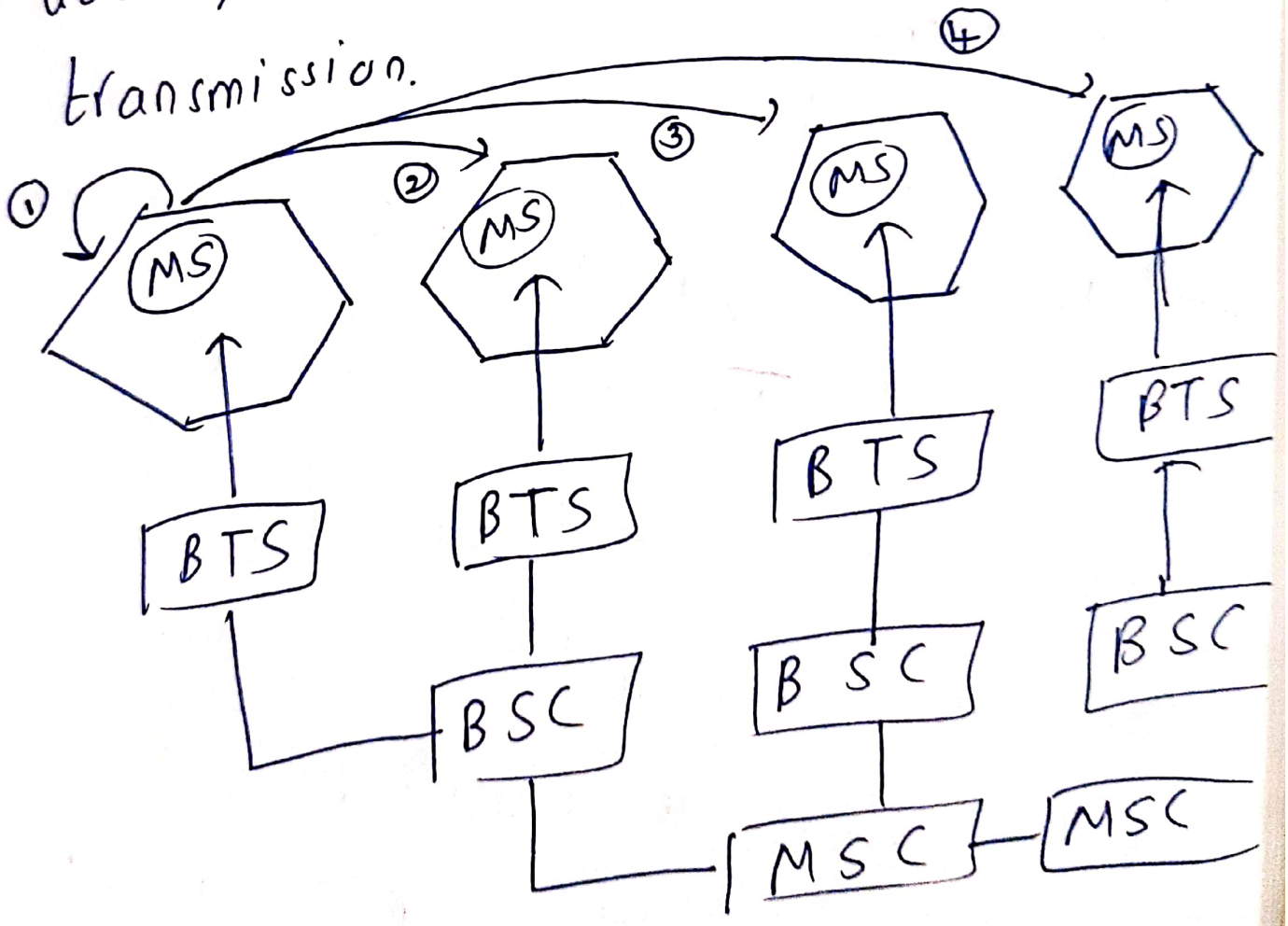
→ hand over / hand off :- (in GSM)

hand over / hand off is a process in tele communication & mobile communication in which cellular transmission (voice or data) is transferred from one base station (cell site) to another without dossing connectivity to the cellular transmission.



i) Intra cell handover
ii) Inter cell, intra BSC handover
iii) Inter BSC, intra MSC handover
iv) Inter MSC handover.

I) Intra cell handover:

If MS moves only inside the cell it comes under intra cell hand over. here the user may change Freq/time slot (BTS level)

II) Inter cell, intra BSC handover.

