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(54) **Title:** WIRELESS HIGH-DEFINITION VIDEO TRANSMISSION

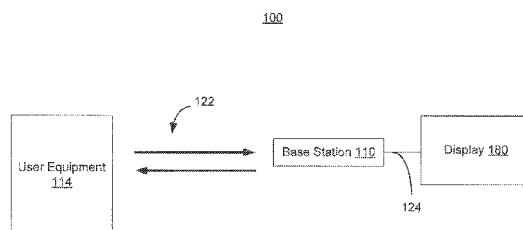


FIG. 1

(57) **Abstract:** Methods and apparatus, including computer program products, are provided for wireless transmission of high-definition video. In some embodiments, there is provided a method. The method may include receiving an indication to establish a connection between a user equipment and a base station; generating a video for transmission from the user equipment to the base station; and transmitting, by the user equipment, the generated video to the connection and the base station to enable the base station to provide the generated video to a display coupled to the base station. Related apparatus, systems, methods, and articles are also described.



WIRELESS HIGH-DEFINITION VIDEO TRANSMISSION

FIELD

[0001] The subject matter disclosed herein relates to wireless transmission of video.

BACKGROUND

[0002] Video has become a major source of content for user equipment, such as smart phones, cell phones, computers, tablet computers, and the like. Video includes a broad range of content, such as commercials, home videos, real-time video streams, web-based video streams, and full length movies. Initially, video content comprised relatively low resolution video, so viewing the content on a typical screen of a device, such as a smart phone, a tablet computer, a computer, and the like, did little to degrade the viewing experience. However, as high-definition video becomes more prevalent, high-definition video is increasingly being streamed to devices, such as smart phones, cell phones, computers, tablet computers, and the like. High-definition video generally refers to video that has a resolution better than traditional, standard television (e.g., 480 interlaced (i) or 576i). Examples of high-definition video include 480 progressive (p), 576p, 720p, 1080i, 1080p, and the like.

SUMMARY

[0003] Methods and apparatus, including computer program products, are provided for wireless transmission of video.

[0004] In some embodiments, there is provided a method. The method may include receiving an indication to establish a connection between a user equipment and a base station; generating a video for transmission from the user equipment to the base station; and transmitting, by

the user equipment, the generated video to the connection and the base station to enable the base station to provide the generated video to a display coupled to the base station.

[0005] In some variations of some of the embodiments disclosed herein, one or more of the following may be included. The indication may be received from a user interface at the user equipment, and the indication may represent a selection of the display for presentation of the video, which comprises high-definition video. The generating may further include compressing the video before storing or transmitting the video. The generating may further include decompressing, at the user equipment, the video, when the video is compressed and stored in a memory of the user equipment. The user equipment may transmit the generated video to the connection comprising one or more radio bearers established between the user equipment and the base station. The base station may comprise a dongle coupled directly to an input of the display. The user equipment may comprise a cell phone, a smart phone, a tablet, and the like. The video transmitted to the base station may be compressed, such that the base station decompresses and provides the video to an input of the display. The user equipment may be authenticated based on at least one of a virtual subscriber identity module and a public subscriber identity module.

[0006] In another aspect, there may be provided a method. The method may include receiving, at a base station, a video transmitted by a user equipment; and providing, at the base station, an output to a display coupled to the base station to enable the video to be presented on the display.

[0007] In some variations of some of the embodiments disclosed herein, one or more of the following may be included as well. The video may be decompressed at the base station, when the video is transmitted by the user equipment as compressed video. The video may comprise high-definition video. The output may comprise a video stream formatted in accordance with at least one of a high-definition multimedia interface (HDMI) and a component video. The video may be

received from one or more radio bearers. The base station may comprise a dongle coupled directly to an input of the display. The user equipment may comprise at least one of a cell phone, a smart phone, and a tablet. At least one of a virtual subscriber identity module and a public subscriber identity module may be used for authentication.

[0008] The above-noted aspects and features may be implemented in systems, apparatus, methods, and/or articles of manufacture, such as for example a computer program product, depending on the desired configuration. The details of one or more variations of the subject matter described herein are set forth in the accompanying drawings and the description below. Features and advantages of the subject matter described herein will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0009] In the drawings,

[0010] FIG. 1 depicts a simplified block diagram of a wireless communication system including a base station used to enable presentation of video at a display in accordance with some exemplary embodiments;

[0011] FIG. 2 depicts an example implementation of a base station in a dongle form factor in accordance with some exemplary embodiments;

[0012] FIG. 3 depicts an example implementation of a user equipment in accordance with some exemplary embodiments;

[0013] FIG. 4 depicts an example implementation of a base station in accordance with some exemplary embodiments;

[0014] FIG. 5 depicts another simplified block diagram of a wireless communication system including a base station used to enable presentation of video at a display in accordance with some exemplary embodiments;

[0015] FIG. 6 depicts an example of a process which may be implemented, in some exemplary embodiments, at the user equipment; and

[0016] FIG. 7 depicts an example of a process which may be implemented, in some exemplary embodiments, at the base station.

