Abstract

The highly increasing demands for high data rate applications in recent years require a new technology that can cover the demands, 60 GHz wireless system can provide such a high data rate. But it has a tremendous amount of both Free Space Path Loss (FSPL) and penetration loss. This research aims to mitigate these challenges by using relay nodes in order to shorten the path length between source and destination by positioning the relay nodes correctly, this will mitigate the effect of FSPL up to 50% in some cases. In addition, it will provide an alternative Line of Sight (LoS) to overcome the penetration loss caused by human bodies.

This research deals with another challenge that is the considerably short range of the wireless network in the 60 GHz band. This short range was extended by applying multi-hop communication with the concept of relay nodes selection, the length of the room was doubled and still get the same losses as if there is no expansion. All techniques are modeled inside ‘Wireless InSite’.

‘Wireless InSite’ is used to simulate the Path Loss (PL), which contains FSPL and penetration loss, from source to destination at any location in the area of interest and how relay nodes reduce these losses values.

Three scenarios have been studied in this research. The first scenario is a conference room with no obstacles to focus only on FSPL. In the second scenario, the same conference room is modeled but with take obstacles into consideration to check the penetration loss effect, the obstacles in this scenario are the human body. The final scenario is the extended version of the first scenario to deal with the small range issue.