

Effect of Interference of UMTS on WLAN

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ABSTRACT

In this paper the effect of interference of UMTS is analysed on WLAN. The effect is analysed by varying the speed of UMTS nodes. To analyse this effect opnet modeler 14.5 is used. The interference is analysed in terms of Video traffic received, Voice traffic received and Load. Result shows that the better performance has been achieved in the absence of UMTS nodes as compare to their presence in the network which causes interference.

Keywords

WLAN, Mobility, Interference, UMTS.

1. INTRODUCTION

Wireless computing is a rapidly emerging technology providing users with network connectivity without any type of wire connection in between the network. A LAN to which mobile users (clients) can connect and communicate with the help of high frequency radio waves to a certain extent than wires [1,4]. IEEE 802.11 is the standard for Wireless Local Area Networks generated by the Institute of Electrical and Electronics Engineers (IEEE). A wireless local area network (WLAN) is a wireless computer network which provide connection in between the two or more than two devices using a wireless distribution method (often spread-spectrum) inside a some degree of area such as a home, college, computer laboratory, or office building [5,6]. This gives users the facility to shift approximately surrounded by a local coverage area and still be connected to the network, and can provide a link to the wide-ranging internet. The majority recent WLANs are based on IEEE 802.11 standards, marketed under the Wi-Fi brand name [7,12].

1.1 WLANs Standards

IEEE 802.11 is the standard for Wireless Local Area Networks (WLANs) developed by the Institute of Electrical and Electronics Engineers (IEEE) i.e. IEEE 802.11a 802.11a is an based on OFDM waveform at 5.8 GHz. and provides protocols that allow sending and receiving of data at rates of 1.5 to 54Mbit/s, IEEE 802.11b is the slow-moving and slightest costly accessible standard. Initially, 802.11b was the best standard because of its price, but as faster standards get a smaller amount expensive, 802.11b is losing popularity. The 802.11b standard used DSSS (Direct Sequence Spread Spectrum) modulation technique. IEEE 802.11b [13] has maximum data rate 11 Mbps and IEEE 802.11g works in the 2.4 GHz band (like 802.11b), but uses the same OFDM depending transmission scheme as 802.11a. It operates at a maximum physical layer bit rate of 54 Mbit/s exclusive of forward error correction codes, or about 22 Mbit/s average throughputs [8, 9].

1.2 UMTS

The Universal Mobile Telecommunications System (UMTS) is a third generation mobile cellular technology for networks based on the GSM standard developed and maintained by the 3GPP (3rd Generation Partnership Project). UMTS is a

part of the International Telecommunications Union IMT-2000 standard set and correlate with the CDMA2000 standard set for networks depending on the competing cdmaOne technology. UMTS uses wideband code division multiple access (W-CDMA) radio access technology to offer greater spectral efficiency and bandwidth to mobile network operators. UMTS defines a complete network system, which comprise of the radio access network (UMTS Terrestrial Radio Access Network, or UTRAN), the core network (Mobile Application Part) and the authentication of users via SIM (subscriber identity module) cards [10,11].

2. LITERATURE SURVEY

B.O. Sadiq et all [14] Designed a video conferencing application over an existing wireless network. To view if the existing wireless network was capable of running a video conferencing application they used The Riverbed Modeler 17.5 software. The Result analysis showed that, the modeled network has highest delay of 0.1225 bytes and lowest delay of 0.01, which resulted to severe throughput degradation. The throughput result was just 80 (Mbps), which is below the desired throughput of 100 (Mbps) for an efficient Video Conferencing application over wireless network.

