Lowering the antenna Height :

→ It doesnot always reduce the Cochannel interference but in Some Circumstances like fairly flat ground & in a valley situation it will be very effective for reducing the Cochannel & adjacent channel interference

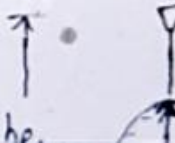
→ There are Three Cases where lowering the antenna height may & maynot effectively help to reduce the interference

a) on a high hill & high Spot :

→ The Effective antenna height, rather than the actual antenna height Varies according to the location of mobile unit.

→ when the antenna site is on a hill then the effective antenna height is $h_1 + H$

If we reduce the actual antenna height to $0.5h_1$ he



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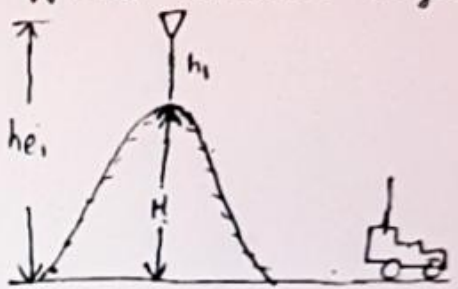

If we reduce the actual antenna height to $0.5h_1$ then the new effective antenna hight becomes $0.5h_1 + H$ then the gain reduction is

$$G = 20 \log \frac{0.5h_1 + H}{h_1 + H} \quad \text{— (1)}$$

$$= 20 \log \left\{ 1 - \frac{0.5h_1}{h_1 + H} \right) \quad \text{— (2)}$$

If $h_1 << H$ then $G = 20 \log_{10}(1) = 0$ dB

This proves that the lowering antenna height on the hill does not reduce the received power at either cell site & the mobile unit.

In a Valley :

→ The Effective antenna height as seen from the mobile unit as h_{e_1} which is less than actual antenna height h_1.

→ If $h_{e_1} = \frac{2}{3} h_1$ and the antenna is lowered to $\frac{1}{2} h_1$ then the new Effective antenna height is

$$h_{e_1} = \frac{1}{2} h_1 - \left[h_1 - \frac{2}{3} h_1 \right]$$

$$= \frac{1}{6} h_1$$

Then the antenna gain is reduced by

$$G_1 = 20 \log \frac{\frac{1}{6} h_1}{2/3 h_1} = -12 \text{ dB}$$

This Simply proves that the lowerd antenna height in a Valley is Very effective in reducing the radiated power.

→ However in the area adjacent to the Cell site antena, the effective antenna is the same as the actual antenna height.

The power reduction caused by decreasing antenna height by half is only

$$20 \log \frac{1/2\, h_1}{h_1} = -6 \text{ dB}$$

In a forested area:

→ In a forested area, the antenna hight must be higher than all of trees ~~in the vicinity~~ because excessive attenuation of desired signal will occur in the vicinity of the antenna & in its cell boundary if the antenna were below the treetop level