Pioneering the Future with Wi-Fi 8

Part one: Fast efficient spectrum

MediaTek Filogic White Paper

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Key Insights

- Wi-Fi 8 is designed to seamlessly complement cellular networks for internet access.
- Wi-Fi 8 enhances Wi-Fi communication through coordination of multiple Access Points (APs).
- Wi-Fi 8 improves the network throughput via optimization of spectrum utilization.

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Introduction

As one of the crowning technological achievements of the 21st century, Wi-Fi has experienced several evolutionary generations, each marked by significant advancements in capability and scope. Since its' early inception, Wi-Fi has expanded from a low-rate conduit of data, into a highly scalable high-performance connectivity, enabling numerous innovative use cases and applications.

MediaTek Filogic- Pioneering Innovation

The forthcoming Wi-Fi 8 aims to prioritize a pivotal aspect of wireless communication that has become increasingly critical: reliability. Recognizing the ever-growing quest for reliable wireless connectivity, the IEEE 802.11 Working Group has designated Wi-Fi 8 for Ultra High Reliability (UHR) and has formed the Task Group bn to spearhead this development. Industry experts from around the globe are contributing a wealth of potential features to this endeavor. MediaTek Filogic, as an active spec contributor and leading product provider for Wi-Fi solutions, is excited to share its technological vision through a series of white papers. These documents will dissect the myriad features under consideration, organized into four key categories:

1. **Fast:** Strategies to enhance the data throughput between access points (APs) and stations.
2. **Reliable:** Methods to bolster the reliability of wireless services.
3. **Always-on Connected:** Techniques to minimize service interruptions and maintain constant connectivity.
4. **Beyond Wi-Fi 8:** A look at the ongoing efforts to improve Wi-Fi services that fall outside the scope of the 802.11bn standard. This includes, but is not limited to, topics such as Integrated Millimeter Wave (IMMW) and Artificial Intelligence and Machine Learning (AIML).

As we advance on this journey to the next frontier of Wi-Fi technology, MediaTek Filogic invites you to join in exploring the innovations that will define the future of wireless connectivity.

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Wi-Fi 8 Overview and Trends

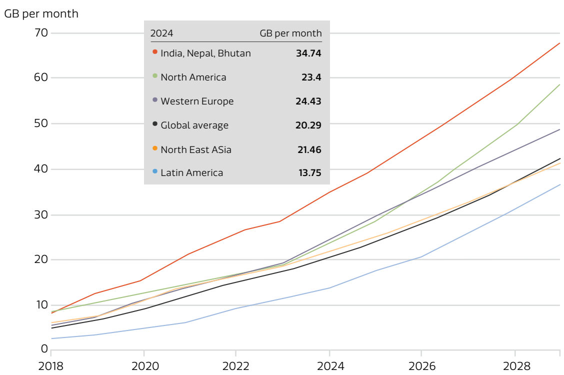
The parity of Wi-Fi and 5G

Wi-Fi has emerged as the most viable alternative to traditional wireline connectivity solutions such as Ethernet and coaxial cables. It offers users the convenience of cable-free flexibility for many devices like laptops and televisions, without the constraints of physical connections. While the peak throughput of Wi-Fi often exceeds the requirements of many applications, users may sometimes experience intermittent jitter during streaming or video conferencing. This is indicative of Wi-Fi's susceptibility to environmental factors impacting signal quality and consistency. In many residential environments, cable-equivalent reliability remains a significant challenge for Wi-Fi technology.

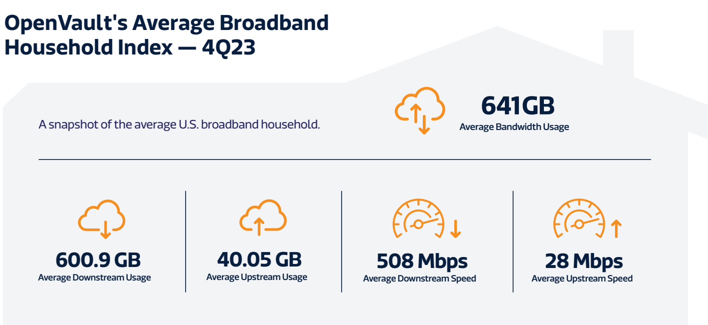
In the current landscape, two prominent wireless technologies dominate the market: cellular 5G and Wi-Fi. While there has been debates about the potential for one to replace the other, yet it is likely that both will coexist in the foreseeable future. Several factors contribute to this coexistence:

1. **Cost Considerations:** The cost of 5G services is generally higher than that of Wi-Fi, largely due to the expensive licensing fees associated with 5G spectrum allocation.
2. **Device Compatibility:** Most consumer electronics come equipped with Wi-Fi capabilities, whereas 5G or 4G connectivity is less common. For instance, Wi-Fi-only tablets continue to lead the tablet market.
3. **Data Offloading:** According to a study by Cisco, in 2022 over 50% of global mobile data traffic was offloaded to Wi-Fi networks, highlighting the significant role Wi-Fi plays in managing data traffic.
4. **Data Volume:** Data usage figures below illustrate the disparity in usage between the two technologies. In the United States, the average monthly data usage per person was approximately 23GB over 4G/5G and a substantial 650GB over broadband as shown in Figure 1. or 250GB per person. And most of the broadband data are carried by Wi-Fi. This indicates that Wi-Fi handles more data in magnitude than 4G/5G. Projections for 2030 suggest that while 4G/5G may carry around 60GB per month, it will still far below the data carried by Wi-Fi. Based on the study, it will surpass 1TB per broadband subscription in 2028 or around 400GB per person.

These points highlight the complementary nature of 5G and Wi-Fi, with each serving distinct roles in the wireless ecosystem. Wi-Fi's significant data handling capacity, along with cost-effectiveness and widespread device integration, ensures its continued relevance amidst the expanding 5G infrastructure..



(a) Mobile data traffic per active smartphone by Ericsson.



(b) A snapshot of the average US broadband household by OpenVault & Fierce network.

Figure 1. data consumption by mobile and broadband per month.

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Evolution of Wi-Fi 8

As previously mentioned, Wi-Fi 8 is designated as Ultra High Reliability (UHR) and aims to enhance effective and reliable communication. This generation of Wi-Fi standards shifts the focus on improving effective throughput, which refers to the actual data transfer rate experienced by users in real-world environments. For example, the flagship Access Points (APs) are equipped with three streams across each frequency band: 2.4GHz, 5GHz, and 6GHz. Most Wi-Fi clients support up to two streams and two bands. Typically, the channel bandwidth available to clients is less than the maximum defined by the standard. For instance, most iPhone models feature an 80MHz bandwidth, except for the iPhone 15 Pro. The capabilities of these smartphones are well-suited for streaming, requiring 25Mbps for 4K video on Netflix and 100Mbps for 8K video on YouTube.

