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(57) Abstract: In some examples, a host device comprises a controller to determine whether a destination of a packet is within a threshold distance from the host device and to apply a tag to the packet based on the determination. The host device comprises a wireless transceiver coupled to the controller. The wireless transceiver is to transmit the packet using a frequency channel based on the tag and using a transmission power based on the tag.

# TAG-BASED PACKET TRANSMISSIONS

## BACKGROUND

**[0001]** Wireless networks enable host devices to access and share information with other host devices. Wireless networks may be ad-hoc (e.g., peer-to-peer, wireless mesh, wireless sensor) or administered with a centralized infrastructure (e.g., wireless access points allow access to a wide area network (WAN), local area network (LAN), wireless LAN (WLAN), WI-FI®).

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0002]** Various examples will be described below referring to the following figures:

**[0003]** FIG. 1 is a schematic diagram of a system for tagging and transmitting packets in accordance with various examples;

**[0004]** FIG. 2 is a diagram of a packet that is tagged in accordance with various examples;

**[0005]** FIG. 3 is a schematic diagram of a host device for tagging and transmitting packets in accordance with various examples;

**[0006]** FIG. 4 is a schematic diagram of a host device for tagging and transmitting packets in accordance with various examples; and

**[0007]** FIG. 5 is a schematic diagram of an electronic device for tagging and transmitting packets in accordance with various examples.

## DETAILED DESCRIPTION

**[0008]** As explained above, wireless networks enable host devices to access and share information with other host devices. Some wireless networks attempt to restrict host devices attempting to communicate on those wireless networks to the use of a single frequency channel and a single transmission power. Accordingly, many host devices operating on such networks use a high or maximal available transmission power to transmit packets, irrespective of the type of packet or the intended recipient, because transmitting at high or maximal transmission power increases signal strength.

**[0009]** Although useful, the increased signal strength that results from the use of high or maximal transmission power on a wireless network also introduces

several disadvantages. Security risks increase because a signal with high signal strength may be intercepted by other nearby electronic devices. In addition, the increased signal strength may increase radiation exposure to a user of the host device. Furthermore, increased signal strength may increase signal interference on the network because the single frequency channel is used for multiple types of transmissions (e.g., maintenance packets, data packets). For instance, multiple host devices may communicate on a network using high or maximal transmission power (and, thus, high signal strengths), thereby increasing signal interference and network congestion. Reducing transmission power or using lower frequency channels may mitigate some of these disadvantages, but such actions introduce other challenges, such as reduced signal quality, reduced communication performance, and diminished user satisfaction.

**[0010]** This disclosure describes host devices and electronic devices that tag packets and that determine on which frequency channel and at which transmission power to transmit a particular packet based on the tag of that packet. The packet is a signal comprising data that is organized in a specific manner, for example as described below with respect to FIG. 2. The host device or the electronic device may tag a packet based on a destination of the packet, a data type associated with the packet, executable code (e.g., an application) associated with the packet, a wireless network via which the packet is transmitted, or a combination thereof, as described below with respect to FIG. 2. Based on the tag of the packet, the host device or the electronic device may adjust a frequency channel on which to transmit the packet, a transmission power at which to transmit the packet, or a combination thereof. By setting the frequency channel and/or the transmission power for a packet based on the tag of that packet, the host device or the electronic device may optimize communications performance, increase security of transmissions, reduce overall power consumption, reduce radiation levels, reduce signal interference, and reduce network congestion.

**[0011]** In an example in accordance with the present disclosure, a host device is provided. The host device comprises a controller to determine whether a destination of a packet is within a threshold distance from the host device and to

apply a tag to the packet based on the determination. The host device comprises a wireless transceiver coupled to the controller. The wireless transceiver is to transmit the packet using a frequency based on the tag and using a transmission power based on the tag.

**[0012]** In another example in accordance with the present disclosure, a host device is provided. The host device comprises a controller to apply a tag to a packet based on an application type of the packet and to determine whether a destination of the packet is within a threshold distance from the host device. The host device comprises a wireless transceiver coupled to the controller. The wireless transceiver is to transmit the packet based on the tag and the determination.

**[0013]** In another example in accordance with the present disclosure, an electronic device is provided. The electronic device comprises a controller to receive, from a host device, a first packet having a first tag and to apply, based on the first tag, a second tag to a second packet for transmission to the host device. The electronic device comprises a wireless transceiver coupled to the controller, the wireless transceiver to transmit the second packet to the host device using a frequency based on the second tag and using a transmission power based on the second tag.

**[0014]** Referring now to FIG. 1, a schematic diagram of a system 100 for tagging and transmitting packets is depicted, in accordance with various examples. The system 100 may comprise a host device 102 and an electronic device 104. The host device 102 may be a notebook, laptop, tablet, smartphone, wearable electronic device, or other mobile device able to transmit or receive signals, for example. The electronic device 104 may be another host device, a peripheral device (e.g., a display device), a docking station, or a wireless access point (e.g., a modem device, a routing device), or any other suitable electronic device able to transmit or receive signals, for example. A wireless access point allows a signal to propagate from a host device to another host device or to another electronic device coupled to a network that is accessible via the wireless access point. In some examples, the electronic device 104 may communicate with the host device 102 wirelessly utilizing BLUETOOTH®, WI-FI®, or utilizing

any other suitable wireless technology standard or radio frequency technique. In other examples, the electronic device 104 may couple to the host device 102 utilizing a cable (e.g., universal serial bus (USB), Ethernet, or any other suitable wired technology standard) that couples to a port (not expressly depicted) of the electronic device 104 and to a port (not expressly depicted) of the host device 102. A signal 122 is communicated between the host device 102 and the electronic device 104. The signal 122 may be a packet transmitted from the host device 102 and received by the electronic device 104, for example. In another example, the signal 122 may be a packet transmitted by the electronic device 104 and received by the host device 102.

**[0015]** In various examples, the host device 102 may comprise a controller 106 coupled to a storage device 108 and a wireless transceiver 110. The controller 106 may be a microprocessor, a microcomputer, a microcontroller, a programmable integrated circuit, a programmable gate array, or another suitable processor, for example. The controller 106 may be a network interface controller, for example. In another example, the controller 106 may be the central processing unit (CPU) of the host device 102. In an example, the controller 106 may be an embedded controller of a wireless transceiver module that includes the wireless transceiver 110. The wireless transceiver 110 transmits and receives signals. The signals may be radio frequency (RF) signals, for example. The wireless transceiver 110 may transmit or receive the signal 122, for example. The wireless transceiver 110 may support transmitting and receiving signals across a range of frequency channels. The wireless transceiver 110 may support 900 megahertz (MHz), 2.4 gigahertz (GHz), 3.6 GHz, 4.9 GHz, 5 GHz, 5.9 GHz, and 60 GHz bands, for example. The wireless transceiver 110 may transmit signals utilizing a range of transmission powers. The wireless transceiver 110 may adjust transmission power from 0 decibel-milliwatts (dBm) to 20 dBm, for example. The storage device 108 may include a hard drive, solid state drive (SSD), flash memory, random access memory (RAM), or other suitable memory, for example. In some examples, the storage device 108 may store the computer-readable instructions 112. The computer-readable instructions 112, when executed by the

controller 106, may cause the controller 106 to perform some or all of the actions attributed herein to the controller 106.

