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MIRACAST NGO AND AGO

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Abstract

Wi-Fi [Peer-to-Peer](#) was conceptualized in the wake of the need for device-to-device communication. Upon the emergence of the Internet of Things and increasing interest in M2M communication, the usage of Wi-Fi P2P is growing in a variety of applications like home networks, data streaming and similar applications.
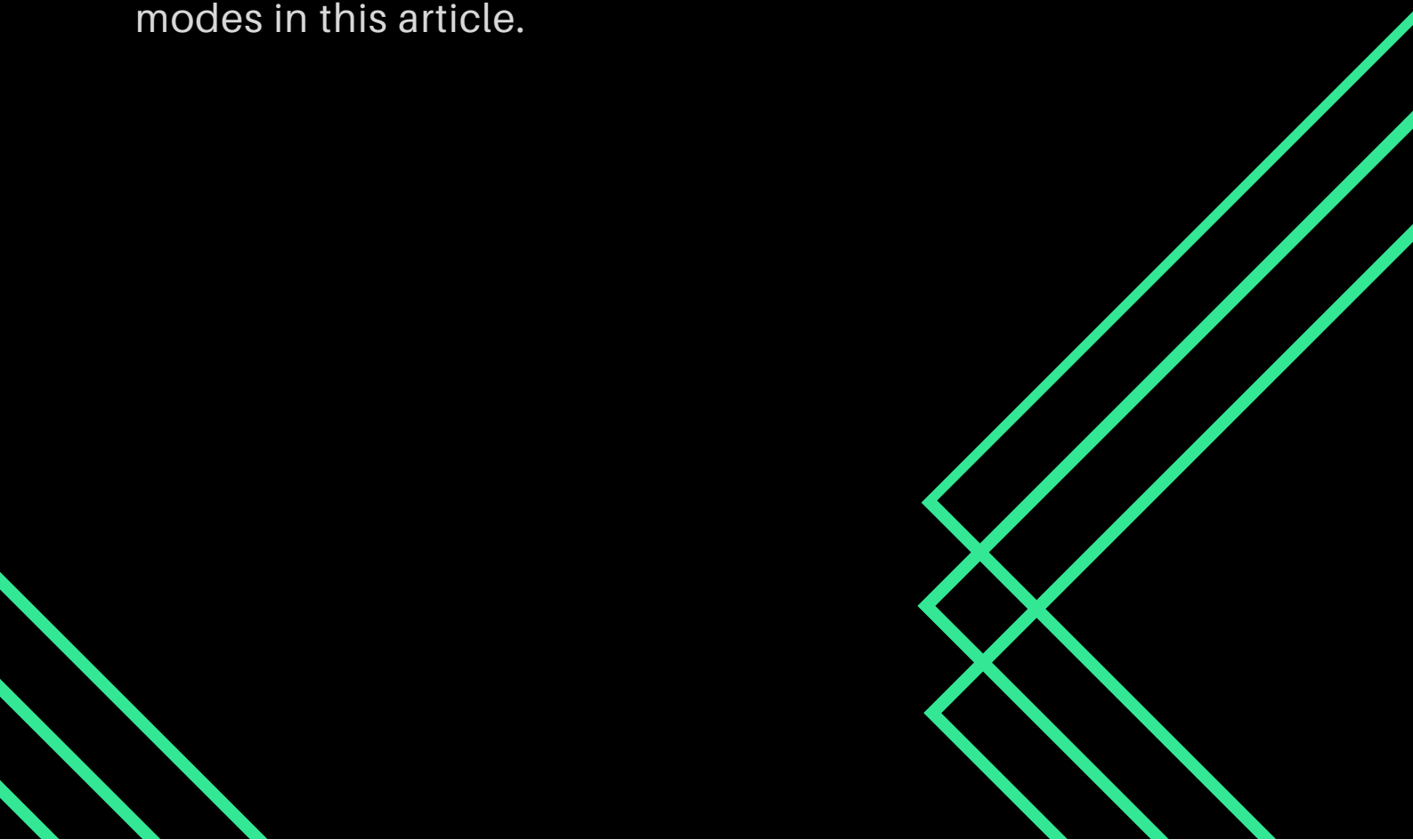
As its name states, it allows devices to communicate with each other via peer-to-peer mode without an access point at standard Wi-Fi speed while utilizing WP2 security. In the midst of M2M communication and the Internet of things, this concept is playing an increasingly important role, with a huge potential to revolutionize device-to-device communication.

As opposed to traditional P2P networks, Wi-Fi P2P requires a group owner that all other devices in the group remain associated with. A Wi-Fi P2P group can be created using a variety of mechanisms. In this whitepaper, we will discuss the main forms of peer-to-peer group formation (Prakash, Masato, & Norihito, 2015).