The table below summarizes the key features and parameters from Wi-Fi 4 through Wi-Fi 8. The concept of multiple AP coordination, introduced in Wi-Fi 7, was deferred to Wi-Fi 8 due to its complexity. The popularity of mesh networks has made multiple APs more common in homes, enhancing the Wi-Fi coverage. However, without effective coordination, these APs may contend and share the common spectrum resources, resulting in often only one AP utilizing the spectrum at any given time. Thus, improving performance is a critical focus.

To address these challenges, dynamic sub-channel operation and non-primary channel usage have been proposed. These features are designed to optimize performance when there is a disparity in the number of streams and channel bandwidths among devices. For example, a BW320 (320MHz bandwidth) AP, when communicating with a BW80 (80MHz bandwidth) client, must limit itself to BW80, thereby losing 75% of its transmission capability. Dynamic Spectrum Optimization (DSO) addresses this issue effectively. Non-Primary Channel Access (NPCA) aims to resolve scenarios where the primary channel is unavailable, allowing communication between the AP and the client to occur via a non-primary channel.

Here is a comparative table highlighting the evolution among Wi-Fi 4 through Wi-Fi 8:

Feature	Wi-Fi 4	Wi-Fi 5	Wi-Fi 6	Wi-Fi 7	Wi-Fi 8
Maximum Channel Bandwidth (MHz)	40	160	160	320	320
Frequency Bands (GHz)	2.4 and 5	5	2.4, 5 and 6	2.4, 5 and 6	2.4, 5 and 6
Max PHY rate	150Mbps * 4 600Mbps	433Mbps * 8 ~4.3Gbps	1200Mbps * 8 ~9.6Gbps	2880Mbps*8 ~23Gbps1	2880Mbps * 8 ~23Gbps
Modulation	64 QAM	256 QAM	1024 QAM	4096 QAM	4096 QAM
Spatial Streams	4	4	8	8	8
MU-MIMO		DL only	UL & DL	UL & DL	UL & DL
Target Wait Time			Individual, broadcast	Restricted	Coordinated
OFDMA (# RU per STA)			Yes (single)	Yes (multiple)	Yes (multiple)
Multi-Link Operation				Yes	Yes
Multi-AP Coordination					Yes
DSO/NPCA					Yes
dRU					Yes
IEEE Standard	11n	11ac	11ax	11be	11bn

Table 1. The major features among Wi-Fi generations.

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Market Trends

Wi-Fi service has become an integral part of daily life due to its convenience and flexibility. In the past, individuals commonly sought out Ethernet connections upon arriving at hotels; nowadays travelers check for Wi-Fi access upon arriving at venues. While cellular LTE & 5G provide long range mobile access, it cannot fully replace the utility of Wi-Fi for most users. As indicated in the preceding section, the final leg of Internet connectivity is increasingly transitioning to Wi-Fi and LTE, with Wi-Fi maintaining a dominant position in this space.

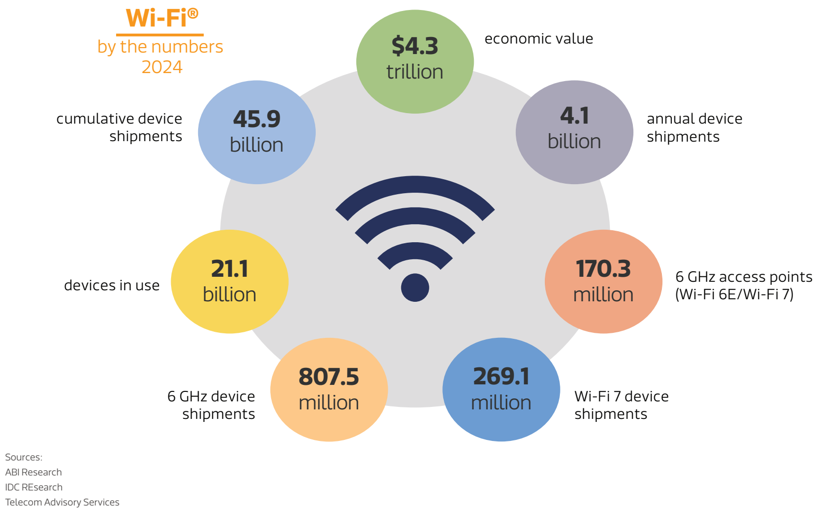

Figure 2. Value of Wi-Fi by the numbers.

Wi-Fi is also a key contributor to the global economy. The number of cumulative Wi-Fi devices shipped will be 45.9 billion by 2024 and around 46% are actively used based on the latest WFA study. In 2024, the annual devices shipped will be 4.1 billion which grows by about 7% YoY. In these devices, around 30% are smart phones and 6.5% are Wi-Fi 7 devices.

The global economic value provided by Wi-Fi reached $4.3 trillion USD in 2024 and will reach $4.9 trillion in 2025 based on the study conducted by WFA across 29 economies. United States and European Union lead the world with $1.6 trillion USD and $637 million USD, correspondingly.

Further analysis shows that growth in the EU region is primarily driven by the development of the Internet of Things (IoT), the use of Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and Extended Reality (XR), along with free wireless internet. Additionally, the EU's opening of 500 MHz of bandwidth in the 6 GHz band for wireless network use gives a significant boost.

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The United States is the country with the most extensive use of wireless networks globally. Eighty-five percent of broadband households have wireless network services, and 55% of mobile users access the internet via Wi-Fi networks rather than cellular 4G/5G. With FCC opening the full 6 GHz band, providing 1200 MHz of bandwidth for Wi-Fi network use, the economic contribution of wireless networks will grow to $1.58 trillion in 2025.

