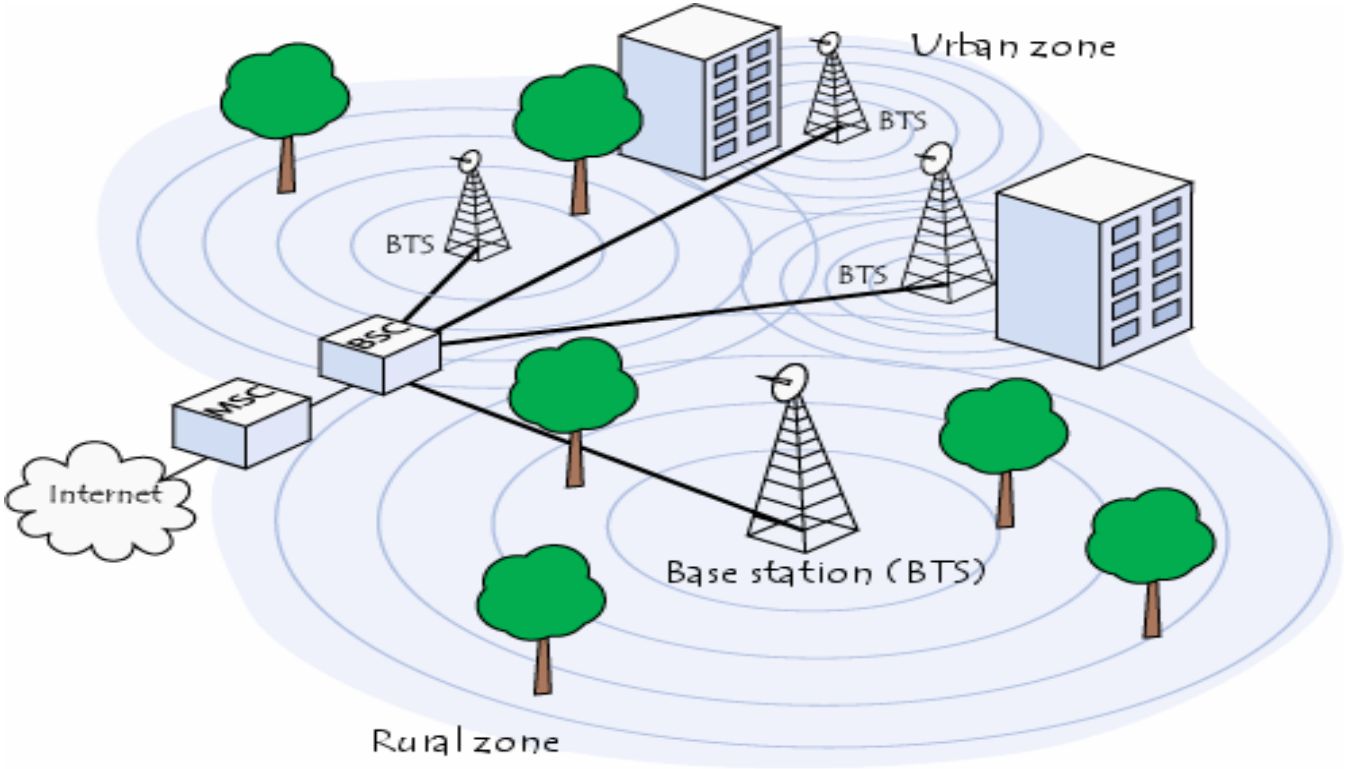
MVNO Simulation

Building MVNO for a university campus such as Oslo university (macro)



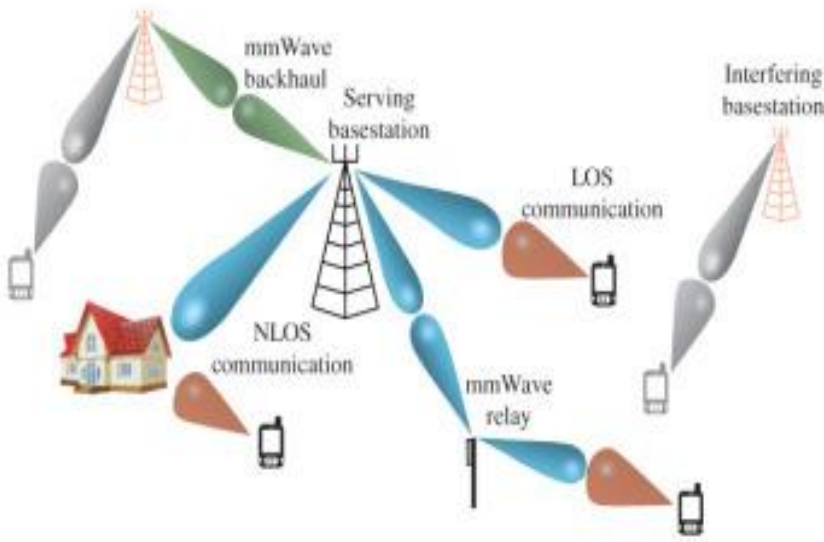
Coverage parameters

Simulation parameters, which impact coverage quality are:

- Wireless communication system

  >>>>LTE

- This coverage model will consider the following points
  - Path loss (SIU model)
  - Antena gain
  - Cable, connector and combiner loss at Tx and Rx
  - Rain loss



SUI Path loss model

Stanford University Interim (SUI) can be used for frequencies above 1900 MHz. $PL = A + 10\gamma \log_{10}(\frac{d}{d_o}) + X_f + X_h + S$

PL = Path Loss in dB

A is free space path loss

d = distance between the transmitter and receiver

d_o = 100m used as a reference

X_f = Correction factor for frequency

X_h = Correction factor for BS height

S = Shadowing

γ = Path loss component

SUI Path loss model

- Terrain A: represents an area with highest path loss, it can be a very dense populated region.
- Terrain B: represents an area with moderate path loss, it can be a suburban environment.
- Terrain C: has the least path loss which describes a rural or flat area.

Parameters	**Terrain A**	**Terrain B**	**Terrain C**
a	4.6	4	3.6
b(1/m)	0.0075	0.0065	0.005
c(1/m)	12.6	17.1	20

$$\gamma = a - bh_b + \frac{c}{h_b}$$

Antena Gain

- Transmitter and Receiver (Tx/Rx) Gain.
  - Dipole 2 [dBi]
  - Biquad 8 [dBi]
  - Helix 15 [dBi]
  - Parabolic 24 [dBi]

Cable loss and Rain loss

Rain loss: absorption of a microwave radio frequency (RF) signal resulted from atmospheric rain.

Cable loss: absorption of a microwave radio frequency (RF) signal resulted from sender and receiver cables.

Additional Points

Depending on previous description we will do the following:

- Divide the campus into cells (may be sectoring is required)
- Providing each cell with femto and micro cells depending on density of users.
  - (kilo meters)Microcell, picocell(30 80 meter), femto cell(used in highly dense urban areas “indoor”).
  - Divding the frequency resources amoung the stations(micro and femto)
- Calculation of requied transmited power.
- How to know number of user could be supported by our network. Given (bandwidth of channel, data rate and SNR (assume, e.g. 10 db)

References

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References

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