Gagro, Ivan et al [15] they used IEEE 802.11 a and b for Video streaming. They have designed private network to show some issues which unbalanced the throughput. They describe other factor that affects the performance of video streaming. They concluded that peer to peer connection is better than access point connection

3. SIMULATION SETUP

In this paper the effect of interference of UMTS nodes is analysed over WLAN. To analyze this effect WLAN network is made. In this network three scenarios are made (ground floor, first floor and second floor). There is also a server room in which two servers are placed in which one have VOIP application and other have VOD application as shown in fig 1. In ground floor 2 access points and 16 WLAN nodes are used as shown in fig 2. In first floor there are 4 access points and 12 WLAN nodes as shown in fig 3. In 2nd floor 1 access point is used and 5 WLAN nodes are used as shown in fig 4. To analyse the effect in first scenario in each floor UMTS mobile nodes are placed which are moving at speed of 5m/s. In second scenario UMTS mobile nodes are moving at speed of 7m/s and in third scenario some UMTS mobile nodes are moving at speed of 5m/s and some at 7m/s.

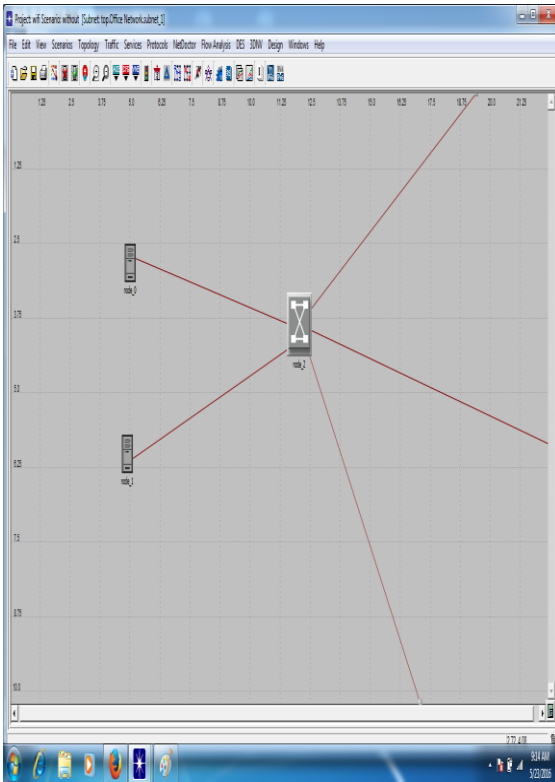


Figure 1: server room

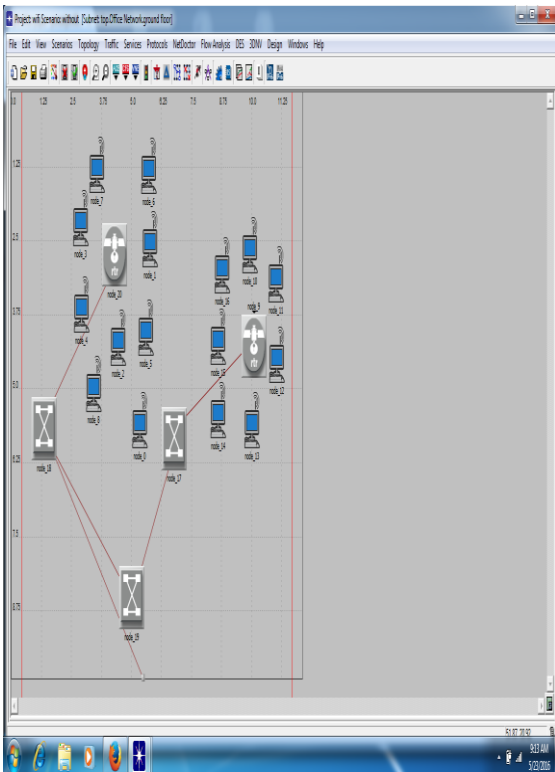


Figure 2: Ground floor

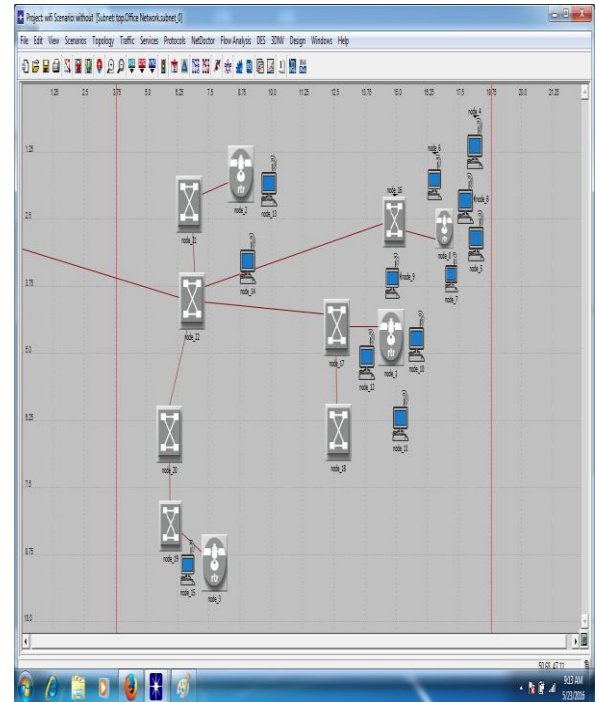


Figure 3: 1st floor

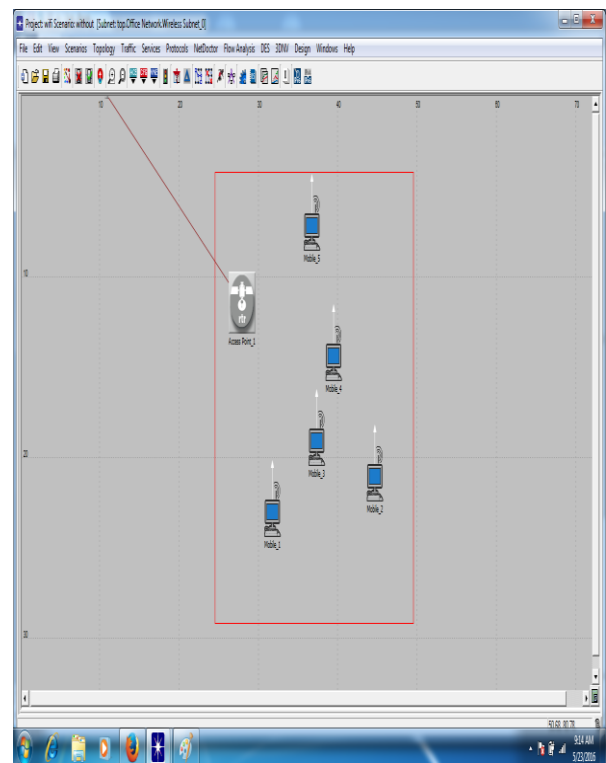


Figure 4: 2nd floor

4. RESULT

In this paper the effect of mobility of UMTS nodes on WLAN performance is analysed in terms of Video traffic received, Voice traffic received and Load.

A. Video traffic received

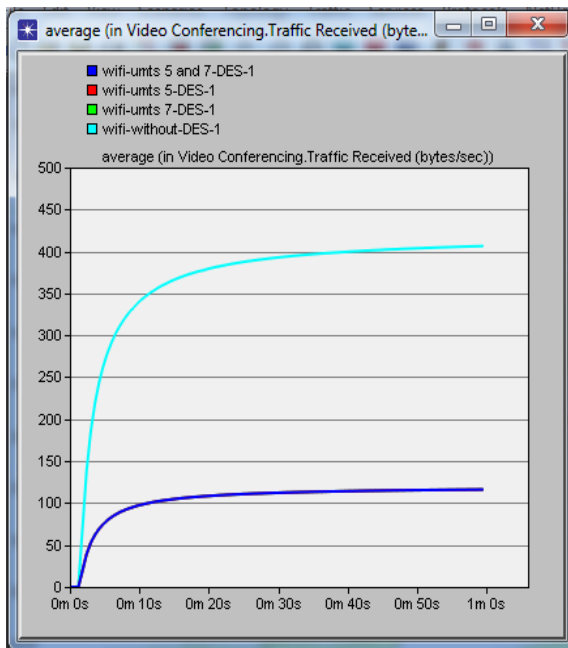


Figure 5: Video traffic received

Fig 5 shows the video traffic received. It shows that when only WLAN is used then performance is good which is 400 bits/sec but when UMTS nodes come in existence the performance decreases to 120 bits/sec.