1-**M2M communication:** Machine to machine (M2M) is direct communication between devices using any communications channel, including wired and wireless

Introduction

Miracast, a Wi-Fi certified program based on the Wi-Fi Display technology, has become a popular wireless display standard in the Android and Windows ecosystem. Its underline wireless connection builds upon the well-known Wi-Fi Peer-to-Peer (P2P) technology. For Wi-Fi P2P, there are two operation modes, i.e. Negotiated Group Owner (NGO) mode and Auto Group Owner (AGO) mode. If the Miracast session is built upon the NGO mode, we call it Miracast-NGO, on the other hand, if the Miracast session is built upon AGO mode, we call it Miracast-AGO. We will describe these two Miracast modes in this article.

Topology and Components

A P2P device can take on the role of both a GO or a client. The roles are determined right at the time of connection in a dynamic manner. Once the roles are determined, GO behaves as a traditional AP, while the client(s) perform the STA functionality of Wi-Fi infrastructure mode. Thus the GO becomes the centralized entity of this star topology (Prakash, Masato, & Norihito, 2015).

Miracast NGO

As its name manifested, the NGO mode must negotiate with the Wi-Fi group owner. In this group formation method, the nodes decide who will assume the responsibility of GO. This is done by exchanging a GO intent value with the node sending higher intent becoming GO (Prakash, Masato, & Norihito, 2015). When two Miracast devices boot up, both of them are in the P2P device role, which means they are not ready for the real Wi-Fi connection procedure. In the device role mode, however, devices can be found or positively find other devices. Figure 1 illustrates the procedure for Miracast NGO.
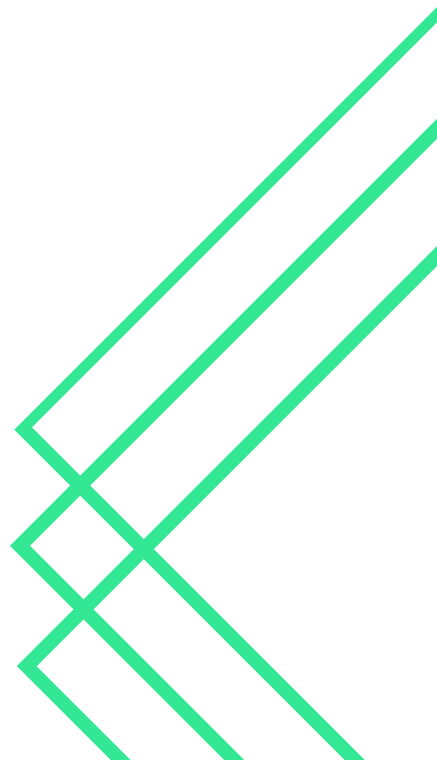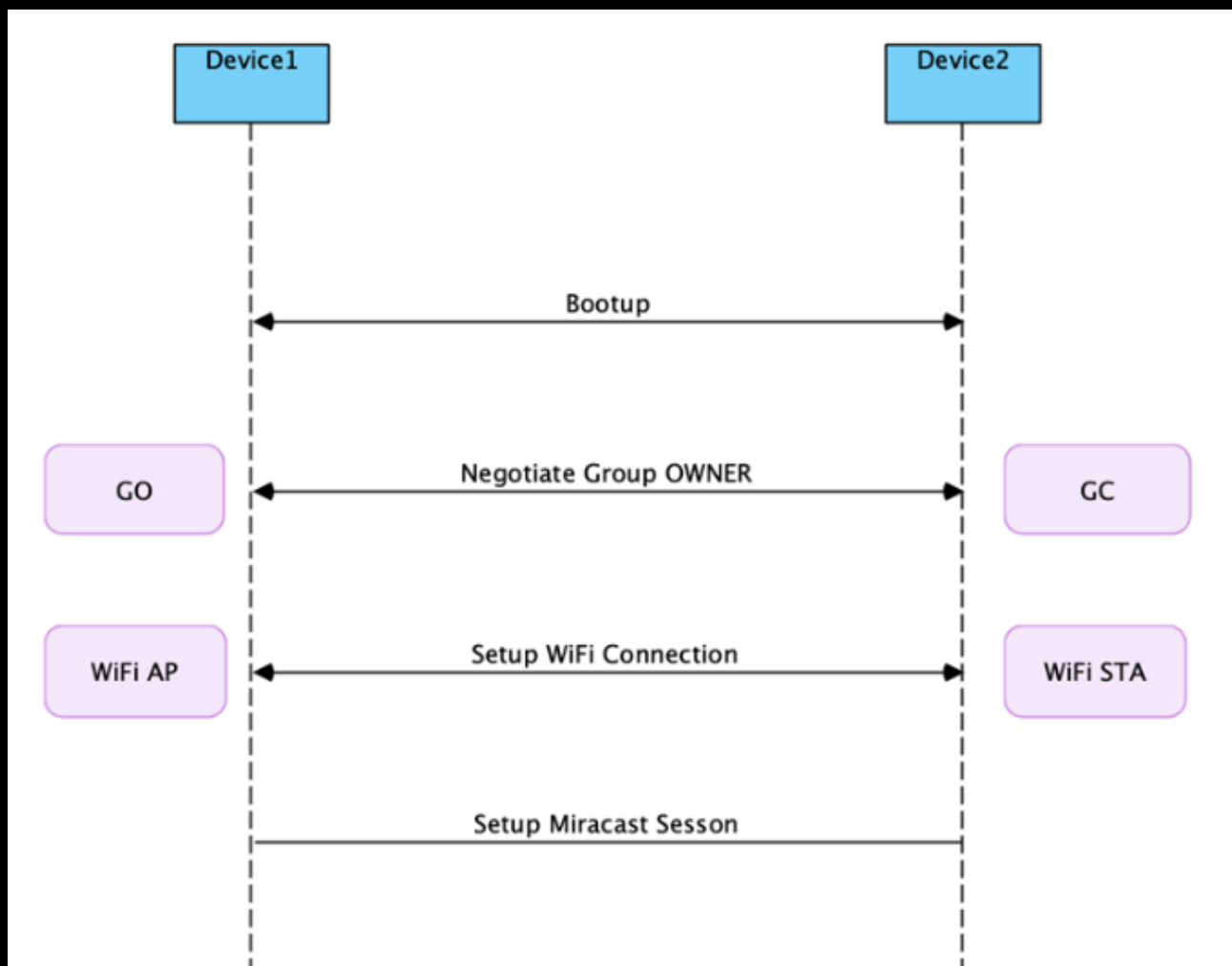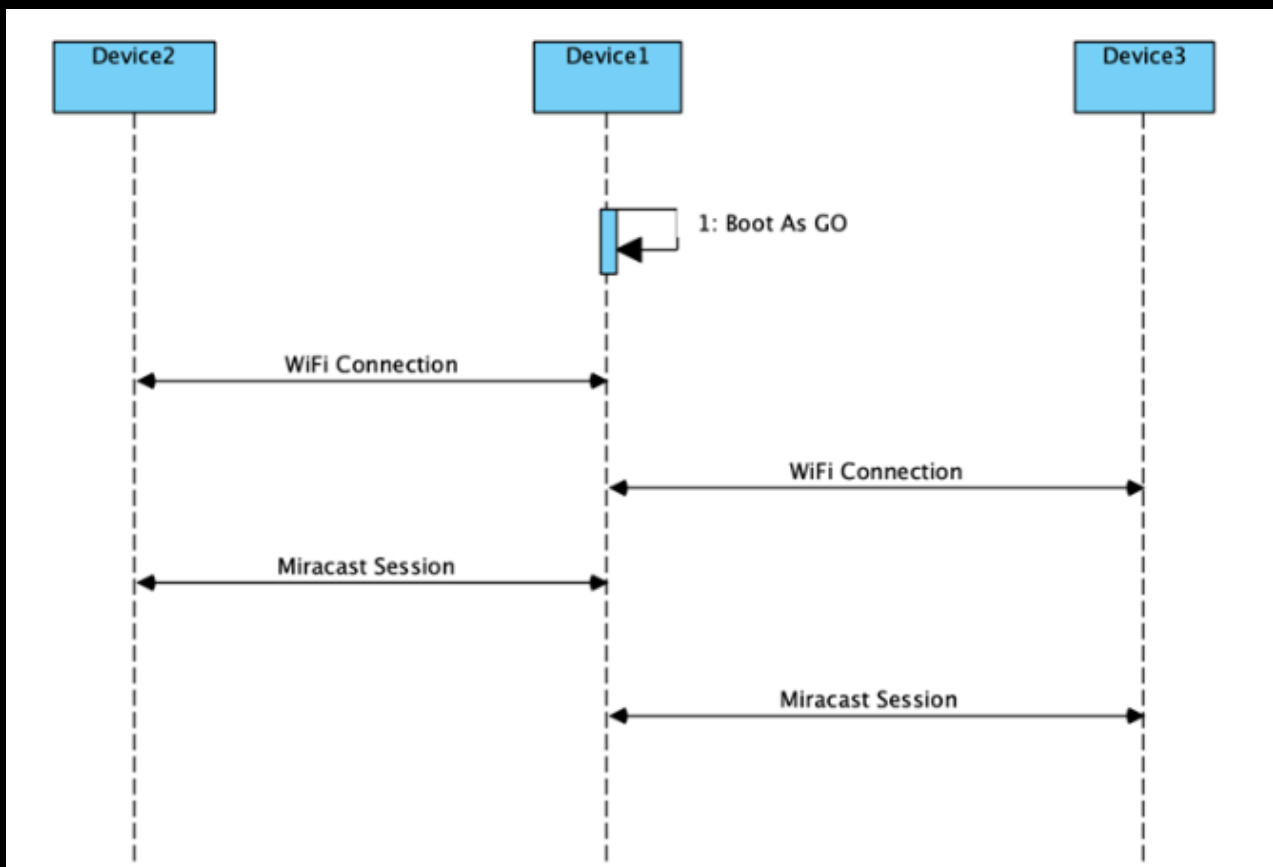
Communication Miracast NGO