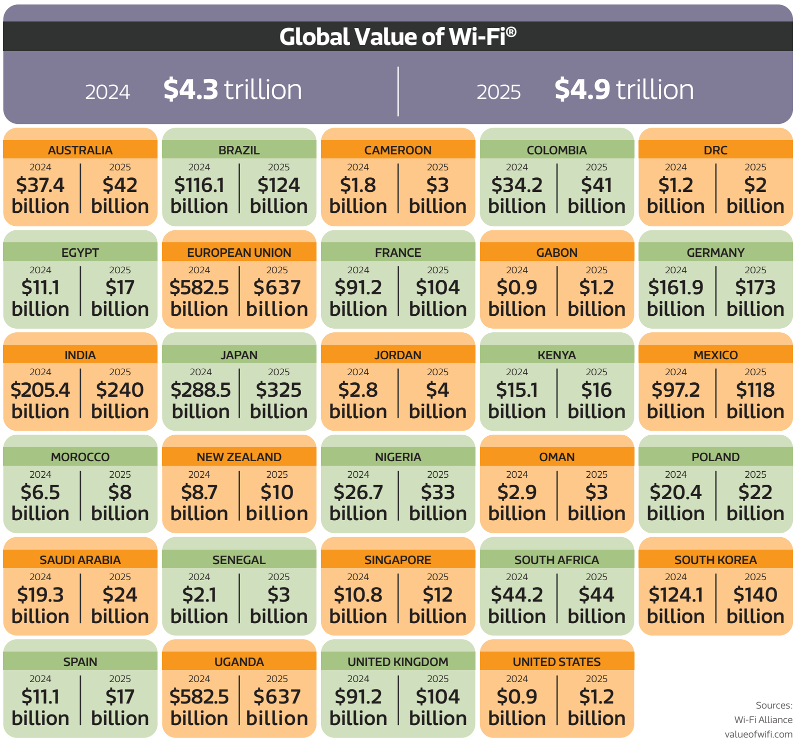

Figure 3. Global value of Wi-Fi.

Among the 27 main economies, China has the largest PON deployment. There are more than 650 million broadband subscribers and 28.6% have 1Gbps or above high-speed broadband access, during mid-2024. The average connection speed is 487.6Mbps which is 17.9% growth compared to 2023. Three major operators shipped most PON gateways with integrated Wi-Fi. while some PON gateways are without Wi-Fi for separate or existing Wi-Fi AP.

With increasing Wi-Fi devices in a household, the rising demand for better Wi-Fi is expected. The ever-growing demand for wireless applications ensures Wi-Fi will continue to play a leading role enabling next generation use cases and applications since there is no replaceable technology in the foreseeable future.

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The Focus of Filogic Wi-Fi 8

Wi-Fi 8 prioritizes reliability as its main objective, aiming to provide deterministic wireless services for applications such as Extended Reality (XR), industrial automation, e-Health, and more. This focus on reliability is a significant shift from previous Wi-Fi standards, which primarily concentrated on increasing speed and throughput.

According to the IEEE 802.11 timeline, the target final approval date of IEEE 802.11bn, which encompasses Wi-Fi 8, is set for September 2028. The certification process for related products generally launches a year before the standard ratification. For instance, the first Wi-Fi 7 products were shipped in late 2023, with Wi-Fi certified Wi-Fi 7 products launching in early 2024, while the Wi-Fi 7 standard, 11be, is expected to be approved in September 2024, that is a 4-month delay from the original schedule. Based on this 4-year cadence, Wi-Fi 8 products are anticipated to hit the market in late 2027. That said, an exception to this cadence was observed in Wi-Fi 4, where the standardization process was prolonged, resulting in the pre-N products introduced approximately 3 years before the standard was officially finalized.

The development cycle for a Wi-Fi standard at IEEE is approximately 6 years, as illustrated in the figure below. It is interesting to note that products often become available before the finalization of the standard. For example, even though Wi-Fi 7 is still in the final approval stage, Wi-Fi 7 devices have been in the market since the end of 2023. This early availability is due to manufacturers developing products based on draft versions of the standard rather than waiting for the final version. For Wi-Fi 8, the first products are expected to be available in early 2028, pacing for early adoption for latest Wi-Fi technologies before the standard is officially completed. Any subsequent spec updates before the final approval need to be accommodated by certification or product update to ensure interoperability.

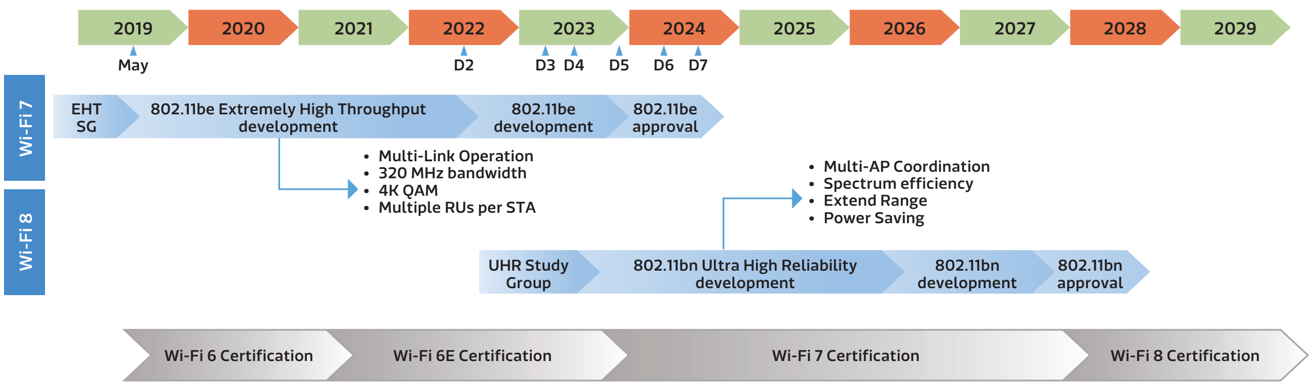

Figure 4. IEEE and WFA milestone about Wi-Fi 7 and Wi-Fi 8.

Each iteration of the IEEE 802.11 standards has progressively enhanced the Wi-Fi capabilities. As indicated in the previous figure, Wi-Fi 7 is focused on maximizing peak throughput with innovations such as Multi-Link Operation, 320MHz bandwidth and 4K-QAM technology. Theoretically, the maximum Physical Layer (PHY) rate for a tri-band 4x4 Wi-Fi Access Point (AP) could reach around 19Gbps. When accounting for overhead, the actual peak throughput in a clean environment is approximately 80% of the PHY rate. Such pristine conditions are typically found only in clean lab environment, rather than everyday usage scenarios.

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The Wi-Fi 8 Advantage

With Wi-Fi access becoming a staple in every household, interference is an inevitable challenge. The situation is further complicated by the deployment of multiple APs or mesh networks to ensure comprehensive home coverage, often sharing the same channel to minimize channel switching latency. Consequently, the throughput experienced by a user at any given moment may be significantly lower than the peak throughput. For instance, streaming a 4K video from Netflix requires 25Mbps, which is a fraction (less than 2%) of the peak throughput of a tri-band 4x4 Wi-Fi 7 AP. Despite this, users may still encounter jitter due to protocol overhead and random interference. This real-world throughput is referred to as effective throughput, which is the actual speed users can expect from their Wi-Fi connection. When effective throughput falls below 25Mbps, users may experience noticeable disruptions in their streaming quality. Wi-Fi 8 highlights the cooperation of multiple APs to minimize the interference and maximize the effective throughput.