**[0016]** In various examples, the electronic device 104 may comprise a controller 114 coupled to a storage device 116 and a wireless transceiver 118. The wireless transceiver 118 may transmit and receive RF signals. The wireless transceiver 118 may transmit or receive the signal 122, for example. The storage device 116 may include a hard drive, solid state drive (SSD), flash memory, random access memory (RAM), or other suitable memory, for example. The controller 114 may be a microprocessor, a microcomputer, a microcontroller, a programmable integrated circuit, a programmable gate array, or another suitable processor, for example. The controller 114 may be a network interface controller, for example. In another example, the controller 114 may be the CPU of the electronic device 104. In an example, the controller 106 may be an embedded controller of a wireless transceiver module that includes the wireless transceiver 118. The wireless transceiver 118 may transmit and receive signals. The signals may be RF signals, for example. The wireless transceiver 118 may transmit or receive the signal 122, for example. The wireless transceiver118 may support transmitting and receiving signals across a range of frequency channels. The wireless transceiver 118 may support 900 MHz, 2.4 GHz, 3.6 GHz, 4.9 GHz, 5 GHz, 5.9 GHz, and 60 GHz bands, for example. The wireless transceiver 118 may transmit signals utilizing a range of transmission powers. The wireless transceiver 118 may adjust transmission power from 0 dBm to 20 dBm, for example. In some examples, the storage device 116 may store the computer-readable instructions 120. The computer-readable instructions 120, when executed by the controller 114, may cause the controller 114 to perform some or all of the actions attributed herein to the controller 114.

**[0017]** In various examples, as described above, the controllers 106, 114 tag packets and determine on which frequency channel and at which transmission power to transmit a packet based on the tag. The controller 106, 114 monitors for a packet that is to be transmitted. For example, the controller 106 may receive an indication from an application that data is to be sent. In another example, the controller 106, 114 may monitor the wireless transceiver 110, 118, respectively,

for a transmission. In response to a determination that a packet is to be transmitted, the controller 106, 114 may tag the packet based on a destination of the packet, a data type associated with the packet, an application associated with the packet, a wireless network via which the packet is transmitted, or a combination thereof, as described below with respect to FIG. 2. Based on the tag of the packet, the controller 106, 114 may set a frequency channel and a transmission power at which the wireless transceiver 110, 118, respectively, is to transmit the packet.

**[0018]** In some examples, the host device 102 and the electronic device 104 may be located on an ad-hoc network. Each device of an ad-hoc network may act as a routing device that directly forwards data to other devices of the ad-hoc network with no assistance from an administered network having a centralized infrastructure. The ad-hoc network may be a WLAN comprised of host devices, electronic devices, wireless mesh devices, wireless sensor devices, or some combination thereof, for example. For example, the electronic device 104 may be a docking station that is coupled to a wireless display device (not expressly shown). The host device 102 may transmit data to the electronic device 104. The electronic device 104, in turn, may transmit the data to the wireless display device. In another example, the electronic device 104 may be a wireless display device, and the host device 102 may transmit data directly to the wireless display device.

**[0019]** In other examples, the host device 102 and the electronic device 104 may be located on an administered network having a centralized infrastructure. The electronic device 104 may be a wireless access point of the network and may forward data transmitted by the host device 102 to another host device or to another electronic device of the network or of another network accessible by the wireless access point. For example, the electronic device 104 may be a routing device or a modem device. The host device 102 may transmit data to the electronic device 104. The electronic device 104 may, in turn, transmit the data to another host device or another electronic device of a LAN, WLAN, or a WAN. The LAN or WLAN may be a network comprising connected devices within a location (e.g., building, campus), for example. The WAN may be a private network

associated with an organization (e.g., business entity, school entity), for example. In another example, the electronic device 104 may, in turn, transmit the data to another host device or another electronic device accessible via the Internet.

**[0020]** FIG. 2 depicts a packet 200 that is tagged in accordance with various examples. The packet 200 comprises data that may be incorporated into the packet 200 in layers. The data may include an identifier of the host device or the electronic device that transmitted the packet 200, an identifier of an intended recipient of the packet 200, an identifier of a network by which the packet 200 is to be transferred, data (e.g., a payload) to be transferred between the host device or the electronic device and the intended recipient, a data type of the data, an application (e.g., set of related computer-readable instructions for performing a task) associated with the data, a number of related packets to be transferred, a size of the packet 200, an identifier of the packet 200, an identifier of the related packets, or some combination thereof, for example. The host device may be the host device 102, for example. The electronic device may be the electronic device 104, for example. To determine the data type, the controller 106, 114 may compare a data structure (not expressly shown) comprising a destination of the packet 200, an application type of the packet 200, a network over which the packet 200 is to be transmitted, a user-defined preference, or some combination thereof. The data structure may associate a frequency channel and a transmission power with each data type. As used herein, a data structure is an object that stores data for cross-referencing (e.g., linked list, lookup table, database). The user-defined preference may be installed at manufacture, determined by a user having a security access to the host device 102 or the electronic device 104, determined by a user having access to the host device 102 or the electronic device 104, or some combination thereof. The user-defined preference may be based on a quality of service preference, for example. The quality of service preference may be assigned based on which applications the user utilizes most often, based on which applications utilize the most resources of the host device 102 or the electronic device 104, based on which applications have higher security levels, or some other suitable user-defined preference. As used herein, related packets are a number of packets to transmit related

information. The related information may be generated by an application installed on the host device 102 or the electronic device 104. For example, the application may be an email application, a web browser, or a video streaming service.

**[0021]** The layers at which data may be added may include an application layer 202, a transport layer 204, a network layer 206, a physical layer 208, or some combination thereof, for example. In another example, data may be added to the packet 200 at other suitable layers (not expressly shown) in accordance with any suitable networking model (e.g., open systems interconnection (OSI), Transmission Control Protocol/Internet Protocol (TCP/IP)). At each layer, data may be incorporated into the packet 200. For example, at the application layer 202, application data 210 and an application header 212 may be incorporated into the packet 200. The application data 210 may be referred to as a payload. At the transport layer 204, a transport header 214 may be incorporated into the packet 200, for example. At the network layer 206, a network header 216 may be incorporated into the packet 200, for example. At the physical layer 208, a physical header 218 may be incorporated into the packet 200, for example.

