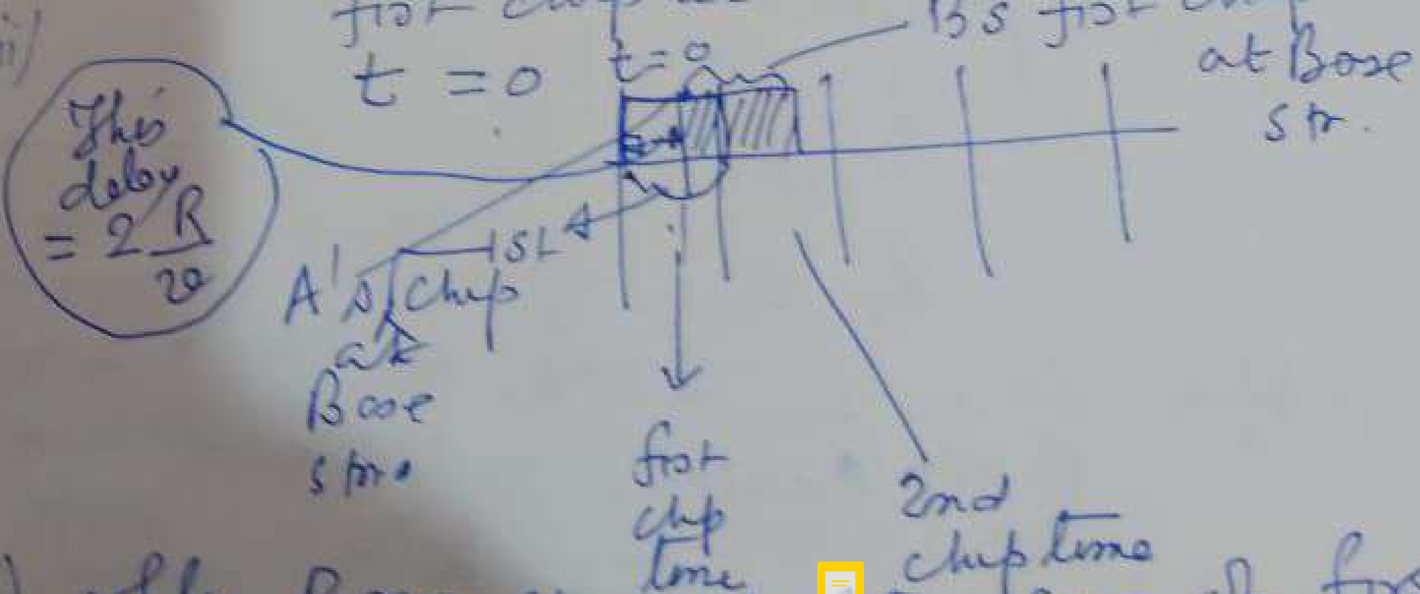
(ii) But above is not true in Practical situation due to propogation delay



A receives tick at t=0
sends first chip at t = 0
Base stn Receives first chip at t = 0

(B) receives tick
(i) at $t = t_p = \frac{R}{2c}$
(ii) starts sending first chip
(iii) first chip received by base stn at $t = 2t_p = \frac{2R}{2c}$ $(t_p + t_p)$

(iii)



(iii) While Base stn calculate sum of first

chip at $t = 0, 2t$ (for 0 & 1) does not get the 1st chip of B. So the calculation of sum signal shall go wrong.

(iv) Soln.

Base stn instead of calculating the sum signal chip by chip at the beginning of chip time, it calculates the chip at the middle of chip time.

If $\frac{2R}{v} = \frac{t_c}{2}$ then the chip of B (farthest station shall also reach at time $\frac{t_c}{2}$, and all other chip value is available at the middle of chip time.

So if $\frac{2R}{v} = \frac{t_c}{2}$ v = speed of signal

$$R = \frac{t_c}{2} v$$

Suppose BW = 2 MHz, Modulation = 4

Bit rate (Baud rate) = 2 Mbaud/sec.

Chip rate = $2 \times 2 = 4$ Mchip/sec

chip time $t_c = \frac{1}{4 \times 10^6}$ sec.

R = known if $v = 3 \times 10^8$ m