Enabling Reliable Actual Performance in Everyday Wi-Fi Environments

MediaTek Filogic is set to share insights on Wi-Fi 8. To streamline this discussion, we have divided our vision into several categories, with each category encompassing a set of features. It's important to note that this categorization is subjective, as each feature can contribute to multiple categories.

In this chapter, we will concentrate on the category labeled "Fast". Here, "Fast" refers to enhancing the effective throughput rather than the PHY peak throughput, which is often advertised on product packaging. Our goal is to address the actual performance that users can reliably achieve in typical, everyday Wi-Fi environments. We have identified advanced technologies of Co-SR, Co-BF, MCS & DSO and illustrated their key aspects for enhancing communication efficiency in the following real-life scenarios.

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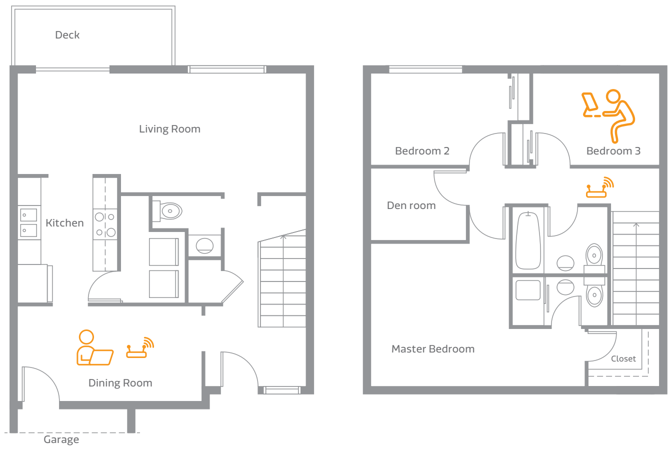
Coordinated Spatial Reuse (Co-SR)

Scenario: John and Mary live in a two-story townhouse. They recently subscribed a broadband service program for 1Gbps with a pair of entry mesh AP's (2x2 + 2x2 BW160) for good Internet surfing experience. They measured the maximum throughput a few times. The best for the first floor is around 1Gbps and 500Mbps for the second floor. One day, John and Mary were downloading Netflix movies for their upcoming trip to save on the 5G roaming cost. John stayed in the dining room on the 1st floor, while Mary was in the bedroom on the 2nd floor. They were expecting the download to be completed in a short time but found that the download speed was only around 300Mbps. They were in stress to download all the movies they liked in a short time since they had a flight to catch in soon. They began to wonder about the reason for the 300Mbps low speed as they had paid a lot for the 1Gbps broadband Internet service.



First Floor Second Floor

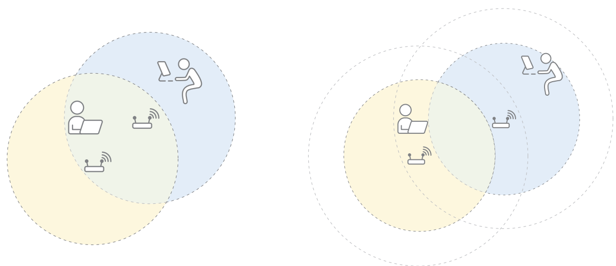
Figure 5. Layout of Two-story townhouse with location of Wi-Fi devices.

Issue: There are three pairs for Wi-Fi connections. The first one is the master AP to John's tablet. The second one is the master AP to slave AP, and the third one is the slave AP to Mary's laptop. The 1Gbps is fairly shared by these three connections and each one gets around 300Mbps. If the SINR between two APs is not as good as AP to tablet or laptop, the associated link data rate is lower and limits the download performance. Since the tablet and laptop are on different floors, is there any way to improve performance?

Challenge: To simultaneously transmit data to independent connections. For example, the transmission from master AP to John's tablet and from slave AP to Mary's laptop.

Technology: The strength from master AP to tablet is higher than master AP to laptop on the 2nd floor. If the transmission power is reduced, the signal may be weak enough to be treated as background noise and the laptop may receive data from slave AP simultaneously.

The technology was proposed and implemented in Wi-Fi 6 and named as Spatial Reuse. As shown in (a) of the left figure, the data can be successfully transmitted only in sequential transmission with the default transmission power. With power control in (b) of the figure, the communications could be done simultaneously.



(a) Default Tx power (b) adjust Tx power

Figure 6. Co-SR adjust TX power to have simultaneously communication.

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With the multiple AP coordination getting mature in Wi-Fi 8, APs will negotiate a suitable transmission power resulting in a better performance than the SR in Wi-Fi 6. The new technology is named as Coordinated Spatial Reuse (Co-SR). There are three phases in Co-SR operation: Cross-BSS Measurement Phase, Multi-AP Coordination Phase, and Concurrent Transmission Phase.

1. The Cross-BSS Measurement Phase: The APs in a Co-SR group measure the interference strength on Cross-BSS STAs and exchange this information among APs.
2. The Multi-AP Coordination Phase: The Co-SR is initiated by the Sharing AP which is not limited to the master AP. The Sharing AP sends out a Co-SR Announce frame, indicating which APs can participate in the next phase and specifying any transmit power limitations.
3. The Concurrent Transmission Phase: The Shared APs transmit data simultaneously with the Sharing AP.

