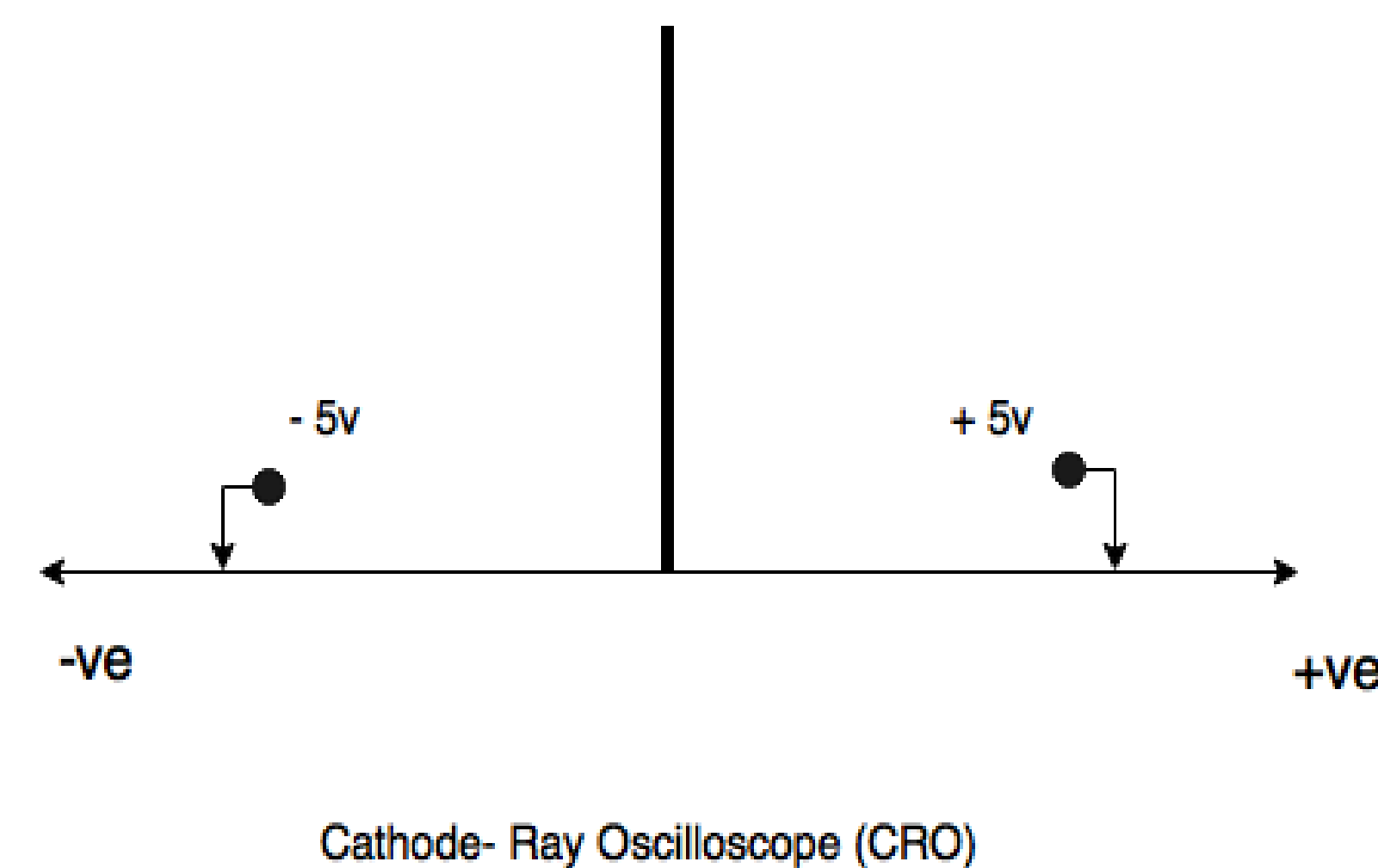# Analysis of Signal Intelligence for Wireless Communication Systems

Nishant Kovuri, SuryaDev Pendyala, Suhana Dawood, Abubakar S Mohammed
Frostburg State University-21532, USA

Introduction

This research is based upon derivations of signal data in wireless communication systems. A cellular network is a radio network distributed over land through cells where each cell includes a fixed location transceiver known as base station. These cells together provide radio coverage over large geographical areas. Mobile network is a combination of multiple nodes (MS, BTS, BSC, MSC, HLR, VLR, EIR) Widely known problems are due to medium between sender-receiver, terrain area, overload traffic, TCP/IP packets congestion, transmitter-receiver hardware and other criteria. Problems could be tackled and reduced in different approaches based on causes.

LITERATURE REVIEW

How signal is degraded? If energy gets to below threshold level because of several interferences in between, it results in signal-drop.

