Claim: 7	Google Cast-Enabled Media Players
[7.0] A first zone player comprising:	Each Cast-enabled media player comprises a "zone player," as recited in claim 7. Each Cast-enabled controller comprises a "controller," as recited in claim 7.
[7.1] one or more processors;	Each Cast-enabled media player includes one or more processors. *See*, *e.g.*, https://support.google.com/googlenest/answer/7072284?hl=en [Google Nest and Home device specifications]; https://support.google.com/chromecast/answer/3046409?hl=en [Chromecast and Google TV Streamer specifications]; https://support.google.com/googlepixeltablet/answer/13555146?hl=en [Google Pixel Tablet technical specifications].
[7.2] at least one network interface; and	Each Cast-enabled media player includes at least one network interface, such as a Wi-Fi interface. *See, e.g.*, https://support.google.com/googlenest/answer/7072284?hl=en [Google Nest and Home device specifications]; https://support.google.com/chromecast/answer/3046409?hl=en [Chromecast and Google TV Streamer specifications]; https://support.google.com/googlepixeltablet/answer/13555146?hl=en [Google Pixel Tablet technical specifications].
[7.3] tangible, non-transitory computer-readable media having instructions encoded therein, wherein the instructions, when executed by the first zone player, cause the first zone player to perform functions comprising:	Each Cast-enabled media player includes tangible, non-transitory computer-readable media comprising executable instructions that enable the Cast-enabled media player to perform the functions identified below. *See, e.g.*, https://support.google.com/googlenest/answer/7072284?hl=en [Google Nest and Home device specifications]; https://support.google.com/chromecast/answer/3046409?hl=en [Chromecast and Google TV Streamer specifications]; https://support.google.com/googlepixeltablet/answer/13555146?hl=en [Google Pixel Tablet technical specifications]; https://support.google.com/googlenest/answer/7365257?hl=en [Google speaker and display firmware versions and release notes]; https://support.google.com/chromecast/answer/7124014?hl=en [Chromecast and Google TV Streamer firmware versions and release notes]; https://support.google.com/googlepixeltablet/answer/13399216?hl=en [Get software updates on your Pixel Tablet and Charging Speaker Dock].
[7.4] performing a master device role for a synchrony group comprising the first zone player and a second zone player, wherein in the master device role, the first	Each Cast-enabled media player comprises instructions that, when executed by a first Cast-enabled media player, cause that Cast-enabled media player to perform a master device role for a synchrony group comprising the first Cast-enabled media player and a second Cast-enabled media player, where in the master device role, the first Cast-enabled media player is configured to control synchronous playback of audio information by both the first Cast-enabled media player and the second Cast-

Claim: 7	Google Cast-Enabled Media Players
zone player is configured to control synchronous playback of audio information by both the first zone player and the second zone player in response to playback commands received from a controller device via a network interface of the first zone player;	enabled media player in response to playback commands received from a Cast-enabled controller via a network interface of the first Cast-enabled media player. For instance, each Cast-enabled media player is programmed with the capability to join a group of two or more Cast-enabled media players that are configured to play back audio in synchrony. *See, e.g.*, Ex. 29 ("Group any combination of Google Nest or Google Home speakers and displays, Chromecast devices, and speakers with Chromecast built-in together for synchronous music throughout the home. Your favorite music and audio from Chromecast-enabled apps are instantly available to stream."); Ex. 106; https://support.google.com/googlenest/answer/7174267; Ex. 122, 1243:3-1245:25 (Google engineer describing "JoinGroup" request); ; *see also e.g.*, Ex. 122, 1278:7-25. In such a group, a first Cast-enabled media player is designated to serve as the "master" of the group (sometimes referred to by Google as the "leader" of the group), and any other Cast-enabled media player in the group is designated to serve as a "slave" of the group (sometimes referred to by Google as the "follower" of the group). *See, e.g.*, Ex. 126, p. 8; Ex. 127; Ex. 122 at 1277:5-1278:6, 1300:6-15. Further, each Cast-enabled media player is programmed such that, while serving as the master/leader of a group, the Cast-enabled media player is configured to control synchronous audio playback by both the leader Cast-enabled media player and each follower Cast-enabled media player in the group in response to playback commands received from a Cast-enabled controller on the same LAN as the leader Cast-enabled media player. *See, e.g.*, Ex. 122, 1300:6-15 ("[S]o in order to play media onto a group, one of the devices in the group has to be the leader. That will be the device that actually will launch the application that you would like to listen to, and that is what downloads the media from the internet and then distributes the audio to the rest of the devices."); *id.*, 1259:20-1260:5, 1268:23-1269:8, 1315:5-10. As one example, while serving as the master/leader of a group, the Cast-enabled media player is configured to receive a "launch" command for the group and responsively, control synchronous audio playback by both itself and each follower Cast-enabled media player in the group. *See, e.g.*,