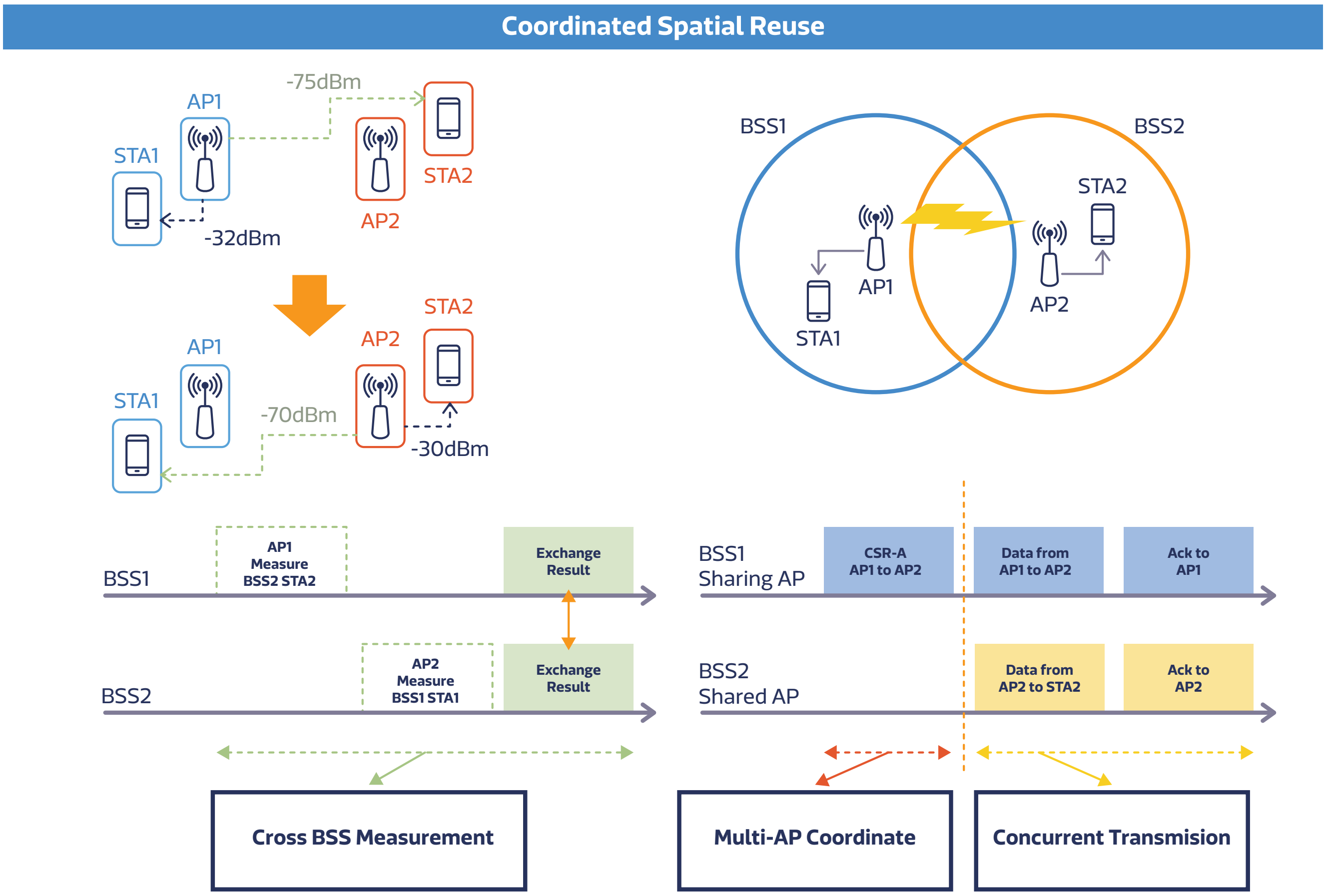

Figure 7. Co-SR Operation Sequence.

MediaTek Filogic has implemented the Co-SR for the most popular Wi-Fi mesh system, one Control AP and one Agent AP. Our preliminary trials show that Co-SR could increase the overall system throughput by 15% to 25%. With joint transmit power control and rate selection, the next-generation Wi-Fi powered by MediaTek Filogic offers the users an increasing spectrum capacity and more reliable Wi-Fi experience.

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Coordinated Beamforming (Co-BF)

Scenario: Alex and Susan live in a three-bedroom apartment and have a 1Gbps broadband connection. To get good wholesome home experience of Wi-Fi connections, they have a high-end two-AP mesh. Each AP equips with 12 antennas, 4 spatial streams in 2.4GHz, 5GHz and 6GHz. The master AP is located close to the door due to the service provider's connection. The slave AP is in the middle of the apartment due to the good Wi-Fi signal between two APs. One day, Alex was downloading a huge APP from internet in the study room. Susan was watching a 4K movie in the kitchen. Due to the heavy interference in the kitchen and data sharing among all devices, Susan experienced few jitters in watching her movie.

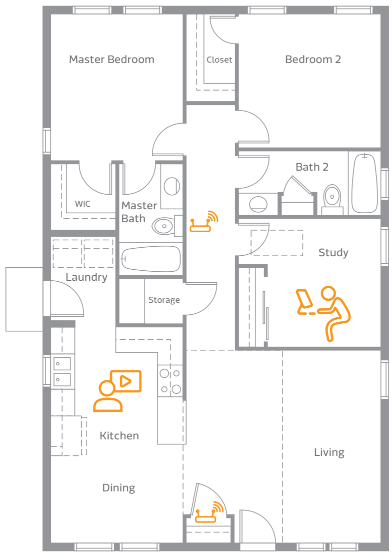

Figure 8. Layout of apartment with location of Wi-Fi devices.

Issue: Like the previous scenario, there are three Wi-Fi connections. However, due to the tablet and TV being close to each other, the Co-SR technology, cannot work properly. Hence, there is a need for an alternate technology to improve performance.

Challenge: Reducing transmission power may not be sufficient to enable Coordinated Spatial Reuse (Co-SR) in certain scenarios, particularly when the OBSS STAs are operating in certain proximity.

Technology: The concept of spatial nulling in multi-user MIMO (MU-MIMO), as defined in IEEE 802.11ac, is extended to multi-AP operations through Coordinated Beamforming (Co-BF). Spatial nulling allows a transmitter to direct its signal toward intended receivers while minimizing interference with unintended receivers by creating "nulls" in the direction of those devices. At the expense of more AP's spatial dimensions in a multi-AP environment, Co-BF allows APs to align their transmission patterns, directing their signals more precisely toward their target devices while avoiding interference with others.

