BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT

Doddaballapur Road, Avalahalli, Yelahanka, Bengaluru, Karnataka 560064

DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Academic Year 2023-24

Activity Report

On

"FLAT FADING AND FREQUENCY SELECTIVE FADING Using Virtual Lab IIT Kharagpur"

Date:4/1/2024

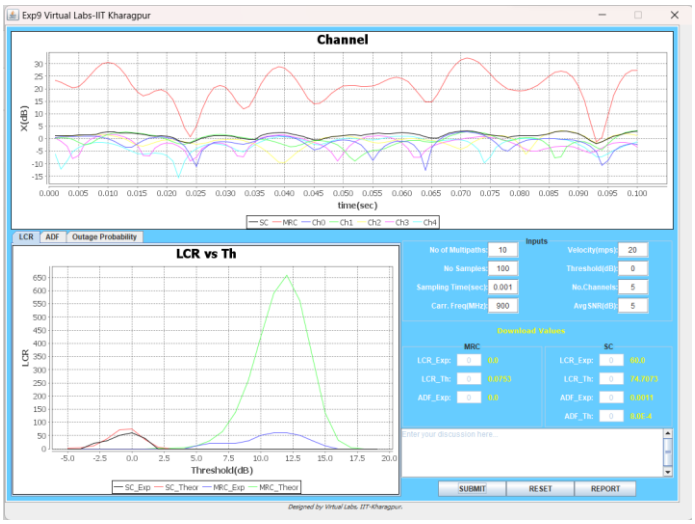
Submitted by:

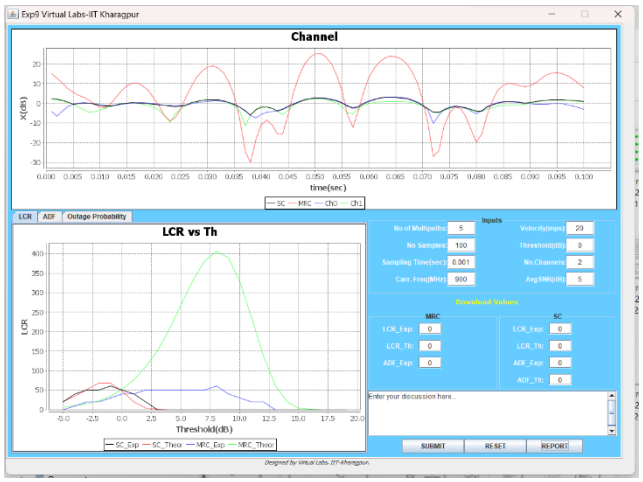
USN	Name of the student	Marks Awarded
1BY20ET048	S Varsha	
Signature of faculty		

Course: Wireless Communication **Course Code:18TE72**

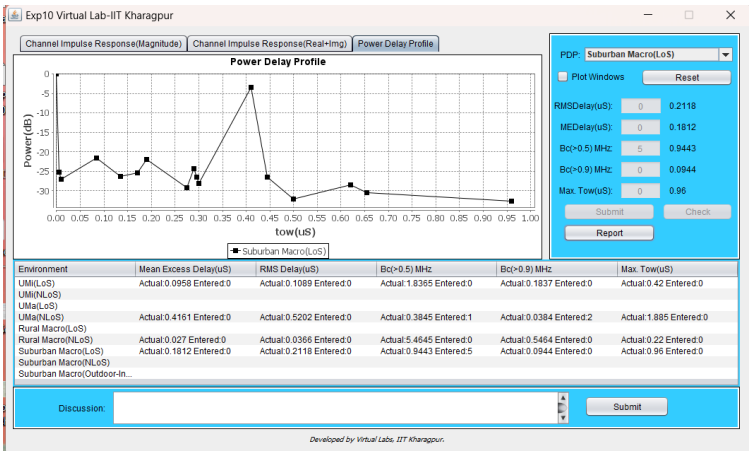
Under the guidance of
Dr. Mallikarjuna Gowda C P
HoD, Dept. of ETE