Claim: 7	Google Cast-Enabled Media Players
	Ex. 122 at 1259:1-1260:5 (Mr. MacKay describing "launch" command sent to "leader" of a group); 1268:23-1269:8, 1300:6-15.
[7.5] while performing the master device role, evaluating one or more operational performance metrics of the one or more processors or the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second zone player, and based on the evaluation, determining that the second zone player should perform the master device role for the synchrony group;	Each Cast-enabled media player comprises instructions that, when executed by a first Cast-enabled media player, cause that Cast-enabled media player to, while performing the master device role, evaluate one or more operational performance metrics of the one or more processors or the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second Cast-enabled media player, and based on the evaluation, determine that the second Cast-enabled media player should perform the master device role for the synchrony group. For instance, each Cast-enabled media player is programmed such that, while serving as the master/leader of a group, the Cast-enabled media player is configured to evaluate one or more metrics related to the performance of the synchronous audio playback by the Cast-enabled media players in the group, including but not limited to one or more metrics related to the wireless signal quality detected by the Cast-enabled media players in the group (e.g., as reflected in "SRV (Server Selection)" fields contained within "_googlezone" MDNS packets exchanged between the Cast-enabled media players in the group), and then, based on the evaluation, determine that a different Cast-enabled media player in the group should take over as the leader of the group. *See, e.g.*, Ex. 126, p. 8 ("One device is automatically elected as the group leader (amongst others based on network quality)…."). Public testimony from Google's engineers evidences this functionality. For example, as explained by Google's engineers, Cast-enabled media players "continuously" engage in a "leader election process" in which each player (i) broadcasts a respective "leader quality number" that "tells the other [players] in the network how good that [player] would be as a leader for the group," where the "quality is in part based on the Wi-Fi signal strength of each device," and (ii) evaluates its own leader quality relative to the respective leader quality of each other player. *See* Ex. 122, 1247:14-24, 1248:3-1249:1, 1249:20-1250:9, 1251:3-1252:9, 1253:4-23, 1300:16-1301:4. In this way, "over time," "the [player] that's chosen as the leader… may change at any time." *Id.*, 1253:19-23; *see also id.*, 1247:2-7, 1251:3-1252:9.