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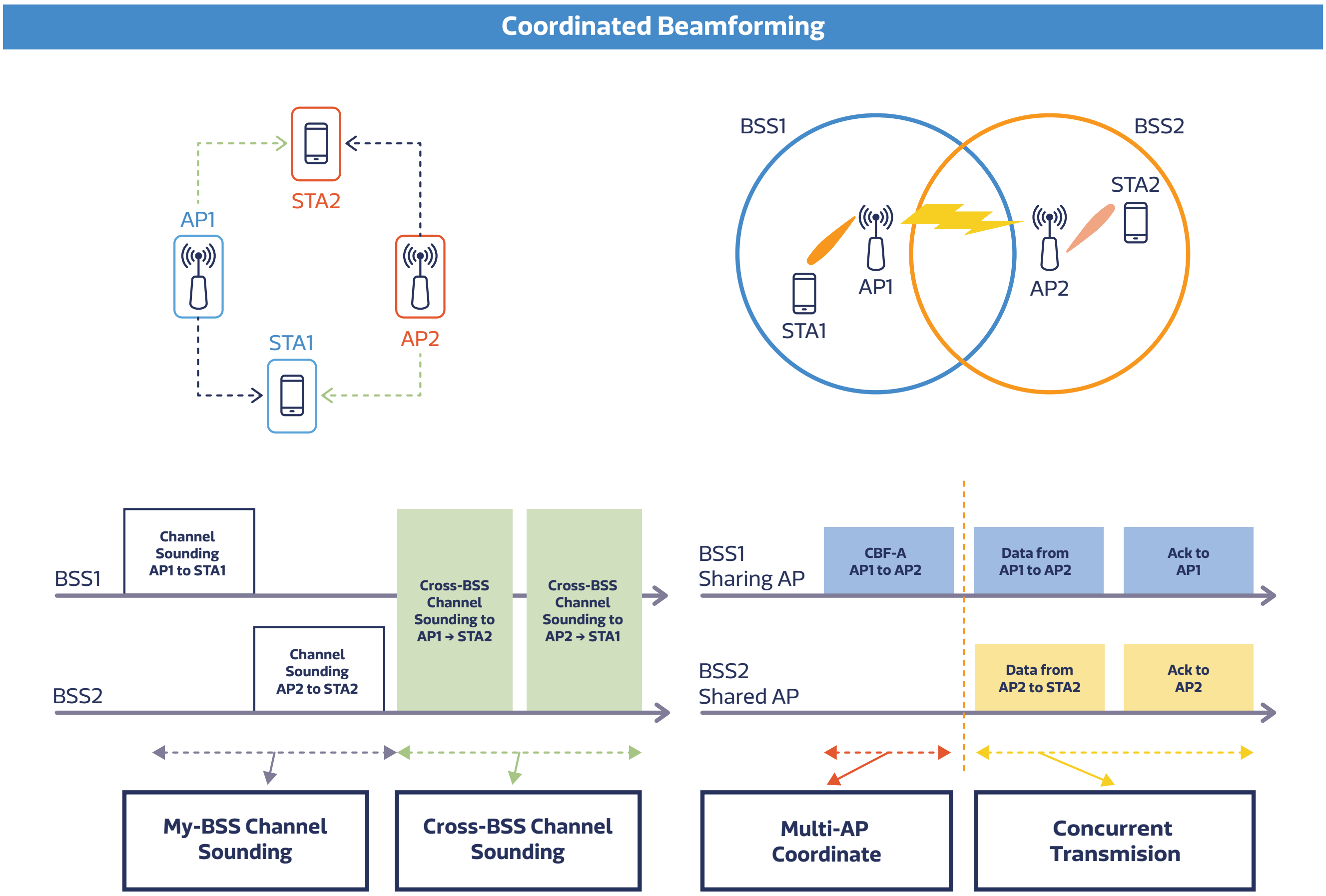

Figure 9. Co-BF Operation Sequence.

In addition to the Channel Sounding for legacy Beamforming, Co-BF operation involves three following phases:

1. In the Cross-BSS Channel Sounding Phase, STAs participating in Co-BF measure the Channel State Information (CSI) from OBSS Aps.
2. Next, in the Multi-AP Coordination Phase, initiated by the Sharing AP, OBSS APs exchange information about the target STAs and calculate the steering matrices, including interference nulling for STAs in the other BSS.
3. Finally, during the Concurrent Transmission Phase, both the Sharing AP and Shared AP apply the steering matrices and transmit concurrently.

The throughput offered by Coordinated Beamforming (Co-BF) in next-generation MediaTek Filogic is significantly enhanced, with increases ranging from 20% to 50% in a mesh network setup with one Control AP and one Agent AP. This improvement in throughput is particularly valuable in environments where high data rates and efficient spectrum usage are critical, such as in densely populated urban areas or large retail spaces.

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New Data Rate

Scenario: Tom lives in a two-bedroom apartment located close to a university. There is a large student community living nearby and almost all have their APs in each apartment. One day, Tom was surfing on the net and downloading a huge file. During the download, he moved from the study room to the bedroom. Then, the download speed suddenly dropped to 200Mbps from 300Mbps. Tom was wondering on what went wrong.

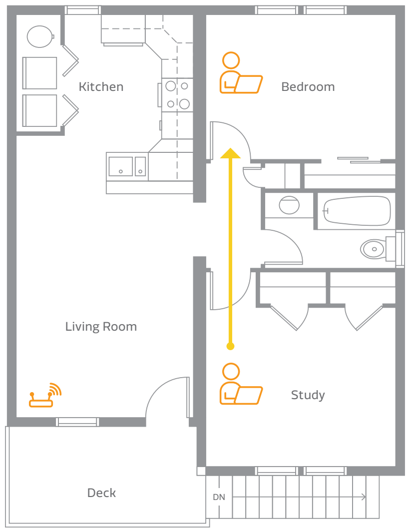

Figure 10. Wi-Fi performance getting worse when moving from Study to Bedroom.

Issue: The Wi-Fi speed is selected based on the signal and noise ratio. There are 14 PHY rates in Wi-Fi 7, from 2,880Mbps through 144.1Mbps. Each step drops around 10% from the step higher from MCS13 through MCS6. Given that, the speed dropped around 33% from MCS5 through MCS0. Tom was originally connected at MCS6 and later connected at MCS4. The PHY rate effectively dropped by 33%.

Challenge: In IEEE 802.11be, only half of the possible combinations are defined for MCS levels. Our study reveals that the sensitivity in Signal-to-Noise Ratio (SNR) requirement gaps between certain neighboring MCS levels can be quite large. For example, the gap is greater than 3.5 dB between MCS2 and MCS3, and over 4 dB between MCS4 and MCS5 under Additive White Gaussian Noise (AWGN) conditions.