B. Voice traffic received

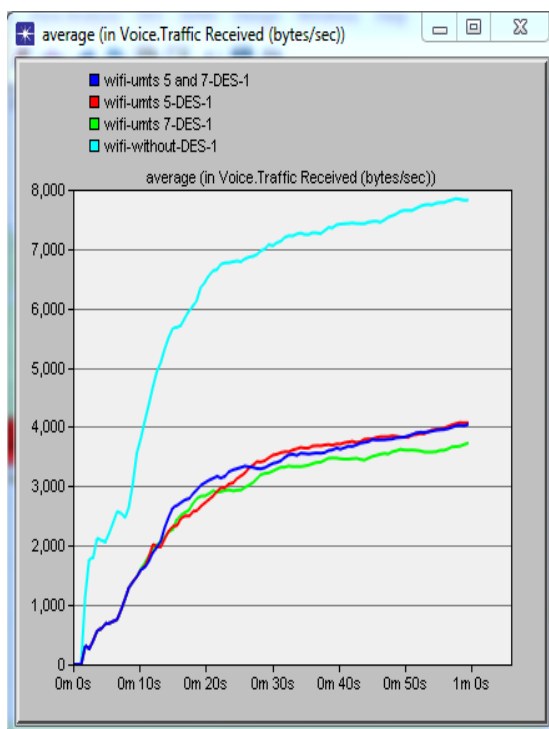


Figure 6: Voice traffic received

Fig 6 shows the voice traffic received. It shows that when only WLAN is used then performance is good which 8000 bits/sec but when UMTS nodes come in existence the performance decreases to 4000 bits/sec when nodes are moving at speed of

5m/s and at mix speed of 5m/s and 7m/s and it is 3800 bits/sec when nodes are moving at speed of 7m/s.

C. Load

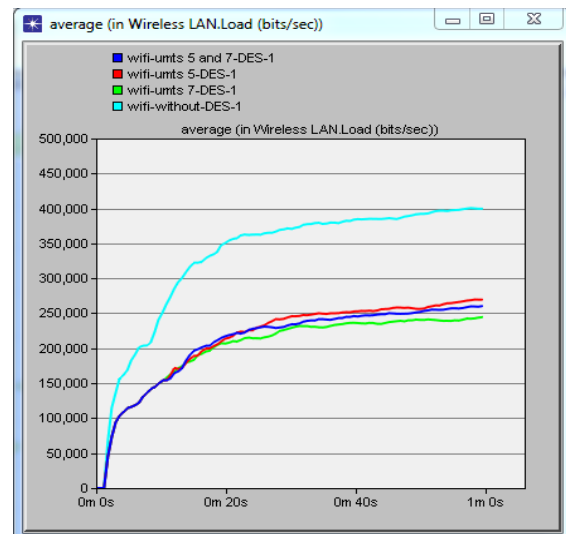


Figure 7: Load

Fig 7 shows the Load. It shows that when only WLAN is used then performance is good which is 400000 bits/sec but when UMTS nodes come in existence performance decreases to 255000 bits/sec when nodes are moving at speed of 5m/s and it is 254000bits/sec at mix speed of 5m/s and 7m/s and it is 250000 bits/sec when nodes are moving at speed of 7m/s.

5. CONCLUSION

In this paper the effect of interference and variation of speed of UMTS on WLAN is analysed. The performance is also analysed by moving nodes of UMTS at different speeds. The performance of WLAN in presence of UMTS is analyzed in terms of Video traffic received, Voice traffic received and Load. Result shows that when there is no interference of UMTS then performance of WLAN is better but when UMTS nodes come in existence then performance decreases. Result also shows that with increase in speed the performance decreases.

6. REFERENCES

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