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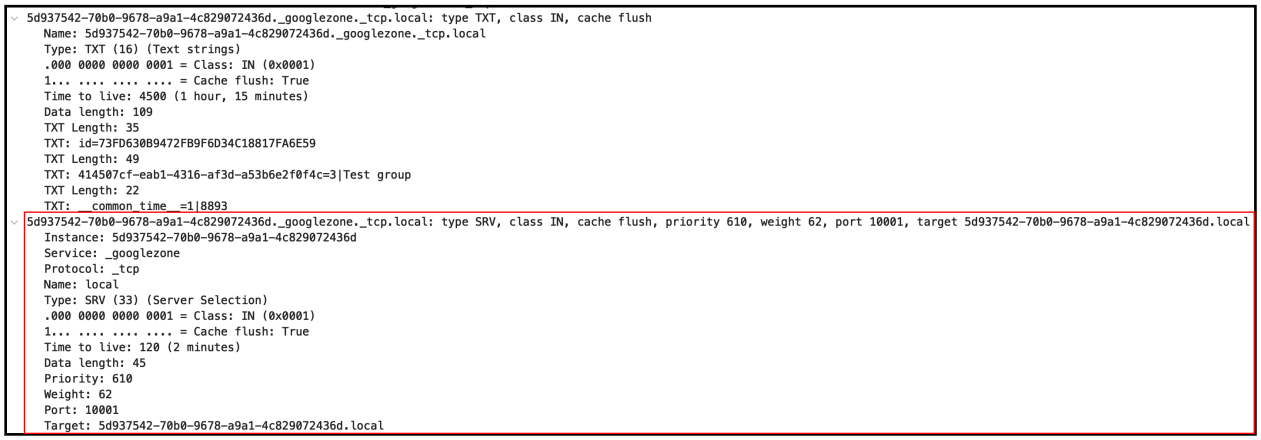
	One example of a "_googlezone" MDNS packet exchanged between Cast-enabled media players during the continuous election process is illustrated below:  5d937542-70b0-9678-a9a1-4c829072436d._googlezone._tcp.local: type TXT, class IN, cache flush Name: 5d937542-70b0-9678-a9a1-4c829072436d._googlezone._tcp.local Type: TXT (16) (Text strings) .000 0000 0000 0001 = Class: IN (0x0001) 1... .... = Cache flush: True Time to live: 4500 (1 hour, 15 minutes) Data length: 109 TXT Length: 35 TXT: id=73FD630B9472FB9F6D34C18817FA6E59 TXT Length: 49 TXT: 414507cf-eab1-4316-af3d-a53b6e2f0f4c=3|Test group TXT Length: 22 TXT: __common_time__=1|8893 5d937542-70b0-9678-a9a1-4c829072436d._googlezone._tcp.local: type SRV, class IN, cache flush, priority 610, weight 62, port 10001, target 5d937542-70b0-9678-a9a1-4c829072436d.local Instance: 5d937542-70b0-9678-a9a1-4c829072436d Service: _googlezone Protocol: _tcp Name: local Type: SRV (33) (Server Selection) .000 0000 0000 0001 = Class: IN (0x0001) 1... .... = Cache flush: True Time to live: 120 (2 minutes) Data length: 45 Priority: 610 Weight: 62 Port: 10001 Target: 5d937542-70b0-9678-a9a1-4c829072436d.local
[7.6] in response to determining that the second zone player should perform the master device role for the synchrony group, initiating migration of the master device role from the first zone player to the second zone player; and	Each Cast-enabled media player comprises instructions that, when executed by a first Cast-enabled media player, cause that Cast-enabled media player to, in response to determining that the second Cast-enabled media player should perform the master device role for the synchrony group, initiate migration of the master device role from the first Cast-enabled media player to the Cast-enabled media player. For instance, each Cast-enabled media player is programmed such that, in response to determining that one of the slave/follower Cast-enabled media players in the group should perform the master/leader role for the group, the leader Cast-enabled media player functions to initiate migrating the "leader" role to the one follower Cast-enabled media player. Public documentation from Google evidences this functionality. For example, one of Google's patent publications related to the Cast-enabled media players explains that, when the "leader" role is to be migrated, the current "leader" performs a "deregistration" process so that another player can take over the "leader" role. *See, e.g.*, US20180262792, ¶52; *see also id.*, ¶51, 64. As another example, a technical document (TX6454) Google published during a jury trial (Ex. 122, 1238:10-24) states "[i]f a new, better group leader comes online, the old group leader should send a goodbye

Claim: 7	Google Cast-Enabled Media Players
	packet to indicate to the SDK that it is no longer the leader." Ex. 127, GOOG-SONOSWDTX-00048968.
[7.7] after migration of the master device role from the first zone player to the second zone player, ceasing to perform the master device role for the synchrony group, and playing back audio information in synchrony with the second zone player while the second zone player is performing the master device role for the synchrony group.	Each Cast-enabled media player comprises instructions that, when executed by a first Cast-enabled media player, cause that Cast-enabled media player to, after migration of the master device role from the first Cast-enabled media player to the second Cast-enabled media player, cease to perform the master device role for the synchrony group, and play back audio information in synchrony with the second Cast-enabled media player while the second Cast-enabled media player is performing the master device role for the synchrony group. For instance, each Cast-enabled media player is programmed such that, after migration of the master/leader role of a group to a former slave/follower of the group, the former leader Cast-enabled media player begins performing the role of a slave/follower of the group. In this respect, while performing the follower role, the Cast-enabled media player is configured to play back audio in synchrony with the new leader Cast-enabled media player. Public testimony from Google's engineers evidences this functionality. For example, one of Google's engineers described scenarios in which the "leader" role of a group was migrated to a "follower" of the group and thereafter, the former "leader" transitioned to operate as a "follower" of the group. *See, e.g.*, Ex. 122, 1247:13-1251:24.

