Abstract
This thesis presents an effective method for coverage control with the use of Active Frequency Selective Surfaces (AFSSs) in indoor wireless environments. Convoluted shape of AFSS elements were used with a band pass and/or band stop frequency response. These elements were applied to an existing wall as a wallpaper to transform the wall into a smart wall. The smart wall can be made to pass and/or stop the desired frequency bands and accordingly improve wireless system performance. Computer Simulation Technology (CST) Microwave Studio (MWS) is used to test the response of the designed convoluted AFSS structure. Remcom ‘Wireless InSite’ is used to simulate the propagation paths from Transmitter (Tx) to Receiver (Rx) at any location inside an area of interest and how the smart wall blocks/Passes the propagation paths of 2.4 and 5GHz band inside the area of interest. At band-stop case Wireless InSite simulation results have shown that the smart wall can attenuate 2.4 and 5GHz frequency band (IEEE802.11a) transmissions by at least 25dB, at the same time the signal passes totally without any attenuation at band-pass case. The smart wall is designed to deal with frequency response over different incidence of angle (0°-90°). Four scenario of different users' distribution within floor inside building have been investigated. The 25dB reduction in signal strength is considered sufficient to block any signal no matter what its' frequency is. Four varactor diodes were used for configuring AFSS elements depending on designed control system commands. The feasibility of these elements was observed and the resultant reflection and transmission behavior were watched. Obtained signal strength inside rooms during each scenario was recorded. Factors that affect AFSS performance such as the element dimensions, element conductivities, dielectric substrates and signal incident angles were taken into account. This thesis work has associated to the domain of anenna design, communication systems and buildings architecture.

Wireless Friendly Buildings
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