[0017] Like labels are used to refers to same or similar items in the drawings.

DETAILED DESCRIPTION

[0018] FIG. 1 depicts a simplified functional block diagram of a wireless communication system 100 consistent with some exemplary embodiments. The wireless communication system 100 may, in some exemplary embodiments, include user equipment 114 wirelessly coupled via wireless links 122 to a base station 110. The base station 110 may be coupled via a local link 124 to a display 180 configured to present video, such as for example high-definition video.

[0019] In some exemplary embodiments, the user equipment 114 may wirelessly transmit video, such as high-definition video, to the base station 110 via one or more wireless links 122, which may comprise cellular radio bearers. The base station 110 may receive the high-definition video and then provide output video via local link 124 to an input port at display 180, where the video is presented. System 100 may enable user equipment 114 to use another, and in some instances larger, or more capable, display 180, rather than a user interface at user equipment 114. For example, rather than use a 4 inch screen on a smart phone, the user may transmit video to base station 110, which is directly coupled to display 180, which may be a larger and/or a higher resolution display. Accordingly, high-definition videos, such as movies, clips, and the like, may be

provided to the display 180 using, for example, one or more wireless links 122, such as standards-compliant cellular radio bearers between user equipment 114 and base station 110.

[0020] In some exemplary embodiments, the user equipment 114 may include one or more of the following: at least one processor, at least one non-transitory computer-readable storage medium (e.g., memory, storage, and the like), a radio interface, a user interface, and the like. The user equipment 114 may be implemented as, for example, a mobile device, a stationary device, a mobile station, a mobile unit, a subscriber station, a wireless terminal, a tablet, a wireless gaming device, a smart phone, a cellular phone, and the like.

[0021] In some exemplary embodiments, the user equipment 114 may communicate with base station 110 via wireless links 122 in accordance with one or more public land mobile network standards. Examples of public land mobile network standards include: the IEEE 802.16 series of standards (commercially known as WiMAX); GERAN (GSM/EDGE Radio Access Network); UTRAN (UMTS Terrestrial Radio Access Network); E-UTRAN (Evolved-UTRAN, which is also referred to as Long Term Evolution (LTE) and/or Long Term Evolution-Advanced (LTE-A)); and any other wireless technology/standard as well as any subsequent additions or revisions to those standards. For example, the wireless links 122 may comprise one or more cellular radio bearers, such as an uplink and a downlink, established between the user equipment 114 and the base station 110.

[0022] In some exemplary embodiments, the base station 110 may be implemented as a wireless base station, such as for example a Node B base station, an evolved Node B base station, a femtocell base station, and/or any other type of base station. In some exemplary embodiments, the base station 110 may be controlled by a network operator, in which case the frequencies (and/or the bandwidth allocations) being used by the base station 110 are controlled by, and in accordance with those used by, the network operator, such as a public land mobile network operator. However, the

base station 110 may also use other frequency bands as well including frequency bands allocated to private users and unlicensed bands. Moreover, the base station 110 may change frequencies and adjust power to adapt to a licensed and/or unlicensed radio frequency environment. For example, the base station 110 may adapt, when communicating with user equipment 114, by selecting a low power, selecting a given frequency to avoid licensed and/or unlicensed users, and/or allocating a bandwidth for the video being transmitted from the user equipment 114 to the base station 110.

[0023] FIG. 2 depicts an example implementation of base station 110 in the dongle form factor, although other form factors may be implemented as well. The dongle form factor of base station 110 may enable base station 110 to be readily used with display 180. The base station 110 at FIG. 2 also includes an output port 210, which provides video (received at the base station from the user equipment 114) to an input port at display 180, where the video is presented.

[0024] In some exemplary embodiments, the dongle base station 110 depicted at FIG. 2 may be configured as a so-called “base station on a chip.” Moreover, the dongle base station 110 depicted at FIG. 2 may be configured, in some exemplary embodiments, as a private base station serving only the display 180 and one or more devices, such as user equipment 114, seeking to present video, such as high-definition video, on display 180.

