

Performance Assessment of Laboratory IEEE 802.11 n Point-to-Multipoint Links

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Introduction - Contactless communications techniques have been developed using mainly electromagnetic waves in several frequency ranges, propagating in the air. The importance and utilization of wireless fidelity (Wi-Fi) and free space optics (FSO) have been growing. In Wi-Fi, mainly IEEE 802.11a,b,g,n standards are used, having CSMA/CA as the medium access control and microwaves in the

2.4 and 5 GHz frequency bands [1]. Such techniques successfully allow, without harming the environment, data transmission through the atmosphere. By this means very important environmental data can be collected on-line. Performance has been a very significant issue, resulting in more reliable and efficient communications. Wi-Fi security is critical, as microwave radio signals can be easily captured. Therefore WEP, WPA and WPA2 encryption types are available. Several performance results have been given for Wi-Fi links [2]. In the present work new performance measurements are made for laboratory Wi-Fi IEEE 802.11n 5 GHz Open point-to-multipoint (PTMP) links. One AP from HP (V-M200) and two out of three PCs having Linksys WPC 600N wireless network adapters were used [3,4]. New detailed results are given, namely at OSI levels 4 and 7, from TCP, UDP experiments, permitting measurements of TCP throughput, jitter and percentage datagram loss.

Experimental details - The experiments were made under far-field conditions and low powers (15 mW i.e. 15 dBm). The setup scheme had mainly a single TCP/IP network involving one AP and Open three-node (PTMP) links involving two portable PCs. One was the Iperf [5] server and the other was the client. TCP and UDP measurements were inspired in [2]. SNR was monitored. Jitter was computed as specified by the RTP in RFC 1889. Batch command files were written to make the TCP and UDP tests.

Results and Discussion – TCP and UDP 802.11n data were acquired versus TCP packet size and UDP datagram size, respectively. The average TCP throughput is 25.3 +- 0.8 Mbps. The average jitter is 2.5 +- 0.2 ms. The average percentage datagram loss is 5.1 +- 0.2 %. There are performance degradations in comparison with average values obtained for the same equipments in point-to-point (PTP) links (51.2 +- 1.5 Mbps for TCP throughput, 2.1 +- 0.1 ms for jitter and 3.1 +- 0.3 % for percentage datagram loss). Better performances are found in comparison to corresponding data measured for 802.11a.

Conclusions – A laboratory arrangement was planned and set that permitted systematic performance measurements of available equipments in Wi-Fi IEEE 802.11n Open PTMP links. The performance results are interesting, although showing degradations when compared to corresponding values for PTP links. The performances are found better in comparison to 802.11a. These techniques permit data collection and transmission without harming the environment. Further work is planned including, mainly, several standards, equipments, topologies, security settings and noise conditions, and also outdoor links.

References

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