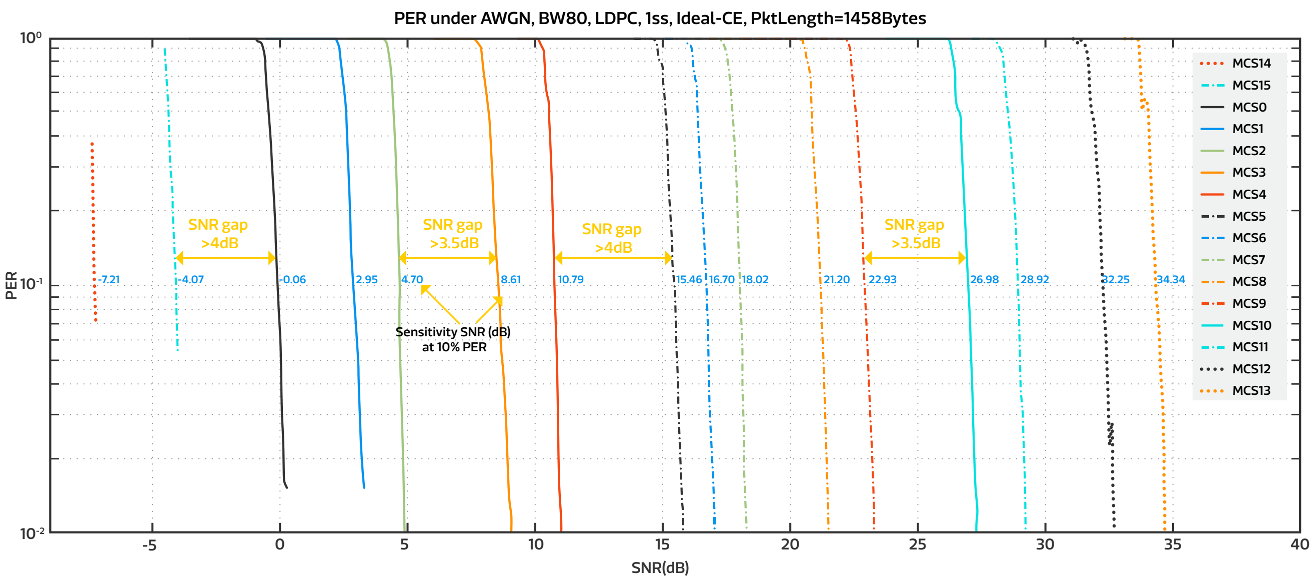

Figure 11. SNR Gaps in Existing MCSs.

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Technology: In the next generation of Wi-Fi, we propose adding new Modulation and Coding Schemes (MCSs) to bridge the sensitivity SNR requirement gaps between adjacent MCS levels. Specifically, we suggest introducing the following MCS options:

- QPSK with a 2/3 coding rate
- 16-QAM with a 2/3 coding rate
- 256-QAM with a 2/3 coding rate
- 16-QAM with a 5/6 coding rate

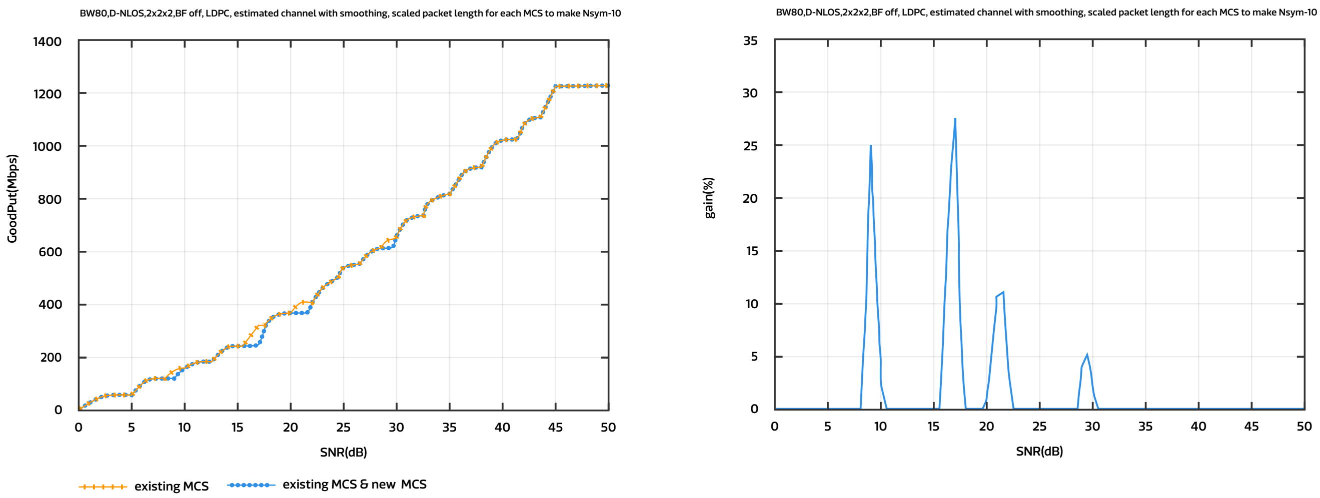

Figure 12. Goodput Gain from New MCS.

By providing finer gradations between MCS levels, the system can accurately match the data transmission rate to the prevailing SNR. Our study indicates that these additional MCSs can enhance transmission rates by 5% to 30%, depending on the specific conditions of the wireless channel. These finer MCSs facilitate more accurate link adaptation, allowing the system to respond more effectively to dynamic changes in the wireless environment.

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Dynamic Sub-channel Operation (DSO)

Scenario: Jimmy invited three classmates to study in his apartment for the upcoming exams. Since the apartment is part of the University, they have 1Gbps internet access. To enjoy the speed, Jimmy had a Wi-Fi 7 flagship BE19000 AP. During the discussion, they found that they needed to have a big file from their school portal. All of them started downloading the same file at the same time and found that none of them were getting a good speed.

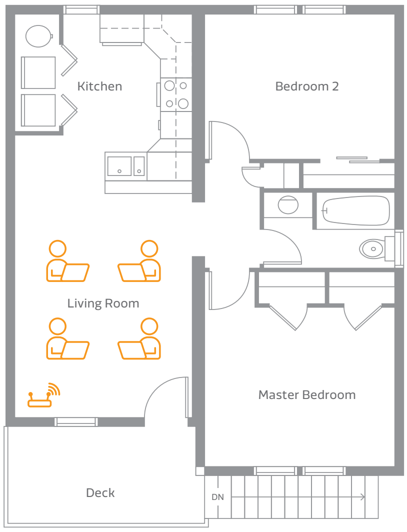

Figure 13. Friends study together and compete on the Wi-Fi service.

Issue: Some notebooks, tablets and smart phones have 2 Wi-Fi antennas and BW80. For example, most iPhones have BW80 except iPhone 15 Pro, which has BW160. The maximum PHY rate is about 1.4Gbps and the effective throughput is about 1.1Gbps. With external interference, they were able to enjoy around 250Mbps each since the limitation is on the internet connection.