FLAT FADING





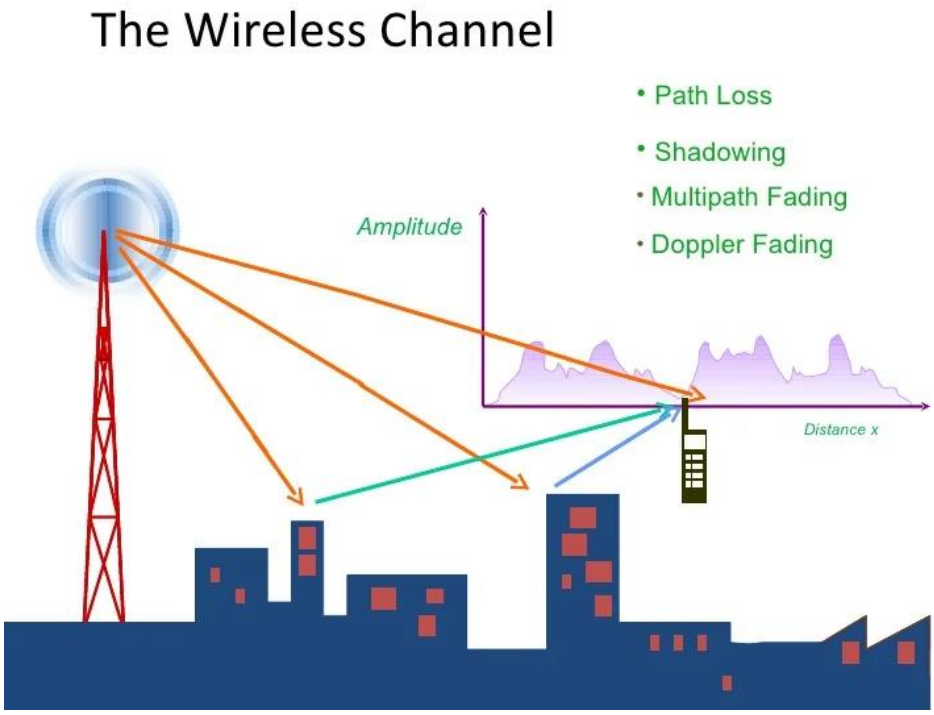
FREQUENCY SELECTIVE FADING



INFERENCE

FLAT FADING

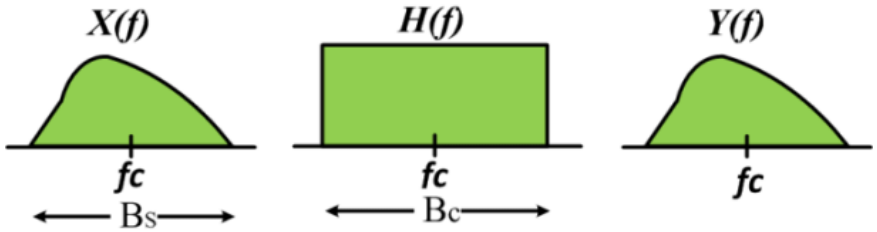
In flat fading, the coherence bandwidth of the channel is larger than the bandwidth of the signal. Therefore, all frequency components of the signal will experience the same magnitude of fading. In frequency-selective fading, the coherence bandwidth of the channel is smaller than the bandwidth of the signal. Small scale fading characterizes the fluctuation of signal (strength) over a spatial distance of fraction of wavelength. The fluctuation is also observed in both time and frequency domain at a gain location. The variation of signal (strength) at the receiver is due to random interference between the different copies of the transmitted signal.



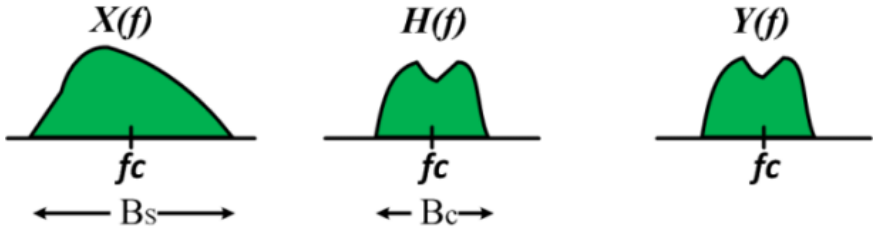
The interference is sometimes constructive and sometimes destructive. The multiple copies of the transmitted signal are generated due to scattering, reflection and diffraction due to obstacle present in the path of radio signal between the Tx and Rx movement of the Tx and Rx or the obstacle cause time domain variation of the signal (strength) and the phenomenon is called Doppler effect. Since each path of the radio wave may exhibit difference doppler its cumulative effect results in spread of the carrier/ frequency content of the signal and hence is also known as Doppler spread.