**[0022]** The application header 212, the transport header 214, the network header 216, and the physical header 218 may each include data that specifies a communication protocol for the packet 200. The communication protocol provides a set of rules by which the packet 200 is transmitted, received, and deciphered. In various examples, the controller 106, 114 may incorporate a tag into a header. The tag may comprise a data type of the packet 200, a destination of the packet 200, an application type of the packet 200, a network over which the packet 200 is to be transmitted, or some combination thereof, for example. In some examples, the destination of the packet 200 may be an intended end-recipient of the packet 200 or may be another host device or another electronic device that will forward the packet 200 to the intended end-recipient of the packet 200.

**[0023]** In an example, the controller 106, 114 may insert, in the application header 212, a tag indicating an application type based on an identifier of the application generating the application data 210. In another example, the controller 106, 114 may insert, in the transport header 214 or the network header 216, a tag indicating a destination of the packet 200 based on an IP address that indicates a

destination of the packet 200, for example. In an example, the controller 106, 114 may insert, in the transport header 214 or the network header 216, a tag indicating a network by which the packet 200 is to be transferred based on an IP address that indicates an origin of the packet 200, based on an IP address that indicates a destination of the packet 200, or some combination thereof. In another example, the controller 106, 114 may insert, in the transport header 214 or the network header 216, a tag indicating a data type of the packet 200 based on the identifier of the application generating the application data 210, the IP address that indicates the destination of the packet 200, the IP address that indicates the origin of the packet 200, or some combination thereof. In another example, the controller 106, 114 may insert, in the physical header 218, a tag indicating a frequency channel on which to transmit the packet 200, a transmission power with which to transmit the packet 200, or some combination thereof.

**[0024]** Tagging the packet 200 enables the controller 106, 114 to improve communications performance, to increase security of transmissions, to reduce overall power consumption, to reduce radiation levels, to reduce signal interference, and to reduce network congestion by routing the packet 200 according to a variety of specifications and preferences that satisfy these criteria. For example, a user may prefer data of an immersive application to be transmitted using a high frequency channel and a high transmission power. As used herein, an immersive application is an application that may utilize a large amount of resources of the host device 102 or the electronic device 104 and that may have low latency tolerances to satisfy a high level of user engagement (e.g., video conferencing, video streaming, music streaming). Other applications may utilize a large amount of resources but have high latency tolerances due to a low level of user engagement (e.g., file transfer protocol (FTP), email) and are not considered immersive applications. The controller 106, 114 may tag the packet 200 to a highest frequency channel of the wireless transceiver 110, 118, respectively, and a highest transmission power of the wireless transceiver 110, 118, respectively. In another example, a user may prefer data of an encrypted email application to be transmitted using a high frequency channel and a low transmission power. The controller 106, 114 may tag the packet 200 to indicate

the highest frequency channel of the wireless transceiver 110, 118, respectively, and a transmission power that is lower than the highest transmission power of the wireless transceiver 110, 118, respectively. In another example, the controller 106, 114 may tag the packet 200 to indicate the packet 200 is to be transmitted on an ad-hoc network. The controller 106, 114 may tag the packet 200 to indicate a lower frequency channel of the wireless transceiver 110, 118, respectively, and a transmission power that is lower than the highest transmission power of the wireless transceiver 110, 118, respectively.

**[0025]** FIG. 3 is a schematic diagram of the host device 102 for tagging and transmitting packets in accordance with various examples. As described above with respect to FIG. 1, the host device 102 comprises the controller 106 coupled to the wireless transceiver 110 and to the storage device 108. The storage device 108 may store the computer-readable instructions 300, 302, and 304. The computer-readable instructions 300, 302, 304 may be the computer-readable instructions 112, for example.

**[0026]** In various examples, when executed by the controller 106, the computer-readable instructions 300, 302, 304 may cause the host device 102 to tag a packet and to transmit the packet using a frequency channel based on the tag and a transmission power based on the tag. The packet may be the packet 200, for example. For example, execution of the computer-readable instruction 300 may cause the controller 106 to determine whether a destination of a packet is within a threshold distance from the host device 102. The packet may be referred to as a first packet. The threshold distance may be referred to as a first threshold distance. Execution of the computer-readable instruction 302 may cause the controller 106 to apply a tag to the packet based on the determination. The controller 106 may apply the tag as described above with respect to FIG. 2. The tag may be referred to as a first tag. Execution of the computer-readable instruction 304 may cause the controller 106 to cause the wireless transceiver 110 to transmit the packet using a frequency channel based on the tag and using a transmission power based on the tag. The frequency channel may be referred to as a first frequency channel. The transmission power may be referred to as a first transmission power. In some examples, the wireless transceiver 110 may

use, based on the tag, a transmission power that is a higher transmission power or that is a lower transmission power than a transmission power utilized to transmit a previous packet. Utilizing a lower transmission power may reduce radiation levels, reduce signal interference, reduce overall power consumption, and increase security of transmissions. In other examples, the wireless transceiver 110 may use, based on the tag, a frequency channel that is a higher frequency channel or that is a lower frequency channel than a frequency channel utilized to transmit a previous packet. Utilizing a higher or lower frequency channel may reduce signal interference and network congestion.

**[0027]** In some examples, the threshold distance may be based on a user-defined preference, on a data type, on an application type, on the destination, on the network for transmitting the packet, or some combination thereof. For example, a user-defined preference may specify the threshold distance as five feet. In another example, in response to the destination having a location on a first network, the controller 106 may determine the threshold distance is three feet. In response to the destination having a location on a second network, the controller 106 may determine the threshold distance is twenty feet. In another example, in response to the application type indicating a high security level, the controller 106 may determine the threshold distance is three feet. Having a threshold distance that varies based on different criteria enables the controller 106, 114 to improve communications performance, to increase security of transmissions, to reduce overall power consumption, to reduce radiation levels, to reduce signal interference, and to reduce network congestion by routing the packet according to a variety of specifications and preferences that satisfy these criteria. In various examples, the controller 106 may determine whether the destination of the packet is within the threshold distance based on a received signal strength indicator (RSSI) of a signal received from the destination, angle of arrival using Bluetooth, time of flight using ultrasonic or infrared tools, etc.

**[0028]** In various examples, the controller 106 may determine the destination of the packet based on a data type of the packet. For example, in response to the data type indicating the packet is to be transmitted utilizing a higher frequency channel and a higher transmission power, the controller 106 may determine that

the packet is to be routed to a first electronic device of a network and set the destination of the packet as the first electronic device. The network may be a LAN, WAN, or the Internet, for example. In response to the data type indicating the packet is to be transmitted utilizing a higher frequency channel and a lower transmission power, the controller 106 may determine that the packet is to be routed to a second electronic device of the network and set the destination of the packet as the second electronic device. In response to the data type indicating the packet is to be transmitted utilizing a lower frequency channel and a higher transmission power, the controller 106 may determine that the packet is to be routed to a third electronic device of a second network and set the destination of the packet as the third electronic device. In response to the data type indicating the packet is to be transmitted utilizing a lower frequency channel and a lower transmission power, the controller 106 may determine that the packet is to be routed to a fourth electronic device of a third network and set the destination of the packet as the fourth electronic device. The third network may be an ad-hoc network, for example. By routing packets based on the data type, the host device 102 may optimize communications performance while increasing security of transmissions, reducing overall power consumption, reducing radiation levels, reducing signal interference, and reducing network congestion.