Claim: 9	Google Cast-Enabled Media Players
[9.0] The first zone player of claim 7, **[9.1]** wherein the one or more operational performance metrics comprise a network latency metric, and **[9.2]** wherein while performing the master device role, evaluating one or more operational performance metrics of the one or more processors or	As described above, each Cast-enabled media player is a "zone player," as recited in claim 7. Moreover, each Cast-enabled media player is programmed with the capability to perform the aforementioned functions where the one or more operational performance metrics comprise a network latency metric and where, while performing the master device role, evaluating one or more operational performance metrics of the one or more processors or the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second Cast-enabled media player comprises the first Cast-enabled media player determining that migrating the master device role from the first Cast-enabled media player to the second Cast-enabled media player would improve latency of message transmission within the synchrony group.

Claim: 9	Google Cast-Enabled Media Players
the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second zone player comprises the first zone player determining that migrating the master device role from the first zone player to the second zone player would improve latency of message transmission within the synchrony group.	For instance, as discussed above, Google's leader-election process involves each Cast-enabled media player of a group exchanging a respective leader quality metric, which comprises a network latency metric, and the leader Cast-enabled media player determining that a different Cast-enabled media player in the group should take over as the leader of the group as a result of the continuous leader election process reflects a determination that latency of message transmission within the group would improve with the different Cast-enabled media player taking over as leader. *See, e.g.*, Ex. 122, 1247:13-1248:13 ("So the way we determine the [leader quality number] is in part based on the Wi-Fi signal strength of each device. So that device has a good Wi-Fi signal so it has a high leader quality."), 1251:3-24 ("So now we see that the lower right device has a higher Wi-Fi signal strength and the upper left device has a lower Wi-Fi signal strength, and the respective leader quality numbers have changed. And so those values that are being broadcast across the network are different…. [S]ince [the Cast-enabled media player on the lower right corner] has a higher signal strength, it has a higher leader quality…. Since the lower right device now has the best quality, it will be selected as the leader for the group."); Ex. 126, p. 8 ("One device is automatically elected as the group leader (amongst others based on network quality)….").

Claim: 11	Google Cast-Enabled Media Players
[11.0] The first zone player of claim 7, **[11.1]** wherein the first zone player performing the master device role for the synchrony group further comprises the first zone player transmitting to at least the second zone player: (i) a network address that the first zone player uses to transmit audio information, (ii) audio information, and (iii) playback timing information for audio information.	As described above, each Cast-enabled media player is a "zone player," as recited in claim 7. Moreover, each Cast-enabled media player is programmed with the capability to perform the aforementioned functions where the first Cast-enabled media player performing the master device role for the synchrony group further comprises the first Cast-enabled media player transmitting to at least the second Cast-enabled media player: (i) a network address that the first Cast-enabled media player uses to transmit audio information, (ii) audio information, and (iii) playback timing information for audio information. For instance, as discussed above, each Cast-enabled media player is programmed with the capability to serve as the master/leader of a group. While serving as the master/leader of a group, the Cast-enabled media player is configured to perform a variety of functions, including transmitting to at least one slave/follower Cast-enabled media player of the group: (i) a network address that the leader Cast-enabled media player uses to transmit audio information, (ii) audio information, and (iii) playback timing information for audio information (i.e., information indicating when the audio

Claim: 11	Google Cast-Enabled Media Players
	information is to be played back). *See, e.g.*, Ex. 127, GOOG-SONOSWDTX-00048969; Ex. 134, p. 19-24.

Claim: 13	Google Cast-Enabled Media Players & Google Software Servers
[13.0] A tangible, non-transitory computer-readable media having instructions stored thereon that, when executed by a first zone player, cause the first zone player comprising one or more processors and at least one network interface to perform a method comprising:	Each Cast-enabled media player is a "zone player" that comprises one or more processors, at least one network interface, and a tangible, non-transitory computer-readable media having instructions stored thereon that, when executed by the Cast-enabled media player, cause the Cast-enabled media player to perform the functions recited in claim 13. *See* claim limitations 7.0-7.3. Moreover, each Google Software Server comprises a tangible, non-transitory computer-readable media having instructions stored thereon that, when executed by a Cast-enabled media player, cause the Cast-enabled media player to perform the functions recited in claim 13.
[13.1] performing a master device role for a synchrony group comprising the first zone player and a second zone player, wherein in the master device role, the first zone player is configured to control synchronous playback of audio information by both the first zone player and the second zone player in response to playback commands received from a controller device via a network interface of the first zone player;	Each of the foregoing devices comprises a tangible, non-transitory computer-readable media having instructions stored thereon that, when executed by a first Cast-enabled media player, cause that first Cast-enabled media player to perform a master device role for a synchrony group comprising the first Cast-enabled media player and a second Cast-enabled media player, where in the master device role, the first Cast-enabled media player is configured to control synchronous playback of audio information by both the first Cast-enabled media player and the second Cast-enabled media player in response to playback commands received from a Cast-enabled controller via a network interface of the first Cast-enabled media player. *See* claim limitation 7.4.