From the diagram below, we see that there is CRO which is used to detect +ve or -ve voltage. We can also detect with multimeter. The threshold voltage in this example is set to 5 volts. It can be any number depending on the distance between transmitter & receiver. If the received signal more than threshold & falls above +ve or -ve 5 volts, then it is recognized as '1'. In all other cases, it is '0'.

Cathode- Ray Oscilloscope (CRO)

Path loss Path loss normally consists of propagation losses which occur by the natural expansion of the radio wave front in free space. Path attenuation is also similar to electromagnetic waves degradation and it is mainly concerned with reduction in power density due to attenuation of an electromagnetic wave.

Cross coverage (isolated BTS) is caused when power is in excess level the cell causes cross coverage which results in call drop. This also causes interference with other cells.

On the other hand packet loss is due to improper congestion control and could be minimized.

METHODOLOGY

Macro cells cannot have deep insight into "Black spots". LTE is an essential driver for small cells and a key for spectral efficiency. Helps in extending battery life as it reduces the power consumption of handset. It gives more extensive transfer speed
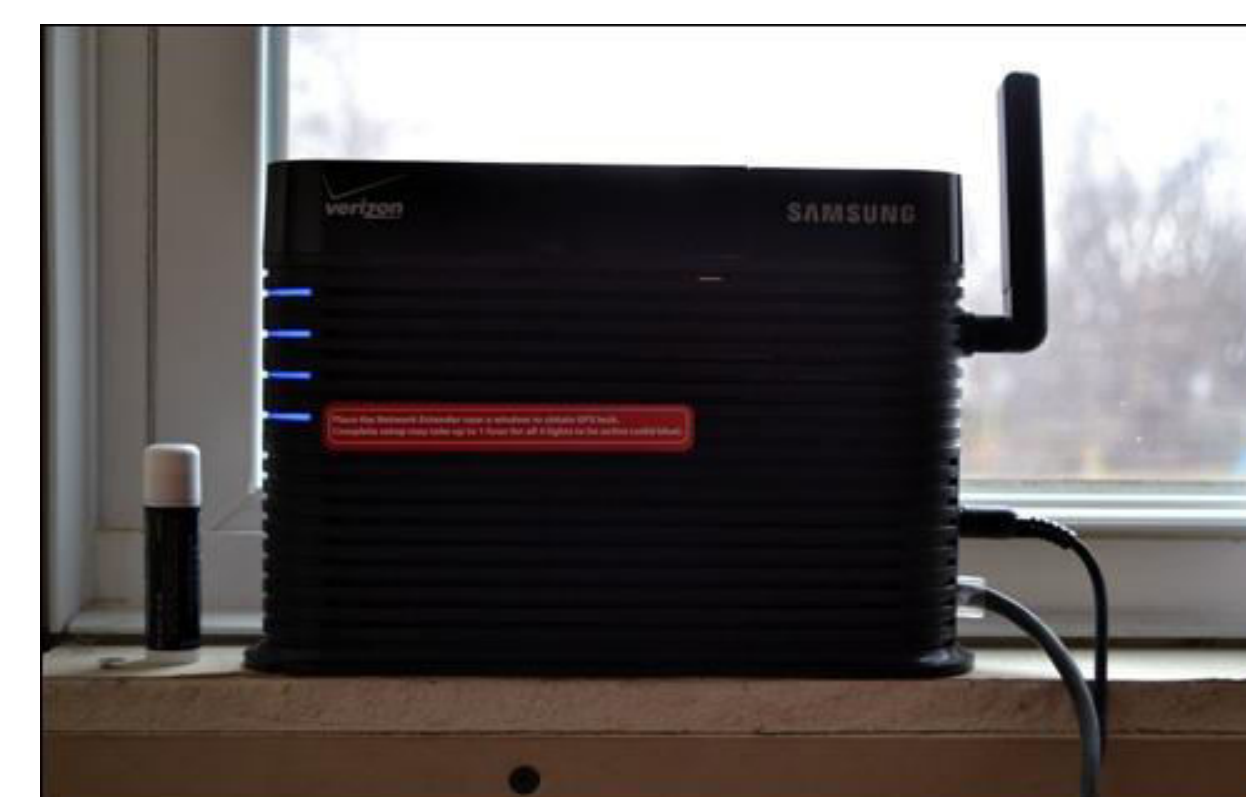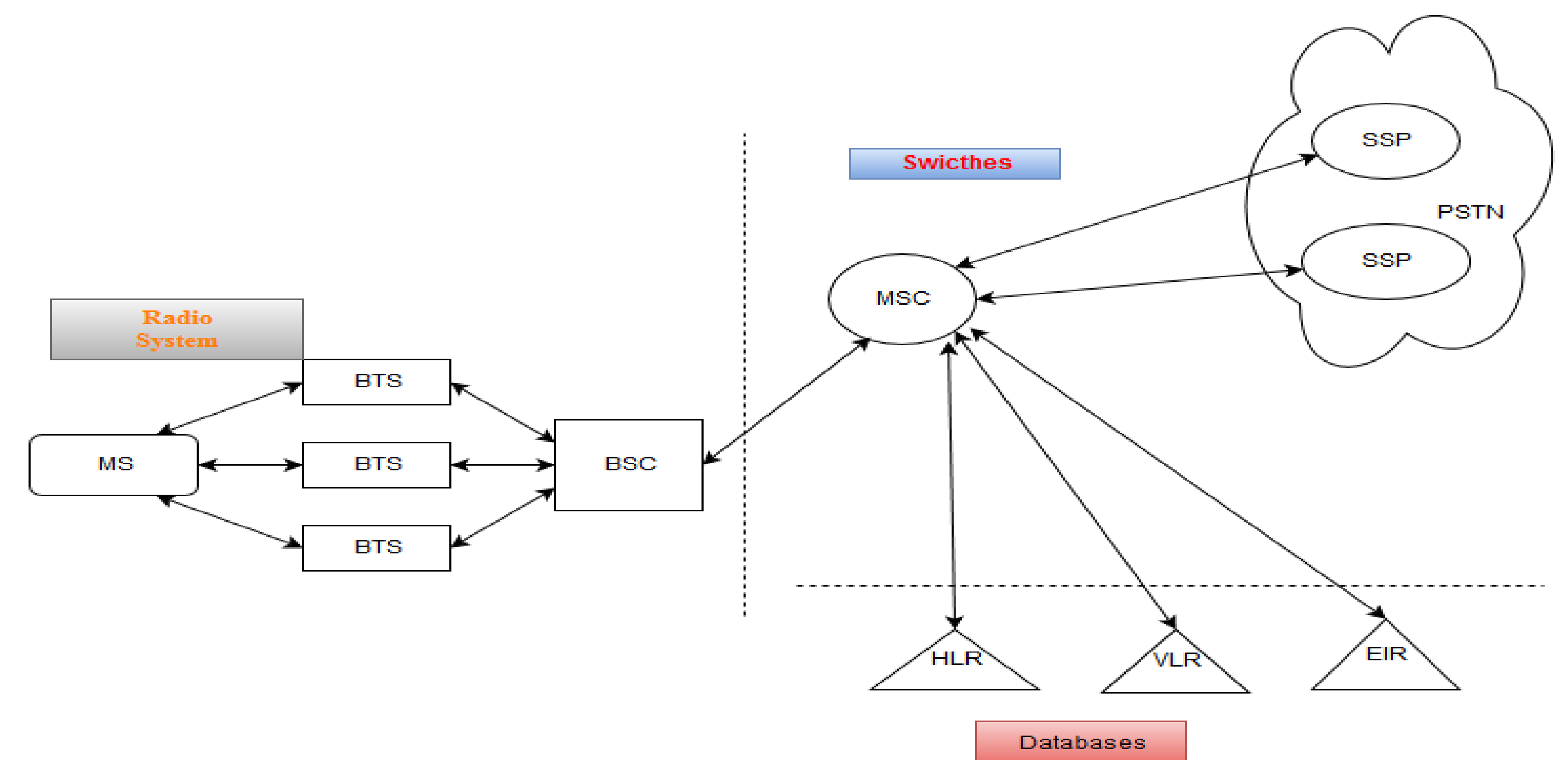
Femtocells are devices same as modems. It could be connected to service provider's network through broadband or DSL cable. Standard edition handles up to 8 mobile devices. There are no worries of interference, building obstacles faced in general scenario, low power, handover problems.

Coming to protocol issues, Freeze Deadline Algorithm (in network and transport layers) works better in LTE (heterogeneous network of devices). In this algorithm, handoff is two types - horizontal & vertical handoff. Vertical handoff is further split into two types - downward & upward. Downward is moving connection from low throughput (bandwidth) to high throughput. This process causes packet losses when shifting between frequency range due to compression of signal.

Conclusion

- The signal handover can be carefully handled by controlling traffic which is done by base station by allotting each receivers with proper radio signal link with in micro cell. The same way results in interference in case of macro cell.
- By introducing subnet agents we can reduce handover failures, as these helps in buffering incoming packets during handoff procedure.
- small cells interference could be avoided with management of frequencies.
- With the help of the fast recovery algorithm of TCP Reno the single packet loss is controlled with one window by eliminating fast recovery mechanism after one packet is lost.