Figure 1

We explain the procedure as follows:

1. First, two devices boot up into the P2P device mode. At this time, devices can only be found by others as P2P devices, but the connection cannot be set up at the stage.

2. When a user triggers the connection, the two devices do the group owner negotiation by exchanging a sequence of messages.

3. After the negotiation completes, one device becomes the group owner (GO) and one device becomes the group client (GC).

4. The GO becomes the Wi-Fi AP, and the GC becomes the Wi-Fi STA.

5. The Wi-Fi STA connects to the Wi-Fi AP as a normal Wi-Fi connection, just like we daily connect our device to a Wi-Fi router.

6. After the underline Wi-Fi has been set up successfully, the Miracast session then starts.

Miracast AGO

As the name AGO showed, auto group owner means one device boots up as the P2P group owner automatically. In this case, a P2P device may assume GO-ship on its own and start sending beacons. Other devices can find this GO and then act as GC to do the following Wi-Fi connection process. Thus, skipping the GO Negotiation. There may be multiple devices connected to the GO simultaneously. Figure 2 depicts this concept.

Commuincation Miracast AGO

Figure 2

The process is as follows.

1. Device 1 boots up as the P2P GO automatically.

2. Device 2 finds Device 1 and then becomes GC and connects to the GO as normal Wi-Fi connection processes.

3. After Device 2 and Device 1 set up a Wi-Fi connection, then they can set up a Miracast session thereby.
4. Up to now Device 1 is still a P2P GO.

5. Device 3 finds device 1 as GO and then it changes itself to GC and connects the GO as normal Wi-Fi connection processes.

