Wi-Fi 6 Technology- A Review

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Abstract: Wi-Fi 6 is a next generation technology which is based on the IEEE 802.11ax standard. This technology will enable the connectivity of next generation Wi-Fi. Wi-Fi 6 will deliver the capacity, coverage and performance to effectively meet the increasing and evolving use of the Wi-Fi technology. Wi-Fi 6 is the new terminology to easily understand Wi-Fi network devices and its connectivity. This paper will review the various key features and new generational methodology of Wi-Fi 6.

Keywords: Wi-Fi 6, Performance, 802.11ax, Terminology.

I. INTRODUCTION

In the course of recent years, Wi-Fi has developed from an early innovation to worldwide, imperative need for business and individual applications. The up and coming age of Wi-Fi, developed by the Institute of Electrical and Electronics Engineers (IEEE) 802.11ax standard, is known as Wi-Fi 6. This new age of Wi-Fi conveys highlights to adequately meet the expanding, advancing utilization of Wi-Fi innovation. The pervasiveness of rich computerized media substance and client want for consistent network convey expanding execution requests to each Wi-Fi gadget. This thusly requires an incredible increment in by and large system limit, and in addition new methods of activity to alleviate wasteful aspects that could show in extensive scale organizations. Wi-Fi 6 tends to challenges uncovered by the kept, extending accomplishment of Wi-Fi in the 2.4 GHz and 5 GHz frequency bands and has a urgent influence in the journey for the expanded limit and execution required by cutting edge network. The new naming framework distinguishes Wi-Fi generations by a numerical arrangement which compare to significant headways in Wi-Fi. Wi-Fi 6 is the new terminology to easily understand Wi-Fi network devices and its connectivity.

II. NETWORK CONNECTION AND TECHNOLOGY

To enable clients to recognize machines that provide the latest Wi-Fi understanding, Wi-Fi Alliance [1] has bring in a easy terminology to give the names to different Wi-Fi generations. These terminologies may appear on devices as its name and description. Wi-Fi devices supporting modern generation of connectivity are derived from the 802.11ax [2] standard and recognized as Wi-Fi 6 devices [1]. Wi-Fi generation network connection and its visual interface are depicted in the figure 1. Wi-Fi 6, 5 and 4 recognize the devices that support the technologies 802.11ax, 802.11ac and 802.11n respectively. A new numerical sequence may appear as user interface visual (UIV) icon as Wi-Fi signal indicator to identify the generation of a network connection. When a client device shows an indication icon as number 6, it indicates a Wi-Fi 6 association, which means that this device is using the latest version of Wi-Fi technology [3].

Generation of network connection	Sample user interface visual
Wi-Fi 6	
Wi-Fi 5	
Wi-Fi 4	

Figure1. Wi-Fi generation terminology and its visual interface

III. KEY FEATURES OF WI-FI 6 TECHNOLOHY

Wi-Fi 6 gives the establishment to a large group of existing and developing uses from spilling ultra top notch motion pictures at home or in a hurry, to mission-basic business applications requiring high data transfer capacity and low inactivity, to remaining associated and profitable while crossing vast, congested systems in airplane terminals and prepare stations. Following are the key features of Wi-Fi 6.

A. OFDMA

OFDMA bring a development as multi-user model of the earlier version of orthogonal frequency-division multiplexing (OFDM) used for Wi-Fi networks. In OFDMA Wi-Fi channels are further subdivided to achieve simultaneous data transmission of many users. An access point of Wi-Fi 6 can concurrently transmit to 9 Wi-Fi clients using OFDMA. Uplink OFDMA allows data frames to be transmitted simultaneously by multiple stations. Downlink OFDMA allows multiple data frames to be transmitted in a single data unit to multiple stations.