[0025] Referring again to FIG. 1, the base station 110 may, in some exemplary embodiments, couple via one or more wireless links 122 to user equipment 114 and also couple via the local link 124 to display 180. As noted, wireless link 122 may be implemented as one or more cellular radio bearers or connections. The local link 124 may be implemented as a wired connection to the display 180, although a wireless link local 124 between the base station and the display (e.g., a Bluetooth link and the like) may be used as well. In any case, the local link 124 may couple a video output port of base station 110 to an input port at display 180 to enable presentation of the video, such as high-definition video. Examples of input ports at display 180 include High-

Definition Multimedia Interface (HDMI), digital visual interface (DVI), component video, separate video (S-Video), and the like.

[0026] The display 180 may be implemented as any type of monitor or display capable of presenting video transmitted by the user equipment 114. For example, the display 180 may be implemented as a high-definition video monitor or a high-definition television configured to present a video (including other information carried along with the video stream, such as for example audio, icons displayed at the user interface of user equipment 114, and the like). The phrase “video stream” refers to a channel of video being transmitted from the user equipment 114 to the base station 110. The video stream may be a so-called “real-time” video stream generated by a camera, such as a camera at user equipment 114, and/or generated as a video stream, such as a clip, a movie, etc., stored, either compressed or uncompressed, in memory 335. The video may also include so-called “static” content, such as icons, images, and the like presented at the user interface of user equipment 114 and then transmitted to the base station 110 for presentation at display 180. In some example embodiments, the display 180 may present video configured as high-definition video, such as video formatted as 480p, 720p, 720i, 1080p, and 1080i, although any other resolution or format may be presented by display 180 as well.

[0027] FIG. 3 depicts an example implementation of user equipment 114 consistent with some of the exemplary embodiments described herein. The user equipment 114 may include one or more of the following components: an antenna 320, a radio interface 370, a camera 380, a processor 330, a memory 335, a video compressor 340, a public subscriber identity module 345, a private subscriber identity module 350, and the like.

[0028] In some exemplary embodiments, the antenna 320 may include one or more antennas. Moreover, the antenna 320 may couple signals to, and/or from, radio interface 370. The radio interface 370 may include one or more components, such as for example filters, converters

(e.g., digital-to-analog converters and the like), processors, symbol demappers, an Inverse Fast Fourier Transform (IFFT) module, a Fast Fourier Transform module, a precoder, a demodulator, a modulator, and the like.

[0029] In some exemplary embodiments, the user equipment 114 may further include at least one processor 330 for controlling the user equipment 114 and for accessing and executing program code stored in at least one memory 335 (which configures the user equipment and/or processor to perform the operations described herein). The processor 330 may also control the transmission of video and/or high-definition video to display 180 via wireless links 122 as described herein.

[0030] In some exemplary embodiments, the processor 330 may include one or more of the following: one or more microprocessors; one or more processors with, or without, accompanying digital signal processor(s); one or more special-purpose computer chips; one or more field-programmable gate arrays (FPGAS); one or more controllers; one or more application-specific integrated circuits (ASICS), and/or one or more computers. In some implementations, the user equipment 114 may also be compatible with one or more of the following: WiMAX, LTE, LTE-Advanced, and the like.

[0031] The memory 335 may, in some exemplary embodiments, include one or more of the following: read-only memory, random access memory, FLASH memory, and any other mechanism configured to store and/or retain information. For example, the memory 335 may be used to store compressed or uncompressed video for transmission to base station 110 and display 180. The memory 335 may also store other information, such as for example code/instructions to provide the operations disclosed herein.

[0032] The video compressor 340 may, in some exemplary embodiments, compress and/or decompress video, such as for example high-definition video. For example, user equipment

114 may store a video, such as a movie, a video stream, etc., at memory 335, and the video may, in some exemplary embodiments, be compressed by video compressor 340 before storage at memory 335. Similarly, when the video is read from memory 335, the video compressor 340 may also decompress the video before transmission, although the video may also be transmitted by user equipment 114 to base station 110 in a compressed format in which case the base station 110 would decompress the video. By compressing the video content, storage requirements may be reduced at memory 335.

[0033] Although video compression is described, in some exemplary embodiments, video compressor 340 may not be used. For example, when there is sufficient storage at memory 335, video compression 340 may not be used. Moreover, when camera 380 captures a video stream and immediately transmits the video stream in a so-called “real-time” format to base station 110, the video compressor 340 may be by-passed to enable transmitting uncompressed video to base station 110 for presentation at display 180.

[0034] In some exemplary embodiments, the public subscriber identity module 345 may be used to authenticate user equipment 114 to a network, such as an operator of a public land mobile network (e.g., authenticating with a authentication server in the operator’s network). For example, the public subscriber identity module 345 may comprise a card, a module, and/or a circuit securely storing a secret key and the like to authenticate a user to the network.