FREQUENCY SELECTIVE FADING

In an urban environment, the height of the mobile antennas is well below the height of the surrounding structures. As a result, a Line of Sight (LOS) propagation path may or may not exist between the Base Station (BS) and the Mobile Station (MS). The radio waves transmitted from the BS, therefore, arrive at the MS after reflection, diffraction and scattering from the natural and man-made objects situated between the BS and the MS. The incoming radio waves arriving from different directions have different propagation delays.



A. Flat fading effect



B. Selective fading effect

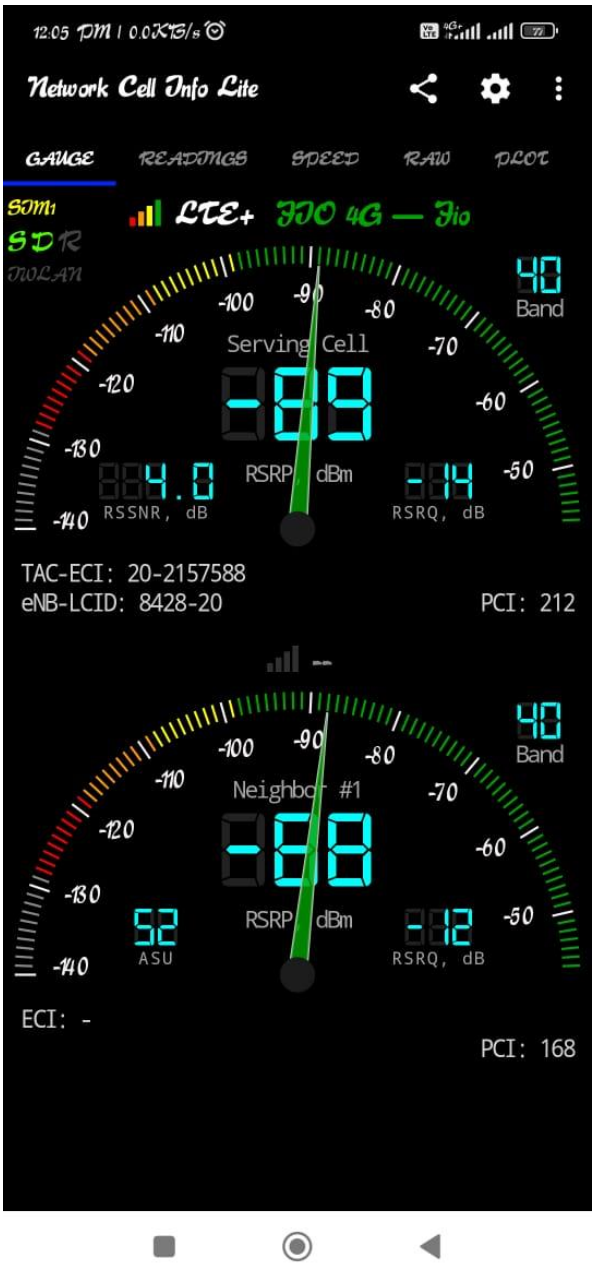
B_S = Bandwidth for signal
B_C = Bandwidth for channel

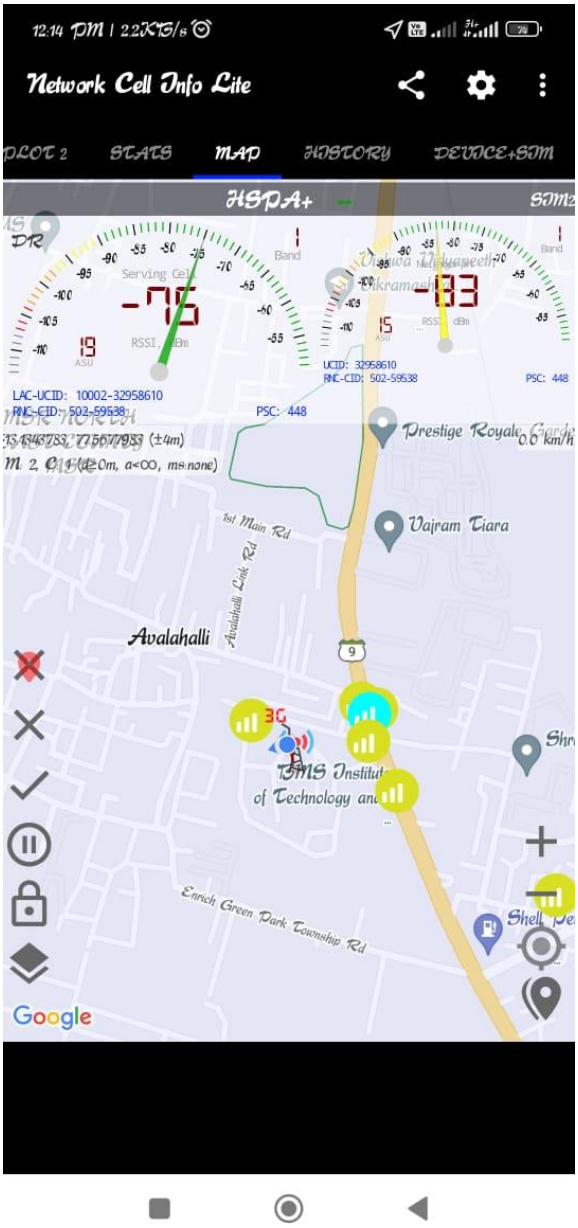
These multipath components, having randomly distributed amplitudes, phases and angles of arrival, combine vectorially at the receiver antenna causing the received signal to distort or fade. Thus, fading is the rapid fluctuations in the amplitude phase and the multipath delays of a radio signal over a short period of time so that large scale path loss effects can be neglected