6. After Device 3 and Device 1 complete the Wi-Fi connection, then they can also set up a Miracast session thereafter.

7. If there are more devices joining, each of them can do the same procedure and we implement the function that multiple Miracast sources project to one Miracast sink.
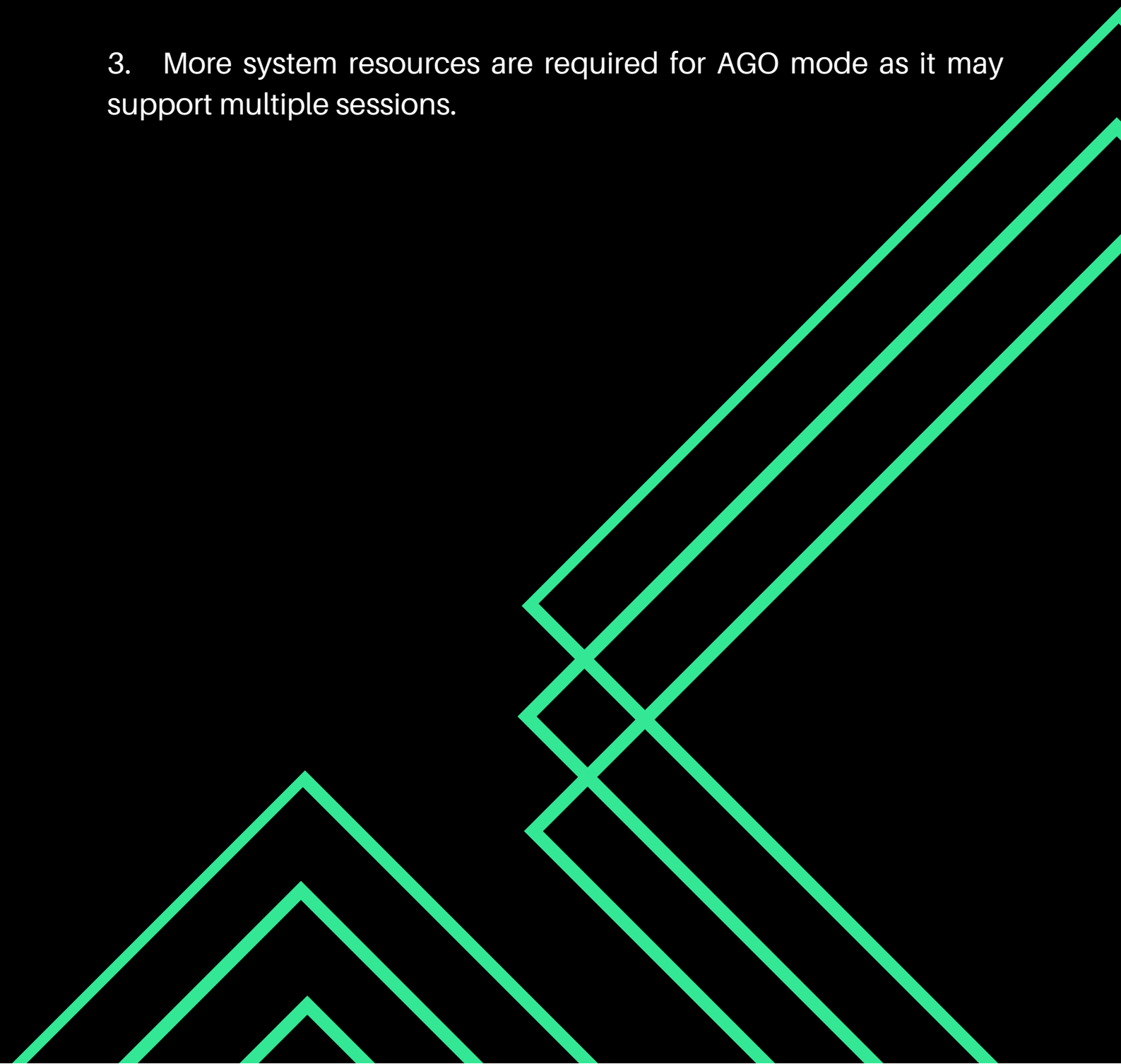
NGO VS AGO

From the above description, we can see the similarities and differences between Miracast NGO and AGO.

Similarities:

1. Both NGO and AGO must have a P2P GO as the Wi-Fi AP.

2. The Wi-Fi connection processes are the same for both modes.

3. The Miracast session processes are the same for both modes.

Differences:

1. The GO in NGO mode is negotiated while in AGO mode it is pre-defined.

2. In NGO mode, only two parties can take part in the Miracast while in AGO mode, multiple Miracast sources can interact with one Miracast sink simultaneously.

3. More system resources are required for AGO mode as it may support multiple sessions.

Conclusion

In this article, we simply describe the Miracast NGO and AGO. We explain the operation procedures for both modes and we also show the common places and differences between them. NGO stands for Negotiated Group Owner. Here, the Miracast session uses the same AP channel/band as the Internet connection. It is suitable for single-use at home, but creates congestion in dense deployments. AGO means Auto Group Owner. In this Miracast mode, the GO sets the channel/band used for the Miracast session, avoiding the GO negotiation. It provides better performance and more stability in dense deployments by operating on an independent channel from IP traffic (Eisenberg, 2020).

With so many devices operating at 2.4 GHz, crowded Miracast sessions are almost unavoidable. However, EZCast Pro series devices feature AGO mode and operate at 5GHz Wi-Fi. Which assures a steady and smooth experience for the users. This also means that EZCast Pro's latest products, QuattroPod Mini, QuattroPod USB, and QuattroPod Standard, feature the ability to use a split screen. Making the users able to display up to 4 sources at the same time. This feature is especially good for education and enterprise environments. We can help you find the perfect solution for YOUR NEEDS! Book a demo! If you love EZCast Pro and want to become our distributor, please contact sales.

Bibliography

Eisenberg, J. (2020). www.goamt.com. Retrieved from Goamt: https://www.goamt.com/wp-content/uploads/2020/05/ScreenBeam-1100-Plus-Slides-Different-Modes-Technical-Slides-10-6-2020_J.Eisenberg.pdf

Prakash, C., Masato, Y., & Norihito, F. (2015). Seamless Group Refromation in WiFi Peer to Peer Network using Dormant Backend Links. 12th Annual IEEE Consumer Communications and Networkin Conference (CCNC) (pp. 773-778). Cloud System Research Laboratories.

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