**[0029]** In some examples, the controller 106 may perform a second determination as to whether a destination of a second packet is within a second threshold distance from the host device 102. The controller 106 may apply a second tag to the second packet based on the second determination. The wireless transceiver 110 may transmit the second packet using a frequency channel based on the second tag and using a transmission power based on the second tag. In various examples, the frequency channel based on the first tag is different from the frequency channel based on the second tag and the transmission power based on the first tag is different from the transmission power based on the second tag.

**[0030]** In various examples the wireless transceiver 110 may comprise a controller (not expressly shown). The controller of the wireless transceiver 110 may compare the tag of the packet to a data structure comprising a list of tags,

each tag associated with a corresponding frequency channel and transmission power. The controller of the wireless transceiver 110 may compare the tag to the list of tags. In response to the tag matching a first value (e.g., a first tag of the list of tags), the controller of the wireless transceiver 110 may adjust a frequency channel to a first frequency channel and a transmission power to a first transmission power. In response to the tag matching a second value (e.g., a second tag of the list of tags), the controller of the wireless transceiver 110 may adjust the frequency channel to a second frequency channel and the transmission power to a second transmission power.

**[0031]** FIG. 4 is a schematic diagram of the host device 102 for tagging and transmitting packets in accordance with various examples. As described above with respect to FIGS. 1 and 3, the host device 102 may comprise the controller 106 coupled to the wireless transceiver 110 and to the storage device 108. The storage device 108 may store the computer-readable instructions 400, 402, and 404. The computer-readable instructions 400, 402, 404 may be the computer-readable instructions 112, for example.

**[0032]** In various examples, when executed by the controller 106, the computer-readable instructions 400, 402, 404 may cause the host device 102 to tag a packet, to determine whether a destination is within a threshold distance, and to transmit the packet based on the tag and the determination. The packet may be the packet 200, for example. For example, execution of the computer-readable instruction 400 may cause the controller 106 to apply a tag to a packet based on an application type of the packet. The controller 106 may apply the tag to the packet as described above with respect to FIG. 2. Execution of the computer-readable instruction 402 may cause the controller 106 to determine whether a destination of the packet is within a threshold distance of the host device 102. The controller 106 may determine whether the destination of the packet is within the threshold distance of the host device 102 as described above with respect to FIG. 3. Execution of the computer-readable instruction 404 may cause the wireless transceiver 110 to transmit the packet based on the tag and based on the determination.

**[0033]** In various examples, in response to the tag indicating the application type matches an identifier of an immersive application and the determination that the destination of the packet is within a threshold distance, the controller 106 may adjust the frequency channel of the wireless transceiver 110 to a higher frequency channel and the transmission power of the wireless transceiver 110 to a lower transmission power. By adjusting the transmission power to the lower transmission power, the controller 106 may reduce signal interference with other nearby host devices (not expressly shown) and may reduce network congestion by routing the packet through an ad-hoc network having a wired connection to a LAN, WAN, or Internet. Additionally, the wired connection may reduce a number of lost packets and improve the user experience.

**[0034]** In some examples, the controller 106 may cause, based on the tag and based on the determination, the wireless transceiver 110 to adjust a frequency channel, a transmission power, or a combination thereof. The controller 106 may compare the tag of the packet to a data structure comprising a list of tags. Each tag may be associated with a first frequency channel and a first transmission power and a second frequency channel and a second transmission power. The controller 106 may compare the tag to the list of tags. In response to the tag having a first value and the determination indicating the destination is within the threshold distance, the controller 106 may cause the wireless transceiver 110 to transmit the packet utilizing the first frequency channel and the first transmission power. In response to the tag having a second value and the determination indicating the destination is outside the threshold distance, the controller 106 may cause the wireless transceiver 110 to transmit the packet utilizing the second frequency channel and the second transmission power. In other examples, a controller of the wireless transceiver 110 may adjust, based on the tag and based on the determination, a frequency channel, a transmission power, or a combination thereof, as described above with respect to FIG. 3. By adjusting the frequency channel or transmission power based on the tags, the host device 102 may improve communications performance while increasing security of transmissions, reducing overall power consumption, reducing radiation levels, reducing signal interference, and reducing network congestion.

**[0035]** In various examples, the controller 106 may apply a second tag to a second packet based on an application type of the second packet. The controller 106 may perform a second determination as to whether a destination of the second packet is within a second threshold distance from the host device 102. The wireless transceiver 110 may transmit the first packet using a first frequency channel based on the tag and using a first transmission power based on the tag. The wireless transceiver 110 may transmit, based on the second tag and the second determination, the second packet using a second frequency channel based on the second tag and using a second transmission power based on the second tag. In some examples, the first frequency channel is different from the second frequency channel. In other examples, the first transmission power is different from the second transmission power.

**[0036]** FIG. 5 is a schematic diagram of the electronic device 104 for tagging and transmitting packets in accordance with various examples. As described above with respect to FIG. 1, the electronic device 104 may comprise the controller 114 coupled to the wireless transceiver 118 and the storage device 116. The storage device 116 may store the computer-readable instructions 500, 502, and 504. The computer-readable instructions 500, 502, 504 may be the computer-readable instructions 120, for example.

**[0037]** In various examples, when executed by the controller 114, the computer-readable instructions 500, 502, 504 may cause the electronic device 104 to tag a packet and to transmit the packet using a frequency channel based on the tag and a transmission power based on the tag. For example, execution of the computer-readable instruction 500 may cause the controller 114 to receive from a host device, a first packet having a first tag. The host device may be the host device 102, for example. Execution of the computer-readable instruction 502 may cause the controller 114 to apply, based on the first tag, a second tag to a second packet for transmission to the host device. The controller 114 may apply the second tag as described above with respect to FIG. 2. Execution of the computer-readable instruction 504 may cause the controller 114 to cause the wireless transceiver 118 to transmit the second packet to the host device using a

frequency channel based on the second tag and a transmission power based on the second tag.

**[0038]** In some examples, the controller 114 may determine, based on the first tag, an application type of the first packet. The controller 114 may apply, based on the determination, a third tag to the first packet. The wireless transceiver 118 may transmit the first packet to a second host device (not expressly shown) using a frequency channel based on the third tag and using a transmission power based on the third tag. In various examples, the frequency channel based on the second tag is different from the frequency channel based on the third tag. In other examples, the transmission power based on the second tag is different from the transmission power based on third tag.