[0035] In some exemplary embodiments, the private subscriber identity module 350 may be implemented as a real, physical subscriber identity module (SIM) card or a virtual subscriber identity module. A virtual subscriber identity module refers to information, such as a file, stored in memory, such as the memory 335. The virtual subscriber identity module may provide information similar to what a physical subscriber identity module card provides, but the virtual subscriber

identity module is configured to only access the so-called “private” base station 110 in the dongle coupled to display 180.

[0036] The private subscriber identity card 350 may include a private, or secret, key used to authenticate user equipment 114 to base station 110. In this example implementation, the private subscriber identity module 350 may be used to authenticate, rather than use the public subscriber identity module 345 which is used to authenticate the user to an operator of a public land mobile network (e.g., authenticating with a authentication server in the operator’s network). For example, the user of user equipment 114 may select base station 110 as a private network to which user equipment 114 authenticates using the secret key at private subscriber identity module 350. Although the previous example describes using a private subscriber identity module 350 and/or a virtual subscriber identity module to authenticate to base station 110 coupled to display 180, other authentication mechanisms may be used as well. For example, user equipment 114 may use the public subscriber identity module 345, use other authentication procedures including a simple password, and/or by pass authentication altogether.

[0037] FIG. 4 depicts an example of base station 110 consistent with some exemplary embodiments. The base station 110 may include one or more of the following: an antenna 420, a radio interface 440, a processor 430, a memory 435, an authenticator 460, a video compressor 475, and a display interface 445.

[0038] In some exemplary embodiments, the antenna 420 may include one or more antennas. The antenna 420 may couple signals to, and/or from, radio interface 440. The radio interface 440 may include one or more components, such as for example filters, converters (e.g., digital-to-analog converters and the like), processors, symbol demappers, an Inverse Fast Fourier Transform (IFFT) module, a Fast Fourier Transform module, a precoder, a demodulator, a modulator, and the like.

[0039] As noted, the base station 110 may, in some exemplary embodiments, be implemented as a wireless base station, such as for example a Node B base station, an evolved Node B base station, a femtocell base station, and/or any other type of base station. Moreover, the base station 110 may also be compatible with one or more of the following: IEEE 802.16, LTE, LTE-Advanced, and the like. As noted above, the base station 100 may also be implemented as a dongle, a base station on a chip, and/or a private base station. Furthermore, base station 110 may, in some exemplary embodiments, be coupled to a public land mobile network, which may include access networks, a core network, an Internet, and/or an Internet Protocol Multimedia Subsystem (IMS).

[0040] In some exemplary embodiments, the base station 110 may further include at least one processor 430 for controlling the base station 110 and for accessing and executing program code stored in at least one memory 435 (which configures the base station and/or the processor to perform the operations described herein). Moreover, the processor 430 may also control base station 110, such that the video carried by the wireless links 122 is demodulated into a video stream and then output via display interface 445, which is coupled to an input at display 180.

[0041] The processor 430 may, in some exemplary embodiments, include one or more of the following: one or more microprocessors; one or more processors with, or without, accompanying digital signal processor(s); one or more special-purpose computer chips; one or more field-programmable gate arrays (FPGAs); one or more controllers; one or more application-specific integrated circuits (ASICs), and/or one or more computers.

[0042] In some exemplary embodiments, the memory 435 may comprise one or more of the following: read-only memory, random access memory, FLASH memory, and any other mechanism configured to store and/or retain information (e.g., code, instructions, video, etc.) to provide the operations disclosed herein. The memory 435 may also buffer video streamed to display interface 445 and display 180.

[0043] In some exemplary embodiments, the base station 110 may also include an authenticator 460 to authenticate the user equipment 114 accessing the base station 110 coupled to display 180. For example, the authenticator 460 may be able to authenticate (or initiate authentication) of the user equipment 114. Although the authenticator 460 is depicted within base station 110, in some exemplary embodiments, the authenticator 460 is located in other devices. For example, the base station 110 may authenticate using the authentication mechanisms provided in a public land mobile network.

[0044] The base station 110 may, in some exemplary embodiments, also include a video de-compressor 475. For example, when the video is transmitted in a compressed format by user equipment 114, the video de-compressor 475 may decompress the video, such as high-definition video.

[0045] In some exemplary embodiments, the display interface 445 may directly couple the base station 110 to the display 180. Moreover, the display interface 445 may output a video (e.g., a high-definition video stream) formatted in accordance with an input port at display 180. For example, display interface 445 may output a high-definition video stream in one or more formats (e.g., HDMI, DVI, component video, S-Video, and the like) to an input port at display 180. Furthermore, the display interface 445 may provide the video stream output in a wired and/or wireless (e.g., Bluetooth) form to an input port at display 180.

