Dynamic Spectrum Alliance Limited
3855 SW 153rd Drive
Beaverton, OR 97003
United States
http://www.dynamicspectrumalliance.org

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
The Office of Engineering & Technology	)	ET Docket No. 18-295
Seeks Additional Information Regarding	)	
Client-to-client Device Communications	)	GN Docket No. 17-183
in the 6 GHz Band	)	

COMMENTS OF THE DYNAMIC SPECTRUM ALLIANCE

Martha SUAREZ
President
Dynamic Spectrum Alliance

February 22, 2021

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I. INTRODUCTION AND SUMMARY

The Dynamic Spectrum Alliance[1] respectfully submits these comments to the Public Notice "The Office of Engineering & Technology Seeks Additional Information Regarding Client-to-Client Device Communications in the 6 GHz Band" ("Public Notice").[2]

Last April, the Federal Communications Commission "FCC" authorized two types of Unlicensed National Information Infrastructure ("U-NII") devices to operate in the 5925-7125 MHz band ("6 GHz band").[3] Standard power devices can operate in 5925-6425 MHz and 6525-6875 MHz under control of an Automated Frequency Coordination ("AFC") system. Low power indoor ("LPI") access points can operate across the entire 6 GHz band. Client devices operate under control of either a standard power or LPI access point. The EIRP limit for client devices were set relative to the EIRP limit of its corresponding access point (standard power or LPI).

[1] The Dynamic Spectrum Alliance is a global, cross-industry alliance focused on increasing dynamic access to unused radio frequencies. The membership spans multinational companies, small- and medium-sized enterprises, academic, research, and other organizations from around the world, all working to create innovative solutions that will increase the utilization of available spectrum to the benefit of consumers and businesses alike. A full list of the DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members/.

[2] Public Notice, *The Office of Engineering & Technology Seeks Additional Information Regarding Client-to-Client Device Communication in the 6 GHz Band*, ET Docket No. 18-295, GN Docket No. 17-183, DA 21-7 (released January 11, 2021)("Public Notice").

[3] *Unlicensed Use of the 6 GHz Band, Expanding Flexible Use in Mid-Band Spectrum Between 3.7-24 GHz*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd. 3852 (2020)(6 GHz Order and 6 GHz Further Notice, respectively).

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As stated in the Public Notice, the Commission prohibited client devices from acting as mobile hot spots in the 6 GHz Report & Order[4] but did not consider whether a more limited approach to client-to-client communications is feasible and should be permitted.[5] The DSA applauds the Commission for issuing this Public Notice and supports a modification to the rules that would allow client-to-client communications when such communications are within the range of a low power indoor (LPI) access point. In the future, after the Commission has approved AFC systems, it may want to consider communications among indoor standard power client devices and between standard power client devices and LPI client devices.

DSA sees the benefits of the Commission permitting client-to-client communications as it will promote greater spectral efficiency, reduced latency, lower duty cycles, and improved energy efficiency for unlicensed 6 GHz operations and devices. Of paramount importance, permitting LPI client-to-client operations will not increase the risk of harmful interference to incumbents. In fact, the client-to-client communications will reduce the overall amount of 6 GHz energy in the air at any time as there will be fewer and shorter transmissions to accomplish the anticipated use cases.

LPI client-to-client communications are envisioned to fill in a unique space in the continuum of indoor 6 GHz unlicensed use cases where high throughput and low latency are required. The latency of direct LPI client-to-client communications is inherently lower than that for indirect LPI client-to-client communications where each LPI client has to send a signal back through its

[4] *See* 6 GHz Order, 35 FCC Rcd. at 3926, paragraph 199; 47 C.F.R. § 15.407(d)(5).

[5] *See* Public Notice at 2.

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respective LPI access point, and must share the channel with other client devices that are associated with that AP in order to communicate with a nearby LPI client.

Client-to-client communications are expected to play a distinct and vital role in personal area networking and is required in addition to the Very Low Power Portable (VLP) category that the Commission is currently considering.[6] VLP devices are expected to enable wearable devices and portable operations that occur both inside and outside. However, VLP devices are expected to operate at very low power levels (14 dBm EIRP) in order to avoid harmful interference to incumbent operations when such transmissions take place outdoors. This power is insufficient for more immersive Augmented, Virtual, and Mixed Reality (AR/VR/MR) applications and for many other indoor applications.

II. LPI CLIENT-TO-CLIENT COMMUNICATIONS SHOULD HAVE THE SAME POWER SPECTRAL DENSITY LIMIT AS LPI CLIENT TO ACCESS POINT COMMUNICATIONS

The Commission should permit LPI client-to-client communications at the same PSD limit as LPI access point to client communications. Permitting LPI clients engaged in client-to-client communications to transmit with a PSD limit of -1 dBm/MHz, the PSD limit for LPI client devices, [7] will not increase the risk of harmful interference to incumbents and is consistent with the approach being used in other countries. The DSA believes that this power level is sufficient

[6] *See* 6 GHz Further Notice, 35 FCC Rcd at 3938-45, paragraphs 231-255.
[7] 47 U.S.C. §15.407(a)(8).

to enable more immersive AR/VR/MR applications that are expected to require much higher data rates, such 4K QAM, which is anticipated as an optional feature under the IEEE 802.11be standard. In addition, if client-to-client communications can take place at -1 dBm/MHz, then device-to-device communications that happen at greater distances, or between walls, such as smart speaker to smart speaker or smart phone to smart speaker connections could be enabled. Also, power allowed under an LPI client should also be sufficient for certain multicasting use cases, such as multiplayer gaming, worker training, and education, or connecting multiple wireless peripherals that require low latency to a computer. Finally, LPI client-to-client communications will also be useful when policy reasons prohibit a device from connecting to infrastructure, but there is still a need to stream, display, or share a file between multiple devices.