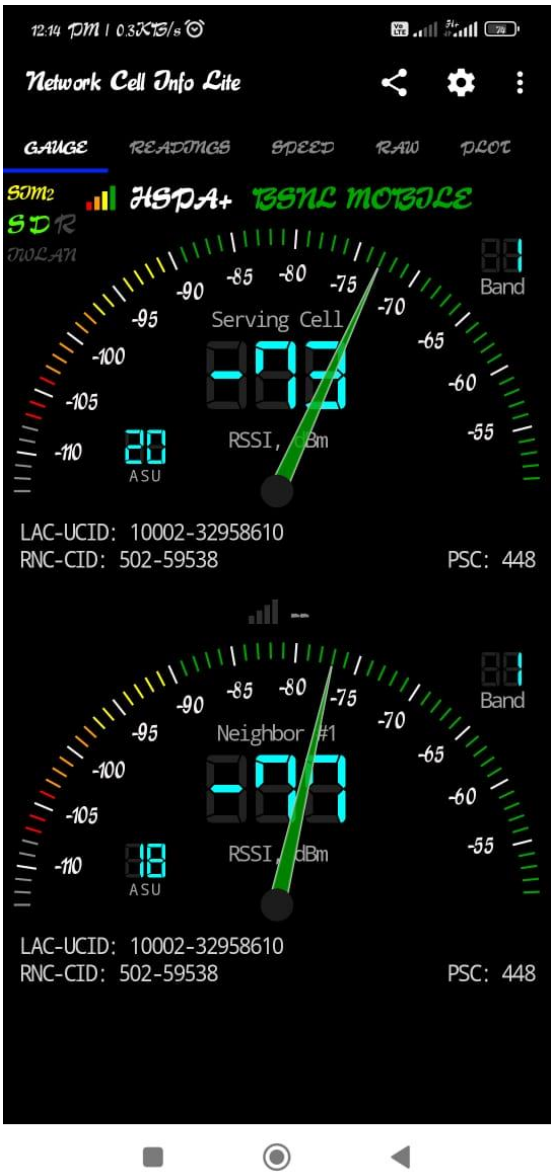
INFERENCE

In this simulation of handoff, different parameters affecting handoff were varied and these values were plotted. Different setups like rural macro, urban macro and mini were simulated for handoffs. The Signal to noise ratio was one of the parameters changed and the number of call drops was noted. There are many other factors like bandwidth, Timeslot, Average time, mobile Speed, Beam width, Cell Radius, Cell Reuse factor which could be varied. Each of the simulations were tabulated and the report is attached.

MEASUREMENT OF RSSI USING NETWORK CELL INFO APP







INFERENCE

The Received Signal Strength Indicator (RSSI) can be measured using various apps available for mobile devices, such as the Network Cell Info app. Compare RSSI measurements in different areas to understand how signal strength changes based on location. RSSI is typically measured in dBm (decibel-milliwatts). A higher value (less negative) usually indicates a stronger signal, while a lower value (more negative) indicates a weaker signal. Network Cell Info Lite is for anyone looking to improve their mobile experience and achieve their strongest cellular and Wi-Fi signal strength. Users also report when they experience bad signals via the Bad Signal Reporter. Different locations of the college were analyzed for cellular coverage and the screenshots are attached.