It occurs when a user/ mobile moves out of the coverage area of one BTS & enters other BTS (which is inter) but enters into same BSC's BTS is (intra BSC) -

III) Inter BSC handover:

When mobile moves out of the range of cells controlled by one BSC, here handover from one BSC to another BSC (so called Inter) & under same MSC

IV) Inter MSC handover:

This from of handover occurs when changing b/n network 2 MSC's (b/n).

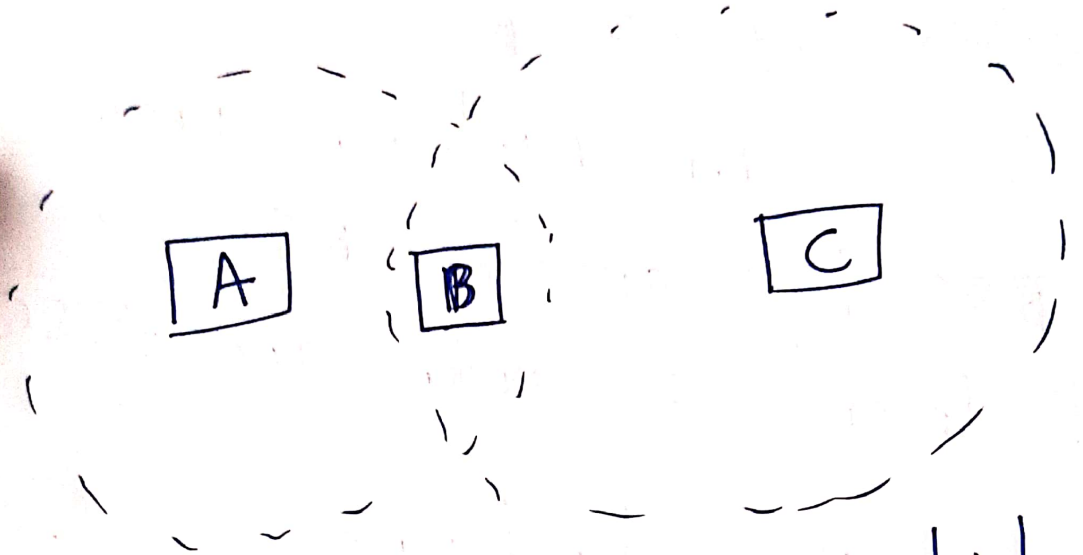
Note!

Inter :- between 2 groups.

Intra :- within or inside 1 group

→ hidden terminals & exposed terminals

↳ hidden terminal propblem:



here A, B, C are (MS) which a specific range in which they communicate.

As only only some part of A & C are overlapping hence if A is sending data to some one C is unaware of it

Similarly C sending data is A unaware of it.

minals

If B is a node which is in both coverage area

hence
B can send data to A & C
C can send to B but not A
A can send to B but not C

problem!

Suppose both A & C want to communicate with B & so they each send it a frame.

A & C are unaware of each other since their signals don't carry that far.

Hence two frames collide each other at B.

here A & C are said to be hidden node with respect to each other.

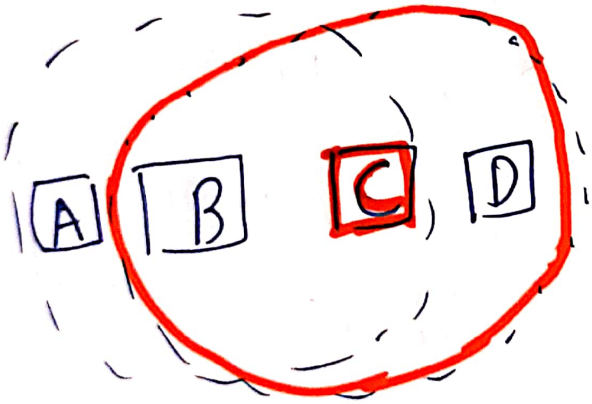
solution:

MACA (Multiple access collision avoidance algorithm) using RTS & CTS frame

RTS → request to send

CTS → clear to send

→ Exposed terminal problem:



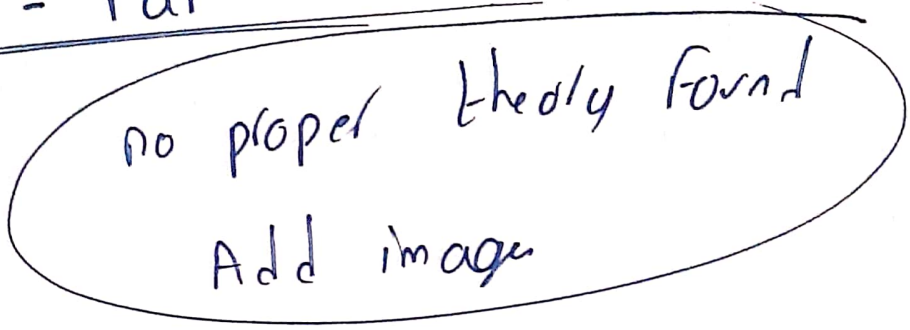
here B & C (MS) having overlapping range hence when one is communicating with some one else other can listen it.