III. THE COMMISSION SHOULD PERMIT LPI CLIENT-TO-CLIENT COMMUNICATIONS BETWEEN ANY CLIENTS THAT CAN DECODE AN ENABLING SIGNAL TRANSMITTED BY A LPI ACCESS POINT

The Commission should permit LPI client-to-client communications if such client has recently decoded an enabling signal from a LPI access point. Such an approach provides the Commission with a high degree of confidence that all such clients are operating indoors. The LPI client should not have to be associated with LPI access point for purposes of the enabling signal for LPI client-to-client communications. The LPI access point is serving a different purpose here, it is establishing that the access point and client device(s) receiving the enabling signal are

indoors. Given that there may be more than one unlicensed technology operating in the 6 GHz band, the Commission should take a technology neutral approach.

IV. THE COMMISSION SHOULD PERMIT LPI CLIENT DEVICES TO RECEIVE THE ENABLING SIGNAL FROM ANY LPI ACCESS POINT

The Commission should permit LPI clients to receive the enabling signal from any LPI access point, not only an LPI access point it is associated with. LPI access point operate indoors. The Commission placed several restrictions on LPI access points that make it very unattractive for users to operate these devices outdoors. .[8] If a LPI client can receive an enabling signal from a LPI access point, it means that it is highly likely that it too is indoors. Requiring that a LPI client can only receive an enabling signal from its associated LPI access point will add unnecessary complexity to Wi-Fi network design in certain environment where the LPI clients are being used nomadically and there is a dense deployment of LPI access points and different operators (e.g., indoor shops / food court). It would also make operations in dense environments, or in home mesh networks more challenging, because it is often the case that two clients in the same location are connected to different APs.

There would likely have to be a separate control signal to determine which LPI access point enabled which LPI client before initiating client-to-client communications. While given time, the DSA supposes that such an approach could be implemented technically, but it will needlessly

[8] *See* 6 GHz Report, 35 Rcd 3891; paragraph 107; 47 U.S.C. § 15.403.

increase the amount of signaling required and increase the overall complexity of indoor unlicensed 6 GHz networks, and more importantly, will not have any bearing on the risk that an LPI client will cause harmful interference to incumbents.

V. THE COMMISSION SHOULD PERMIT LPI CLIENT-TO-CLIENT COMMUNICATIONS ON ANY AVAILABLE LPI CHANNEL

The Commission should allow LPI client devices to receive enabling signals on any available LPI channel. Permitting LPI client-to-client communications on a channel that is different than the channel used to receive the enabling signal, has no bearing on an incumbent's risk of receiving harmful interference. Unlike standard power access point where only some channels are available, all channels indoors are available for LPI access points and clients (as per the band plan). It should not matter which channels are used to transmit enabling signals to each client devices and the channel used for the communication, what should matter to the Commission is that all LPI clients are indoors. DSA's understanding is that for managed networks, having the flexibility to have the enabling signal on a different channel than that used for client-to-client communications will help improve network traffic management.

As the Commission has taken such a conservative approach in authorizing LPI devices with a 5 dBm/MHz PSD limit, there will homeowners and apartment dwellers requiring range extender pods to provide full residential coverage. If there are two LPI clients in a home, each associated with a different 6 GHz range extender, each pod may be operating on a different channel for access, and unless the rules provide the flexibility for an LPI client to receive the enabling signal

from any LPI access point and permit the LPI client to operate on a different channel than the enabling signal, LPI client-to-client communications becomes much more complex than necessary. Again, the critical consideration for LPI client-to-client communications is to provide the Commission with an extremely high degree of confidence that all the LPI client devices engaged in client-to-client communications will, in fact, be operating indoors.

VI. CONCLUSION

The Commission should permit LPI client-to-client communications. Client-to-client communications will increase the overall spectral efficiency of the band by reducing the total number of transmissions required. Its combination of low latency and high throughput will enable a unique set of applications for consumers. In high-density deployment enterprise environments, client-to-client communications can also be used as a Wi-Fi network management tool. Most importantly, with some straight forwarded technical rules, client-to-client communications can live up to its full potential without increasing the risk of harmful interference to incumbents.

These technical rules include: (1) permitting client devices engaged in client-to-client communications to operate with the same PSD limit as LPI client devices, (2) permitting client-to-client communications to occur so long as a LPI client device can decode an enabling signal from an LPI access point that is resent periodically, (3) permitting client devices engaged in client-to-client communications to obtain the enabling signal from any LPI access point, and (4) permitting client devices engaged in client-to-client operations to be able to communicate with

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other client devices on a different channel either client device used to receive its respective enabling signals.

The DSA looks forward to working with the Commission to ensure that LPI client-to-client communications can be included in the Report and Order for the Further Notice of Proposed Rulemaking on Unlicensed Use of the 6 GHz Band.

Respectfully submitted,

Martha SUAREZ
President
Dynamic Spectrum Alliance

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