Challenge: Most non-AP stations (STAs) do not have the same bandwidth capabilities as APs. This mismatch can lead to inefficient use of the APs' bandwidth when interacting with lower-bandwidth STAs. To address this issue, IEEE 802.11ah and IEEE 802.11ax introduced a feature called Subchannel Selective Transmission (SST). However, the subchannel, also known as the TWT channel, must be pre-negotiated through an individual TWT agreement initiated by the STAs. The individual TWT cannot be initiated by the APs for non-predictable traffic. Due to these limitations, SST has not seen widespread deployment.

Technology: To fully utilize the bandwidth supported by an AP, Dynamic Sub-channel Operation (DSO) is proposed for next-generation Wi-Fi. Unlike the predefined TWT service period, DSO-capable STAs can be assigned sub-channels by the AP on a per-TXOP basis.

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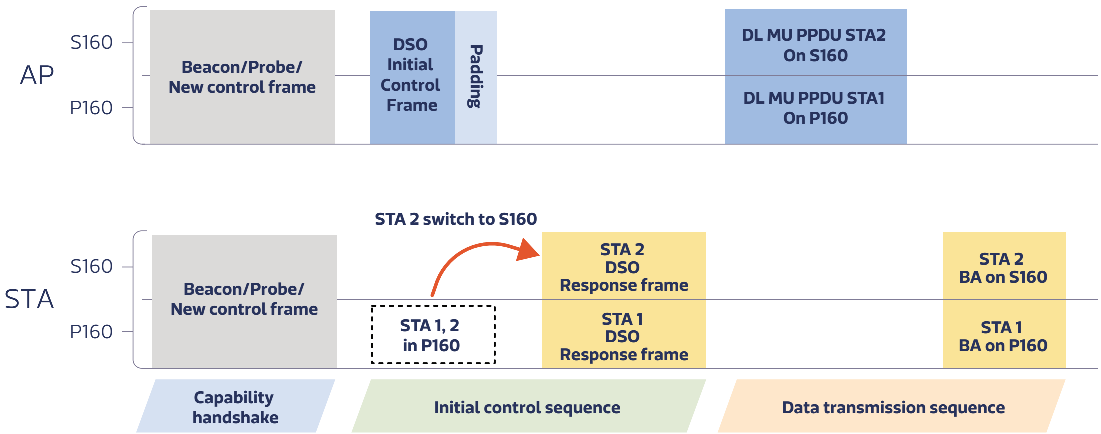

Figure 14. Switching DSO Capable Station STA2 to Sub-Channel.

Dynamic Sub-channel Operation consists of the following three phases:

1. In the Capability Handshake Phase, the AP gathers information from DSO-capable STAs, including supported sub-channels, sub-channel switch times, and other relevant details.

Following that, each TXOP is divided into two phases: the Initial Control Phase and the DSO Transmission Phase.

2. During the Initial Control Phase, the AP assigns sub-channels to each DSO-capable STA and allocates sufficient time for the STAs to switch sub-channels.

3. In the DSO Transmission Phase, the AP and STAs complete the transmission, after which the STAs switch back to the primary channel.

The performance of DSO is heavily influenced by the STA switching time and the specific traffic patterns presented in the network. DSO can provide substantial throughput benefits, with our studies indicating improvements of over 20% in several use cases. The benefits of DSO become even more pronounced under conditions of heavy traffic, where the system is pushed to its limits. In peak throughput scenarios, DSO can deliver up to an 80% increase in throughput.

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Conclusion

The evolution of Wi-Fi standards is being driven by the ever-increasing demand for faster, more reliable, and even more efficient wireless communications. Each new standard, from 802.11a to the latest 802.11be, has brought significant improvements in speed, capacity, and performance, enabling a wide range of applications and devices to connect seamlessly. As we continue to innovate and integrate more devices into our daily lives, the progression of Wi-Fi technology remains crucial, ensuring that our wireless networks can keep up with the growing needs of both consumers and businesses. The 802.11bn standard promises greater advancements, with the potential for higher effective speeds, lower latency, and more robust communications in increasingly crowded and diverse wireless environments.

Filogic has leveraged several advanced technologies as below for enhancing communication efficiency across the various user scenarios.

- Technologies such as Co-SR (Coordinated Spatial Reuse) and Co-BF (Coordinated Beamforming) are particularly beneficial in mesh network environments, where the goal extends beyond connectivity to achieving superior performance.
- The New Data Rate addresses the issue of rapid speed degradation experienced by clients as they move away from the access point (AP), ensuring more stable data transmission rates.
- The Dynamic Spectrum Optimization (DSO) is highlighted for its role in improving spectrum efficiency, especially in environments with few clients. Given the ubiquity of Wi-Fi sharing today, where competition for Wi-Fi access is intense, DSO plays a critical role in optimizing the use of available spectrum.

Further enhancements and features that build upon these foundational technologies will be explored in subsequent papers, continuing the discussion on advancing Wi-Fi communication capabilities.

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MediaTek in the Wi-Fi Industry

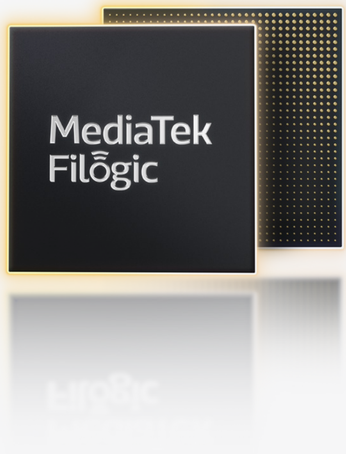
MediaTek is the world's largest supplier of Wi-Fi solutions, including standalone networking products such as routers, repeaters, and mesh access points, and devices with embedded Wi-Fi connectivity such as smartphones, tablets, TVs, IoT, smart home devices, PCs and laptops, games consoles, and many others.

Besides delivering high performance and low power integrated solutions to these platforms, MediaTek is actively participating in IEEE and Wi-Fi Alliance certification development to ensure top performance and industry interoperability. Some recent examples include selection of MediaTek's Filogic platforms as Wi-Fi 6E and Wi-Fi 6 R2 test bed devices. With Wi-Fi 7 and more, MediaTek continues to contribute technical expertise and knowledge of diverse market segment standards for improved Wi-Fi performance in daily applications.

Get set for Wi-Fi 7 with the latest in MLO innovation from MediaTek

MediaTek's innovations and product platforms are equipped to support next-generation MLO reliability using our newly unveiled Filogic 880 and Filogic 380 high performance, power-efficient and reliable Wi-Fi solutions.

Discover Filogic



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