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The impact of Wi-Fi 6 on the next generation network

White Paper

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High bandwidth is the new norm in Wi-Fi. Wi-Fi 6 or 802.11ax, originally designed to replace both Wi-Fi 4 (802.11n) and Wi-Fi 5 (802.11ac) as the next WLAN standard is being developed to deliver considerable increases in network efficiency and capacity for densely populated areas, with improvements to peak data rates, which will be sustained more consistently across several devices simultaneously.

The Federal Communications Commission has opened an entire new band of spectrum to accommodate next-gen devices designed to tap into it.



The Wi-Fi Alliance, an industry group that manages Wi-Fi nomenclature, branded this new spectrum and the devices that can take advantage of it under a new name: Wi-Fi 6E. As per Qualcomm, "the problem is not how fast Wi-Fi can go, but if the Wi-Fi network has enough capacity to handle the growing demand for many different connected devices and services."

Wi-Fi 6 should have a noticeably positive impact on the network performance in crowded areas such as playgrounds or shopping malls. It is expected to be adopted faster than previous Wi-Fi iterations and will eventually become a necessity for home users as 100Mb/s to 1Gb/s broadband connections become more available, supporting the roll-out of IoT which leads to 'everything' being online. IOT/IOE (Internet of things/ Internet of everything) will become *the* use case for Wi-Fi-6 sub system.

Wi-Fi 6 covers the boost in multi-user support and particularly the increase in simultaneous upstream connections arriving alongside an accelerating demand for user data. The data will be gathered

from IoT enabled devices and used for purposes such as Virtual Reality, Artificial Intelligence and Machine Learning.

Since there will not be an earlier generation of Wi-Fi devices that can tap into the 6GHz band, Wi-Fi 6 is really the key to the cleaner bandwidth challenge. This means that Wi-Fi 6 networks will not have any older-generation devices acting as weak links in the chain. Fortunately, with backwards compatibility, your older generation Wi-Fi devices will still work with networks (routers/gateways) utilizing Wi-Fi 6, they just won't be able to operate in that exclusive 6GHz band.



The new Wi-Fi 6 incorporates many new technologies to achieve this vision state. Leading industry experts have been quoted as saying that Wi-Fi 6 will improve each user's average speed by "at least four times" in congested areas, even with several connected devices.

Key capabilities:

- Wi-Fi 6 introduces support for up and downlink "Orthogonal Frequency Division Multiple Access" (OFDMA), a modulation scheme that is equated to a multi-user version of OFDM (the spec on 802.11ac/n), which will reduce latency, boost capacity and improve efficiency by allowing as many as 25+ users to share a channel simultaneously.
- Multi-user MIMO allows more downlink data to be transferred at one time, enabling access points to concurrently handle more devices.
- Target wake time (TWT) significantly improves network efficiency and device battery life, including IoT devices.

(Key Capabilities continued)

- 1024 quadrature amplitude modulation mode (1024-QAM) increases throughput for emerging bandwidth intensive uses by encoding more data in the same amount of spectrum.
- Wi-Fi 6 will also include improved Beamforming technology for improving user Wi-Fi reception and reducing interference. Beamforming promises a faster, stronger WIFI signal with longer range for each device. Rather than simply broadcasting in all directions, the router attempts to broadcast wireless data intended for a device in way that's optimal for that device.



UDT Highlights

- Fully automated Wi-Fi 6 testing enabled
- Scalable software architecture to process multiple products
- Extendable software framework for ease of upgrade.
- Concurrent processing/testing on all ports for efficient throughput.
- Cloud enabled system management for remote debugging.

Call now to get your WiFi 6 device moving!



Thank you, Rajeev

Rajeev

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WHY CONTEC Solutions:

[Contec, Technology's Source for Logistics, Test & Repair](#), Research & Development team is driving technology innovation every day for our customers. With over 50 US patents, our technology provides peace of mind to our customers that their assets are both thoroughly tested and ultimately protected by our world class technology solutions. Contec's [Universal Device Tester \(UDT\)](#) supports all current standards as well as WI-FI 6 enabled wireless routers/gateways. Contec's vision is to provide and integrate innovative test technologies with our customers without disrupting their supply chain eco systems. As this technology continues to spread through the ecosystem and all MSO's/OEM's deploy more and more Wi-Fi 6 enabled wireless devices, Contec's UDT solutions will be a critical instrument in effectively testing this technology. **Please email or call us for more information or scheduling product demo.**

While we will first see Wi-Fi 6 deployed mainly within communication networks (commercial and residential), the immense possibility exists to see it expanded into Connected Home and Security and Surveillance products soon.

CONTEC's Universal Device Tester (UDT)

Appendix A: W-IFI 4/5/6 Feature comparison list.

SN	Description	802.11n (Wi-Fi 4)	802.11ac Wave 2 (Wi-Fi 5)	802.11ax (Wi-Fi 6)
1	Released	2009	2013	2019
2	Bands	2.4GHz & 5GHz	5GHz	2.4GHz & 5GHz, spanning to 1GHz - 7GHz eventually
3	Channel Bandwidth	20MHz, 40MHz (40MHz optional)	20MHz, 40MHz, 80MHz, 80+80MHz & 160MHz (40MHz support made mandatory)	20MHz/40MHz @ 2.4GHz, 80MHz, 80+80MHz & 160MHz @ 5GHz
4	FFT Sizes	64, 128	64, 128, 256, 512	64, 128, 256, 512, 1024, 2048
5	Subcarrier Spacing	312.5kHz	312.5kHz	78.125 kHz
6	OFDM Symbol Duration	3.6ms (short guard interval) 4ms (long guard interval)	3.2ms (0.4/0.8ms cyclic prefix)	12.8ms (0.8/1.6/3.2ms cyclic prefix)
7	Highest Modulation	64-QAM	256-QAM	1024-QAM
8	Data Rates	Ranging from 54Mb/s to 600Mb/s (max of 4 spatial streams)	433Mb/s (80MHz, 1 spatial stream) 6933Mb/s (160MHz, 8 spatial stream)	600Mb/s (80MHz, 1 spatial stream) 9607.8Mb/s (160MHz, 8 spatial stream)
9	SU/MU-MIMO-OFDM/A	SU-MIMO-OFDM	SU-MIMO-OFDM Wave 1, MU-MIMO-OFDM Wave 2	MU-MIMO-OFDMA

References:

Reference/Organization	Link
Federal Communication Commission	https://www.fcc.gov/
Wi-Fi Alliance	https://www.wi-fi.org/
Contec WP Link:	https://www.gocontec.com/white-papers/

Appendix B: CONTEC Overview

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Forward & Reverse Logistics

- B2B/B2C Fulfillment
- Hub Services
- RMA Returns
- Asset Recovery
- Kitting/Packaging
- Service Parts Logistics



Test, Repair & Diagnostics

- Test & Diagnostics
- Automated Test HW/SW
- Product Triage
- CPI clear (Data Wipe)
- Cosmetic & Refurb
- L2-L4 Repair (BGA)

Product Capabilities



Set Top
Box/CPE



Parts
Mgmt.



Security &
Surveillance



Wireless
Streaming



PC &
Storage



Point of Sale



Connected
Home



Audio



WIFI /
Gateways



Accessories



Mobile



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