Claim: 13	Google Cast-Enabled Media Players & Google Software Servers
[13.2] while performing the master device role, evaluating one or more operational performance metrics of the one or more processors or the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second zone player, and based on the evaluation, determining that the second zone player should perform the master device role for the synchrony group;	Each of the foregoing devices comprises a tangible, non-transitory computer-readable media having instructions stored thereon that, when executed by a first Cast-enabled media player, cause that first Cast-enabled media player to, while performing the master device role, evaluate one or more operational performance metrics of the one or more processors or the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second Cast-enabled media player, and based on the evaluation, determine that the second Cast-enabled media player should perform the master device role for the synchrony group. *See* claim limitation 7.5.
[13.3] in response to determining that the second zone player should perform the master device role for the synchrony group, initiating migration of the master device role from the first zone player to the second zone player; and	Each of the foregoing devices comprises a tangible, non-transitory computer-readable media having instructions stored thereon that, when executed by a first Cast-enabled media player, cause that first Cast-enabled media player to, in response to determining that the second Cast-enabled media player should perform the master device role for the synchrony group, initiate migration of the master device role from the first Cast-enabled media player to the second Cast-enabled media player. *See* claim limitation 7.6.
[13.4] after migration of the master device role from the first zone player to the second zone player, ceasing to perform the master device role for the synchrony group,	Each of the foregoing devices comprises a tangible, non-transitory computer-readable media having instructions stored thereon that, when executed by a first Cast-enabled media player, cause that first Cast-enabled media player to, after migration of the master device role from the first Cast-enabled media player to the second Cast-enabled media player, cease to perform the master device role for the synchrony group, and play back audio information in synchrony with the second Cast-enabled

Claim: 13	Google Cast-Enabled Media Players & Google Software Servers
and playing back audio information in synchrony with the second zone player while the second zone player is performing the master device role for the synchrony group.	media player while the second Cast-enabled media player is performing the master device role for the synchrony group. *See* claim limitation 7.7.

Claim: 15	Google Cast-Enabled Media Players & Google Software Servers
[15.0] The tangible, non-transitory computer-readable media of claim 13, **[15.1]** wherein while performing the master device role, evaluating one or more operational performance metrics of the one or more processors or the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second zone player comprises the first zone player determining that migrating the master device role from the first zone player to the second zone player would improve latency of message	As described above, each Cast-enabled media player and each Google Software Server comprises a "tangible, non-transitory computer-readable media," as recited in claim 13. Moreover, in accordance with the computer instructions, each Cast-enabled media player is programmed with the capability to perform the aforementioned functions where, while performing the master device role, evaluating one or more operational performance metrics of the one or more processors or the at least one network interface indicating potential degradation in performance of synchronous playback of audio information by both the first and second Cast-enabled media player comprises the first Cast-enabled media player determining that migrating the master device role from the first Cast-enabled media player to the second Cast-enabled media player would improve latency of message transmission within the synchrony group. *See* claim limitation 9.2.

Claim: 15	Google Cast-Enabled Media Players & Google Software Servers
transmission within the synchrony group.	

Claim: 17	Google Cast-Enabled Media Players & Google Software Servers
[17.0] The tangible, non-transitory computer-readable media of claim 13, **[17.1]** wherein the first zone player performing the master device role for the synchrony group comprises the first zone player transmitting to at least the second zone player: (i) a network address that the first zone player uses to transmit audio information, (ii) audio information, and (iii) playback timing information for audio information.	As described above, each Cast-enabled media player and each Google Software Server comprises a "tangible, non-transitory computer-readable media," as recited in claim 13. Moreover, in accordance with the program instructions, each Cast-enabled media player is programmed with the capability to perform the aforementioned functions where the first Cast-enabled media player performing the master device role for the synchrony group comprises the first Cast-enabled media player transmitting to at least the second Cast-enabled media player: (i) a network address that the first Cast-enabled media player uses to transmit audio information, (ii) audio information, and (iii) playback timing information for audio information. *See* claim limitation 11.1.