2 Simulation Modeling

In this study, a static network simulator is proposed to evaluate the performance of the enterprise femtocell system.

Enterprise environment:
- 9600m², 80m x 120m;
- no internal walls/windows assumed for simplicity.

Channel Model:
- carrier frequency: 2 GHz;
- spectrum bandwidth: 5 MHz;
- ITU-R.P 1238 model.

Femtocell User Equipment (FUE):
- adjustable data rate: 12.2kbps, 64kbps, 144kbps and 384kbps;
- maximum transmit power: 20dBm;
- deployed randomly with uniform distribution.

Home NodeB (HNB):
- Round-Robin scheduling;
- RoT threshold: 12dB;
- AWGN floor at HNB receivers: -95dBm;
- deployed in the middle of service area (whole area covered evenly);
- number of HNBs: up to 4.

Power control algorithm:
- closed-loop.

Receiver algorithms evaluated:
- single-user detector (SUD);
- advanced receiver with intra-cell interference cancelation capacity (IFX).

5% Outage prob. to evaluate cell capacity.

3 Numerical Results

Capacity for uplink enterprise application (Figure 1):
- conventional NodeBs can only support up to 1.5Mbps, 3Mbps and 4.5Mbps high speed UEs with one NodeB, two NodeBs, and four NodeBs respectively;
- 4.6Mbps supported by one IFX;
- one IFX HNB is similar to 4 SUD HNB.

Noise Rise at HNB (Figure 2):
- one IFX: around 10dB;
- IFX saturates slowly as UE number increases;
- cells with NodeB SUD are unable to handle high-speed traffic.

Average Tx power (Figure 3):
- one HNB: as UE number increases, IFX Tx power stays 2dBm then saturates at 9dBm slowly.

Uplink Capacity vs. Coverage (Figure 4):
- 10m² area: one IFX triples capacity;
- 7x10m² area: one IFX equals to 4 SUD.

4 Conclusion

- Researched on the tradeoff between the uplink capacity and coverage for the enterprise scenario by simulation.
- By adopting advanced NodeB receivers, the system capacity can be tripled while the noise rise at the NodeB is close to the designed RoT.
- Less average transmit power required for advanced receivers.