**[0039]** In various examples, the controller 114 may receive, from a second host device, a third packet having a third tag. The controller 114 may apply, based on the third tag, a fourth tag to a fourth packet for transmission to the second host device. The wireless transceiver 118 may transmit the fourth packet to the second host device using a frequency channel based on the fourth tag and using a transmission power based on the fourth tag. In some examples, the frequency channel based on the second tag is different from the frequency channel based on the fourth tag and the transmission power based on the second tag is different from the transmission power based on the fourth tag.

**[0040]** In other examples, the controller 114 may receive, from a second host device, a third packet having a third tag. The controller 114 may apply, based on the third tag, a fourth tag to a fourth packet for transmission to the second host device. The wireless transceiver 118 may transmit the fourth packet to a third host device (not expressly shown) using a frequency channel based on the fourth tag and using a transmission power based on the fourth tag. In some examples, the frequency channel based on the second tag is different from the frequency channel based on the fourth tag and the transmission power based on the second tag is different from the transmission power based on the fourth tag.

**[0041]** By tagging packets and transmitting the packets based on the tags, a host device or an electronic device may improve communications performance while increasing security of transmissions, reducing overall power consumption,

reducing radiation levels, reducing signal interference, and reducing network congestion by routing the packets according to a variety of specifications and preferences that satisfy these criteria.

**[0042]** The above discussion is meant to be illustrative of the principles and various examples of the present disclosure. Numerous variations and modifications will become apparent to those skilled in the art once the above disclosure is fully appreciated. It is intended that the following claims be interpreted to embrace all such variations and modifications.

**[0043]** In the figures, certain features and components disclosed herein may be shown exaggerated in scale or in somewhat schematic form, and some details of certain elements may not be shown in the interest of clarity and conciseness. In some of the figures, in order to improve clarity and conciseness, a component or an aspect of a component may be omitted.

**[0044]** In the above discussion and in the claims, the term "comprising" is used in an open-ended fashion, and thus should be interpreted to mean "including, but not limited to...." Also, the term "couple" or "couples" is intended to be broad enough to encompass both indirect and direct connections. Thus, if a first device couples to a second device, that connection may be through a direct connection or through an indirect connection via other devices, components, and connections. As used herein, including in the claims, the word “or” is used in an inclusive manner. For example, “A or B” means any of the following: “A” alone, “B” alone, or both “A” and “B.”

# CLAIMS

What is claimed is:

1. A host device, comprising:

a controller to:

determine whether a destination of a packet is within a threshold distance from the host device; and

apply a tag to the packet based on the determination; and

a wireless transceiver coupled to the controller, the wireless transceiver to transmit the packet using a frequency channel based on the tag and using a transmission power based on the tag.

2. The host device of claim 1, wherein the controller is to determine the destination of the packet based on a data type of the packet.

3. The host device of claim 2, wherein the data type indicates that the destination of the packet is on an ad-hoc network.

4. The host device of claim 1, wherein the controller is to:

perform a second determination as to whether a destination of a second packet is within a second threshold distance from the host device; and

apply a second tag to the second packet based on the second determination; and

wherein the wireless transceiver is to transmit the second packet using a frequency channel based on the second tag and using a transmission power based on the second tag, and

wherein the frequency channel based on the tag is different from the frequency channel based on the second tag and the transmission power based on the tag is different from the transmission power based on the second tag.

5. The host device of claim 1, wherein the wireless transceiver is to transmit, in response to the tag matching a first value, the packet using a first frequency channel and a first transmission power and is to transmit, in response to the tag matching a second value, the packet using a second frequency channel and a second transmission power.

6. A host device, comprising:

a controller to:

apply a tag to a packet based on an application type of the packet; and

determine whether a destination of the packet is within a threshold distance from the host device; and

a wireless transceiver coupled to the controller, the wireless transceiver to transmit the packet based on the tag and the determination.

7. The host device of claim 6, wherein the controller is to:

apply a second tag to a second packet based on an application type of the second packet; and

perform a second determination as to whether a destination of the second packet is within a second threshold distance from the host device; and

wherein the wireless transceiver is to:

transmit the packet using a first frequency channel based on the tag and using a first transmission power based on the tag; and

transmit, based on the second tag and the second determination, the second packet using a second frequency channel based on the second tag and using a second transmission power based on the second tag.

8. The host device of claim 7, wherein the first frequency channel is different from the second frequency channel.

9. The host device of claim 7, wherein the first transmission power is different from the second transmission power.

10. The host device of claim 6, wherein the application type indicates whether an application associated with the packet is an immersive application.

11. An electronic device, comprising:

a controller to:

receive, from a host device, a first packet having a first tag; and

apply, based on the first tag, a second tag to a second packet for transmission to the host device; and

a wireless transceiver coupled to the controller, the wireless transceiver to transmit the second packet to the host device using a frequency channel based on the second tag and using a transmission power based on the second tag.

12. The electronic device of claim 11, wherein the electronic device is a wireless access point.

13. The electronic device of claim 11, wherein the controller is to:

determine, based on the first tag, an application type of the first packet; and

apply, based on the determination, a third tag to the first packet; and

wherein the wireless transceiver is to transmit the first packet to a second host device using a frequency channel based on the third tag and using a transmission power based on the third tag.

14. The electronic device of claim 13, wherein the frequency channel based on the second tag is different from the frequency channel based on the third tag or the transmission power based on the second tag is different from the transmission power based on third tag.

15. The electronic device of claim 11, wherein the controller is to:

receive, from a second host device, a third packet having a third tag; and

apply, based on the third tag, a fourth tag to a fourth packet for transmission to the second host device; and

wherein the wireless transceiver is to transmit the fourth packet to the second host device using a frequency channel based on the fourth tag and using a transmission power based on the fourth tag, and

wherein the frequency channel based on the second tag is different from the frequency channel based on the fourth tag and the transmission power based on the second tag is different from the transmission power based on the fourth tag.