Suppose B is sending to A.
Node C is aware of this communi-cation because it hears B's transmission.
It would be a mistake for C to conclude that it cannot transmit to anyone just because it can hear B's communication.
Suppose C want to transmit to node P.
It can transmit as A can't it

~~disted~~
listen

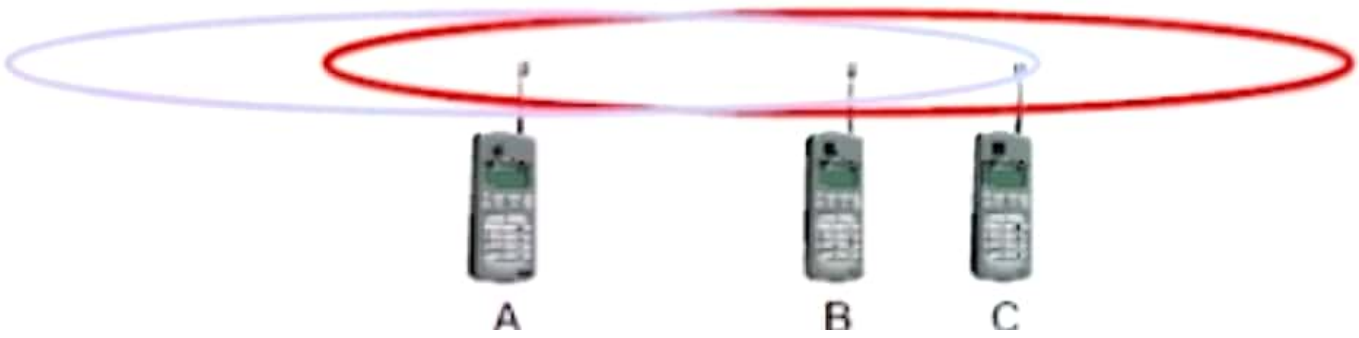
Solution
MACA (multiple access collision avoidance algorithm)
using RTS & CTS frames
requrit to send → Clear to send.

→ Near - Far terminals :-



Motivation - near and far terminals

- Consider the situation as show in figure.
- A and B are both sending with the same transmission power.
- As the signal strength decreases proportionally to the square of the distance, B's signal drowns out A's signal.
- As a result, C cannot receive A's transmission.
- The near/far effect is a several problem of wireless networks using CDM.
- All signals should arrive at the receiver with more or less the same strength.


A
B
C

→ Routing in Satellites:

→ Routing is the process of moving packets from source to destination (which path deciding is routing.)

2 ways for satellites

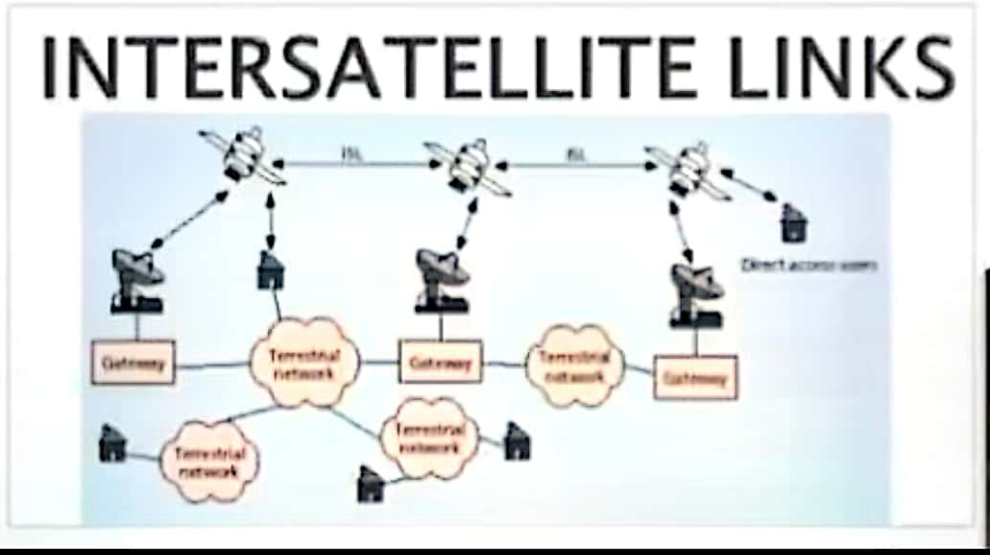
i) Inter ~~sto~~ satellite links:

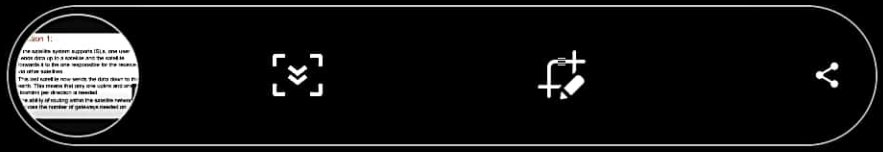
Add images

Solution 1:

- If the satellite system supports ISLs, one user sends data up to a satellite and the satellite forwards it to the one responsible for the receiver via other satellites.
- This last satellite now sends the data down to the earth. This means that only one uplink and one downlink per direction is needed.
- The ability of routing within the satellite networ reduces the number of gateways needed on earth.

Solution 1:

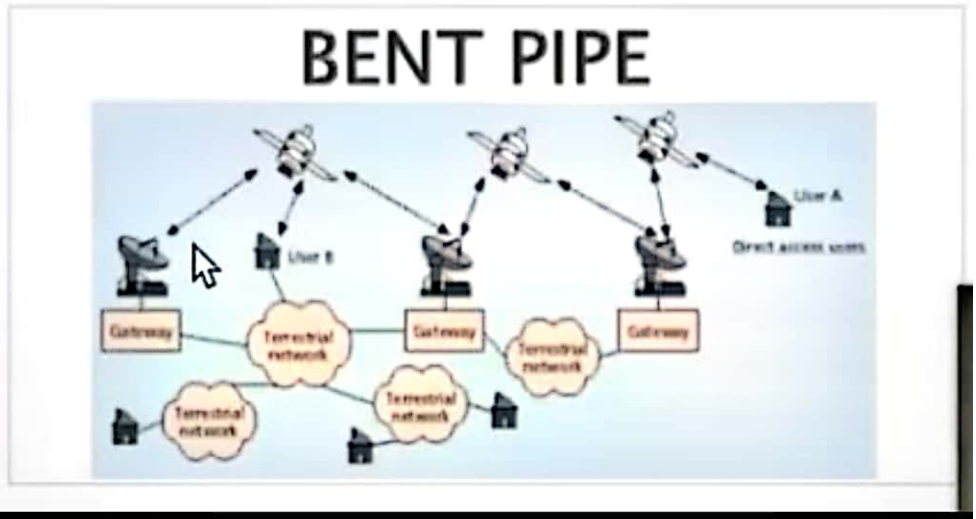




Solution 2: Bent Pipe

- If a satellite system does not offer ISLs, the user also sends data up to a satellite, but now this satellite forwards the data to a gateway on earth.
- Routing takes place in fixed networks as usual until another gateway is reached which is responsible for the satellite above the receiver.
- Again data is sent up to the satellite which forwards it down to the receiver.
- This solution requires two uplinks and two downlinks.

Solution 2:



Handover in satellite systems

Several additional situations for handover in satellite systems compared to cellular terrestrial mobile phone networks caused by the movement of the satellites

- Intra satellite handover
  - handover from one spot beam to another
  - mobile station still in the footprint of the satellite, but in another cell
- Inter satellite handover
  - handover from one satellite to another satellite
  - mobile station leaves the footprint of one satellite
- Gateway handover
  - Handover from one gateway to another
  - mobile station still in the footprint of a satellite, but gateway leaves the footprint
- Inter system handover
  - Handover from the satellite network to a terrestrial cellular network
  - mobile station can reach a terrestrial network again which might be cheaper, has a lower latency etc.

DSSS vs. FHSS

Direct Sequence		*Frequency Hopper*
Short Latency Time	vs.	Long Latency Time
Constant Processing Gain = A Better Signal to Noise Ratio.	vs.	No Processing Gain
Quick Lock-in as Radios Synchronize	vs.	Slow Lock-in, Must Search a Channel
No Dwell Time	vs.	400 Microsecond Dwell Time
No Re-sync with Other Radio Necessary	vs.	Must Re-sync with Other Radio After Every Hop
Short Indoor Range	vs.	Short Indoor Range
Long Outdoor Range (40km)	vs.	Short Outdoor Range (10km)
Greater Overall Data Throughput	vs.	Lower Overall Data Throughput