B. MU-MIMO

MU-MIMO is multi-user MIMO feature will use beam-forming in Wi-Fi 6. Downlink MU-MIMO multiplex the transmission of devices which contains lesser antennas thus

permits higher throughput. 802.11ac standard introduced the MU-MIMO and support up to 4 concurrent users whereas Wi-Fi 6 can support up to 8 users efficiently.
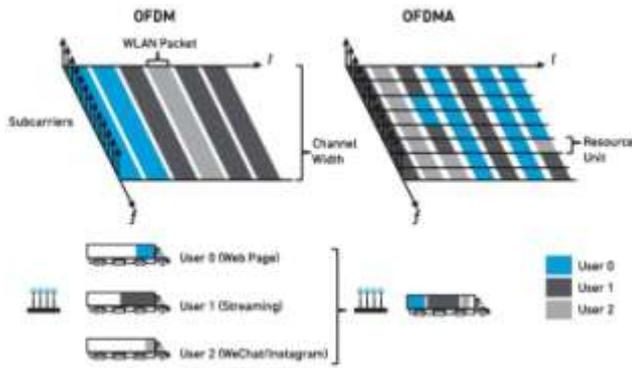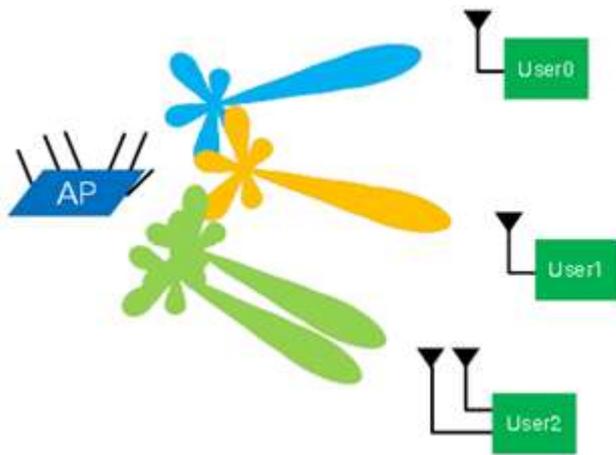

Figure2. OFDMA in Wi-Fi 6

Figure3. MU-MIMO beam-forming

C. Enhanced Link

Wi-Fi 6 supports the 1024 quadrature amplitude modulation (QAM) mode. 1024-QAM enables peak gigabit speeds for emerging, bandwidth-intensive use cases. 1024-QAM will increase the throughput by 25 percent as compare to Wi-Fi 5.

D. Target Weak Time (TWT)

TWT is a system that is responsible for the traffic scheduling of data transmission between access point and a client. Scheduling increases the efficiency as it provides the transmission opportunities by accessing channels. TWT also helps to decrease power consumption by awakening the client device on their scheduled data transmission time.

E. Improved MAC

Wi-Fi 6 will implement the spatial reuse method in which a wireless station in the network can recognize whether signal is from its network or not. Improved medium access control

(MAC) in Wi-Fi 6 will reduce the latency and helps to achieve high data transfer capacity and lowers the inactivity.

Table1. Comparison of Wi-Fi 6 with Wi-Fi 5

Features	Wi-Fi Technologies	
	Wi-Fi 6	**Wi-Fi 5**
IEEE Standard	802.11 ac	802.11 ax
Operational Frequency Bands	5 GHz	2.4 and 5 GHz
Resource Allocation	OFDM	OFDMA
MU-MIMO	4 user support	8 user support
Modulation Mode	256-QAM	1024-QAM
Target Wake Time	Not supported	Allows transmission scheduling between AP and Client

IV.   CONCLUSION

This paper presented a review of new generation Wi-Fi technology, Wi-Fi6. W-Fi 6 will enable the users to easily understand and experience the high performance wifi technology. Table 1 presents the new upgradation and comparison to existing wi-fi technology. OFDMA, 1024-QAM and improved MAC features of wi-fi 6 will bring enhanced performance experience for the wi-fi users. Wi-Fi 6 will also bring more capabilities to support smart homes, IoT (Internet of Things) and environment with large-scale deployments.

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