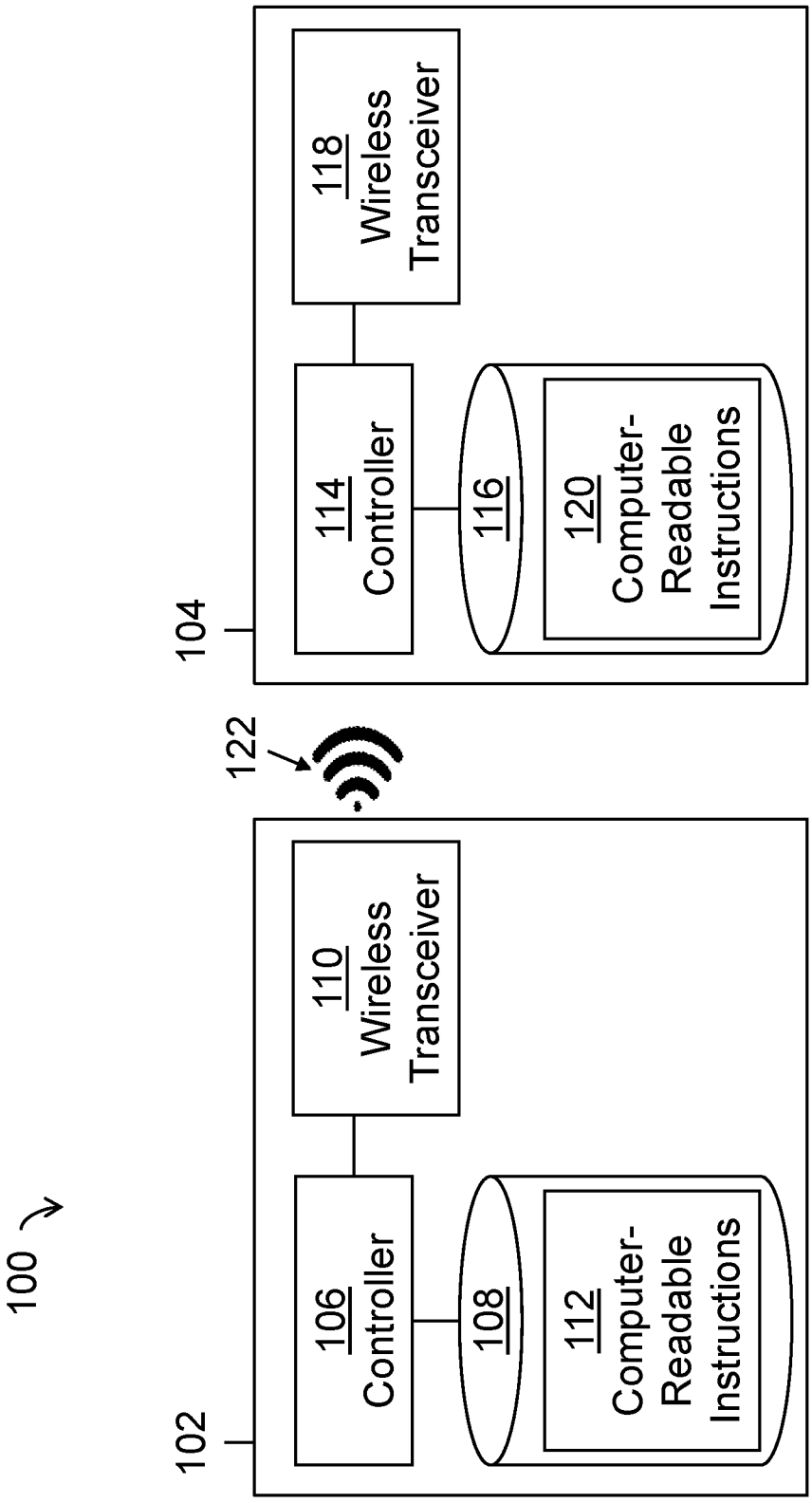
100
102
106 Controller
108
112 Computer-Readable Instructions
110 Wireless Transceiver
122
104
114 Controller
116
120 Computer-Readable Instructions
118 Wireless Transceiver

FIG. 1

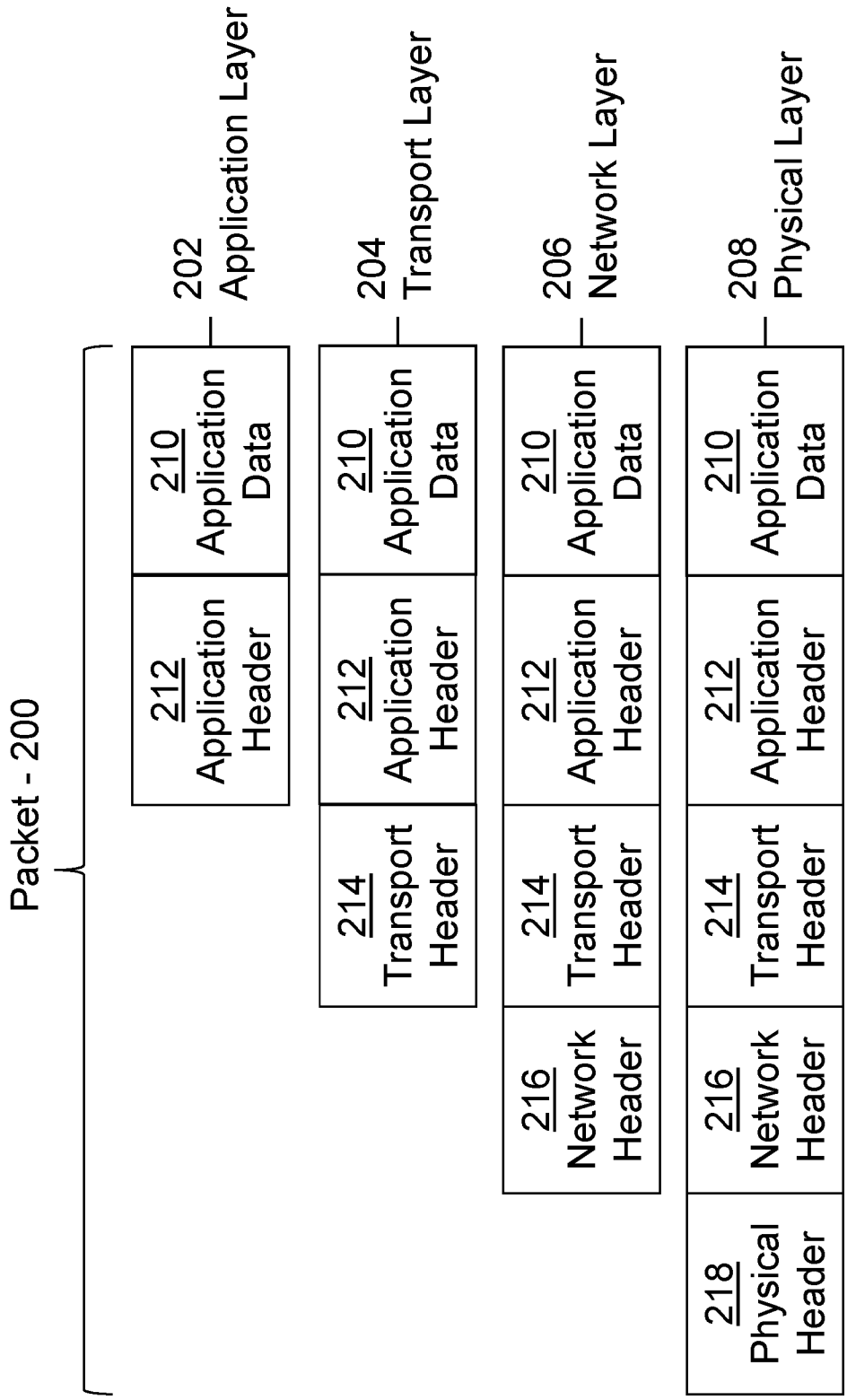
Packet - 200
202 Application Layer
204 Transport Layer
206 Network Layer
208 Physical Layer
210 Application Data
212 Application Header
214 Transport Header
216 Network Header
218 Physical Header

FIG. 2

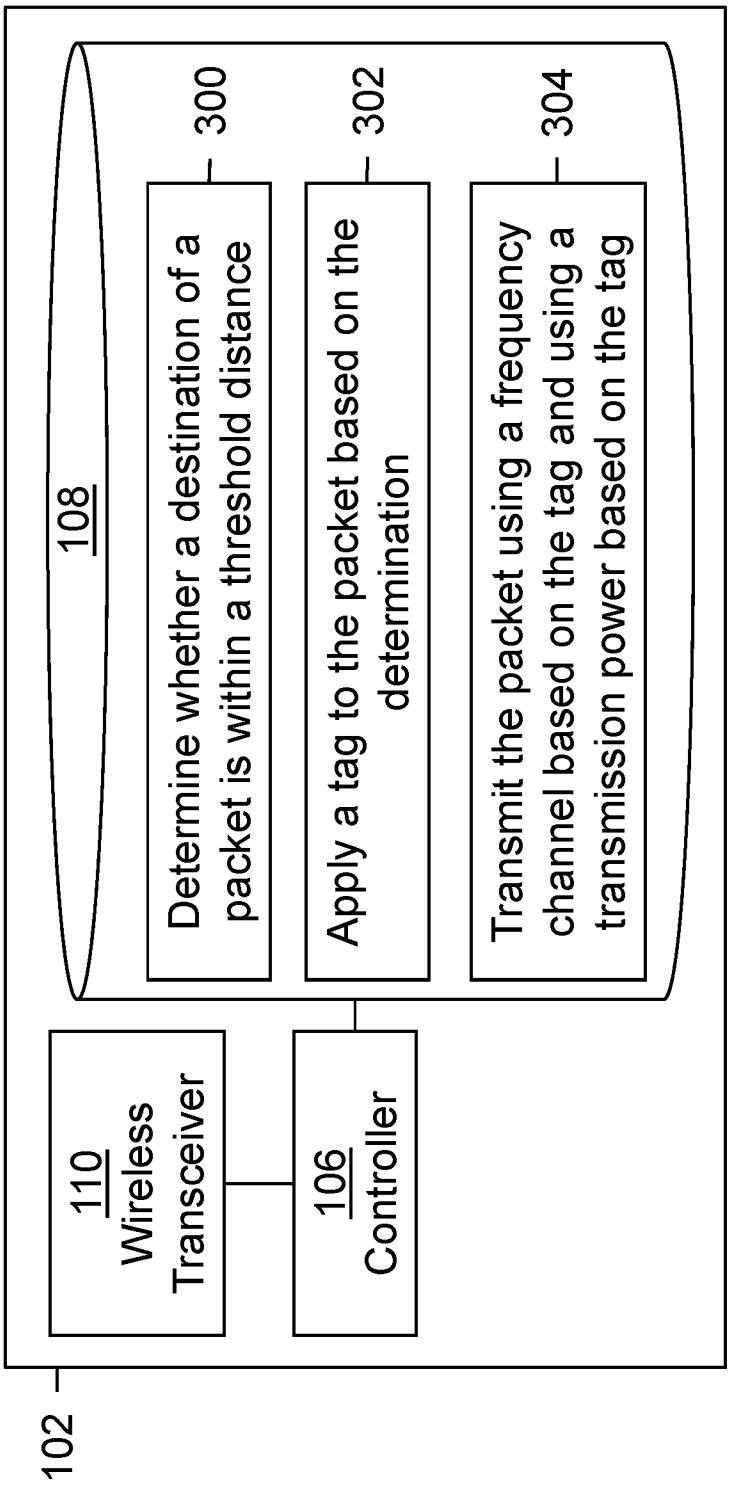
102
110
Wireless
Transceiver
106
Controller
108
300
Determine whether a destination of a packet is within a threshold distance
302
Apply a tag to the packet based on the determination
304
Transmit the packet using a frequency channel based on the tag and using a transmission power based on the tag

FIG. 3

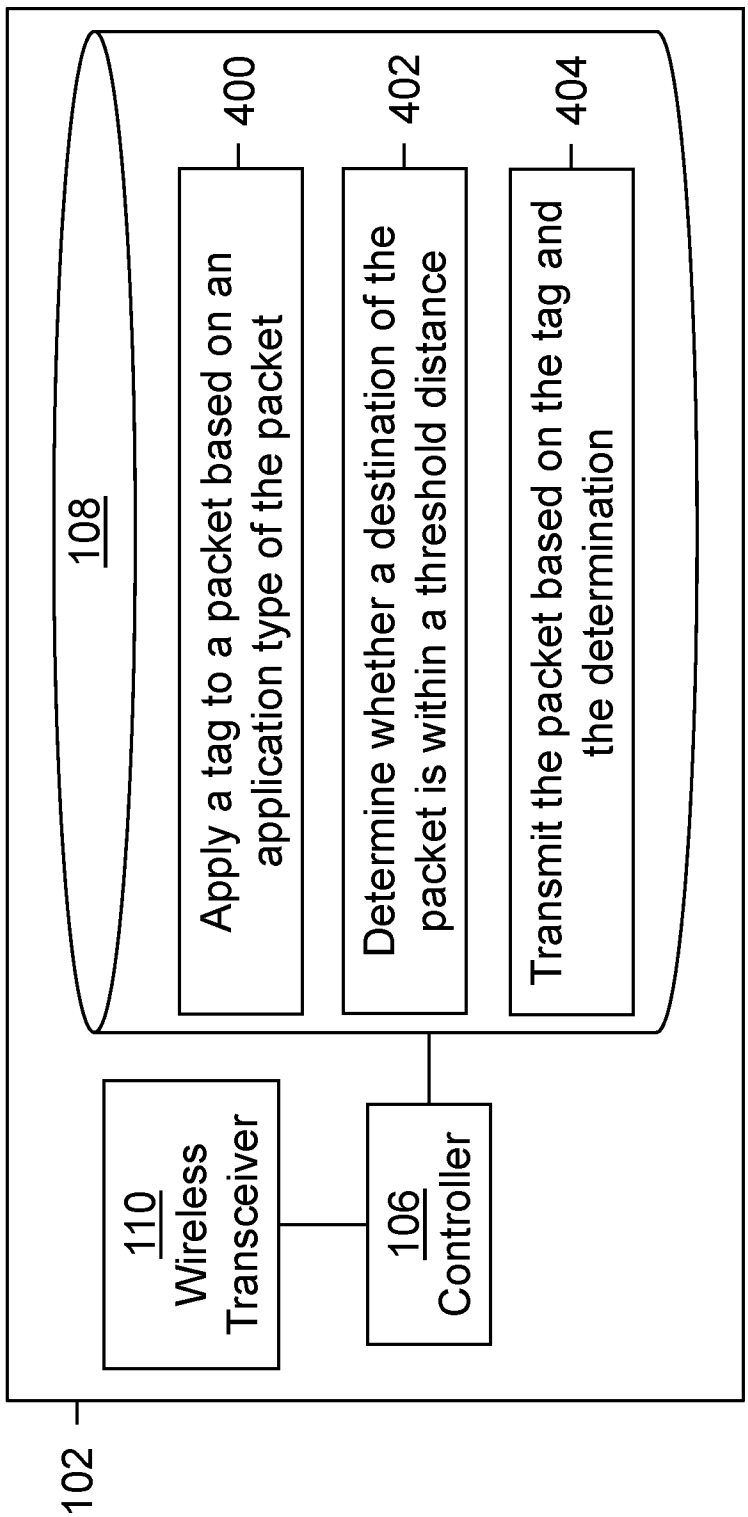
102
110 Wireless Transceiver
106 Controller
108
Apply a tag to a packet based on an application type of the packet
400
Determine whether a destination of the packet is within a threshold distance
402
Transmit the packet based on the tag and the determination
404

FIG. 4

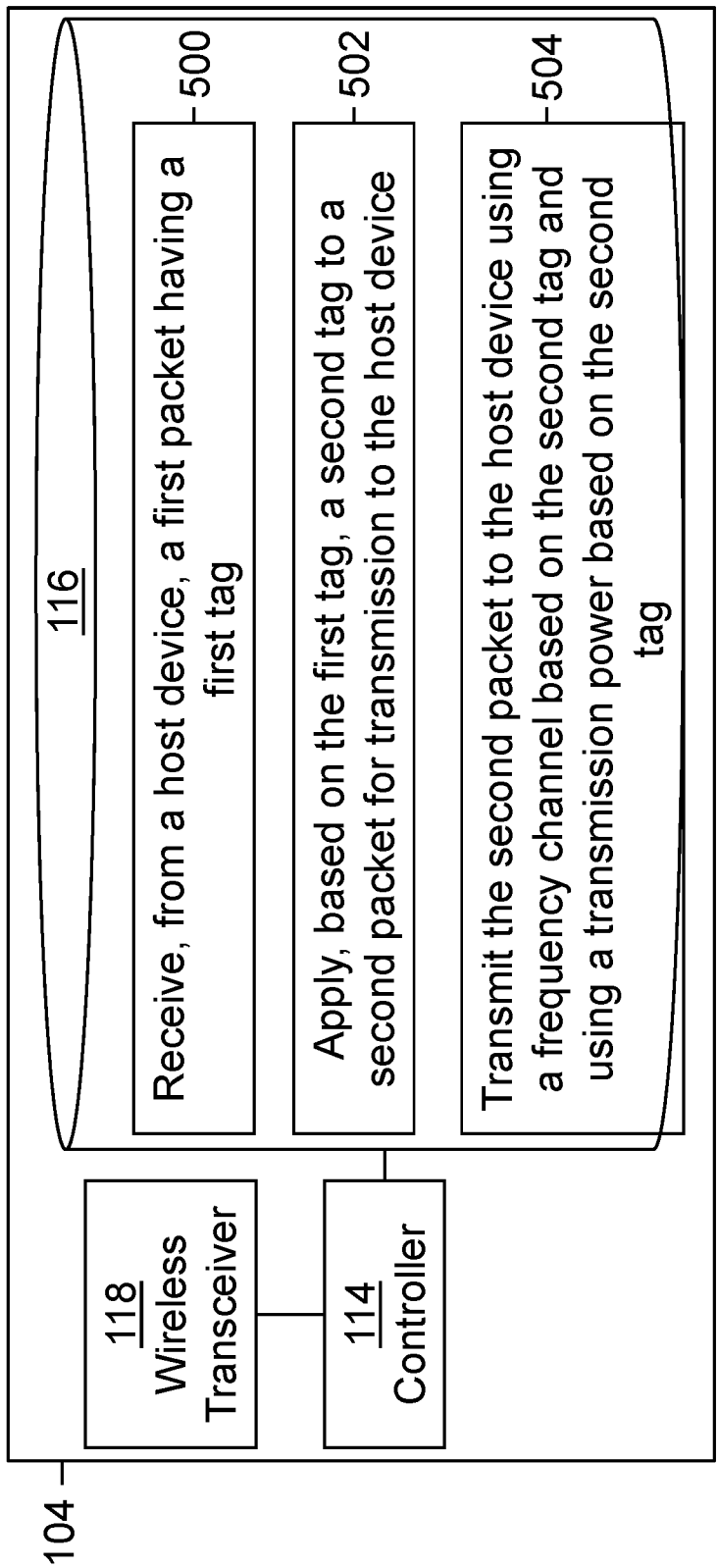
104
116
500
Receive, from a host device, a first packet having a first tag
502
Apply, based on the first tag, a second tag to a second packet for transmission to the host device
504
Transmit the second packet to the host device using a frequency channel based on the second tag and using a transmission power based on the second tag
118 Wireless Transceiver
114 Controller

FIG. 5

**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US 2020/047620

A. CLASSIFICATION OF SUBJECT MATTER

***G06F 16/00*** *(2019.01)*
***G06F 1/3206*** *(2019.01)*
***G06F 3/06*** *(2006.01)*
***H04W 4/02*** *(2018.01)*

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F 16/00, 1/3206, 3/06, H04W 4/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAPATIS, ESPACENET, PatSearch (RUPTO internal), USPTO, PATENTSCOPE, Google

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 2018/0014161 A1 (APPLE INC.) 11.01.2018, abstract, claims 8, 49, paragraphs [0060], [0061], [0069], [0072], [0097], [0112], [0113], [0141], [0170], [0221], [0223], [0233] | 1, 2, 4, 6, 7, 10-13, 15 |
| Y | | 3, 5, 8, 9, 14 |
| Y | US 2018/0232221 A1 (DAHRWIN LLC) 16.08.2018, paragraphs [0003], [0066], [0088], [0095], [0097] | 3, 8, 9, 14 |
| Y | US 2016/0135241 A1 (QUALCOMM INCORPORATED) 12.05.2016, paragraphs [0112], [0114], [0115], [0124] | 5 |
| A | US 2019/0149360 A1 (NICIRA, INC.) 16.05.2019 | 1-15 |
| A | US 7336618 B2 (GENERAL INSTRUMENT CORPORATION) 28.02.2008 | 1-15 |

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 28 April 2021 (28.04.2021) | 20 May 2021 (20.05.2021) |
| Name and mailing address of the ISA/RU:<br>Federal Institute of Industrial Property,<br>Berezhkovskaya nab., 30-1, Moscow, G-59,<br>GSP-3, Russia, 125993<br>Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37 | Authorized officer<br>V. Zakharov<br>Telephone No. +7 (495) 531-64-81 |