[0046] FIG. 5 depicts another example of a wireless communication system 500. The system 500 is similar in some respects to wireless communication system 100 described above. However, the wireless communication system 500 depicts user equipment 514 and dongle form factor base station 550. The user equipment 514 is similar to user equipment 114 but further includes a user interface 510 and a video compressor 340. The dongle form factor base station 550 is similar to base station 110 but further includes a video decompressor 475.

[0047] When a user decides to connect to dongle form factor base station 550 and display 180, a user at user equipment 514 may indicate that decision by, for example, selecting an icon 512 at user interface 510. The selection of icon 512 is received by a processor at user equipment 514, which may initiate a connection to the dongle form factor base station 550. Once the user equipment 514 is authenticated, user equipment 514 may connect to the base station 550 and transmit compressed video (which is compressed by video compressor 340). The compressed video is received at dongle form factor base station 550. The video de-compressor 475 decompresses the video. The decompressed video is then output by dongle form factor base station 550 to local link 124 and display 180, where the video is presented. In the example depicted at FIG. 5, the video 590 presented at display 180 comprises the contents of the user interface 510 of user equipment 514, but the video 590 presented at display 180 may include any other content, such as a high-definition movie, a clip, and the like.

[0048] FIG. 6 depicts an example of a process 600 which may be implemented, in some exemplary embodiments, at user equipment, such as user equipment 114 and/or 514. The description of process 600 also refers to FIGs. 1, 3, and 5.

[0049] In some exemplary embodiments, the user equipment (e.g., a processor in the user equipment) may receive, at 605, an indication that a user seeks to connect to the base station which is coupled to a display. For example, a user of user equipment 514 may select an icon 512 to initiate a connection to base station 550 in order to present high-definition video at display 180. This indication (e.g., a selection of the icon 512) may be received at processor 330.

[0050] The user equipment may, in some exemplary embodiments, authenticate, at 610, to the base station. The user equipment 514 may, for example, authenticate to the base station 550 using, for example, a secret key in at least one of the private subscriber identity module 350 and the public subscriber identity module 345. The user equipment 514 may also use a simple password

and/or a virtual subscriber identity module to authenticate to base station 550. In some exemplary embodiments, the user equipment 514 and base station 550 exchange messages to authenticate one another by passing the authentication mechanisms provided by a network operator of a public land mobile network coupled to base station 550, although the network operator's authentication mechanisms may be used as well.

[0051] At 615, the user equipment 514 may, in some exemplary embodiments, generate a video for transmission from the user equipment to the base station coupled to the display. For example, the user equipment 514 may have a video to be displayed, but rather than display the video at the user equipment 514 (e.g., using the relatively small screen of a cell phone), the video is displayed on a larger, or more capable, display 180. In this example, the video may include high-definition video content with resolutions ranging from 480p to 1080p resolution. In some exemplary embodiments, the generated video may be stored in memory 335 after compression by video compressor 340. The compressed video may, in some exemplary embodiments, be read from memory 335 and then transmitted to base station 550, where the video de-compressor 475 decompresses the video. However, in some exemplary embodiments, the video compressor 340 may decompress the video stored in memory 335 before transmission to base station 550. Furthermore, when real-time video is used, the video may not be compressed but instead transmitted directly to base station 550. In any case, the user equipment 514 may generate the video by forming a video stream.

[0052] In some exemplary embodiments, the user equipment may transmit, at 620, the video through one or more wireless links, such as cellular radio bearers to the base station to enable the base station to provide the video to a display for presentation. As noted above, the video at user equipment 514 may be transmitted to base station 550 via one or more links 122, such as standard cellular radio bearers established between the user equipment 514 and the base station 550. The

base station 550 may thus be used to provide the user equipment's video to display 180 for presentation.

[0053] FIG. 7 depicts an example of a process 700 which may be implemented, in some exemplary embodiments, at a base station, such as base station 110 and/or 550. The description of process 700 also refers to FIGs. 1, 4, and 5.

[0054] In some exemplary embodiments, the base station may authenticate, at 710, the user equipment. The base station 550 may authenticate user equipment 514 in a manner compatible with the authentication process used at 610.

[0055] In some exemplary embodiments, the base station may receive, at 715, a video or video stream from links 122 (e.g., one or more radio bearers) and the user equipment. For example, the base station 550 may receive the video transmitted at 620 through one or more standard radio channels (e.g., radio bearers) established between the base station 550 and user equipment 514. The base station 550 may process the signal(s) carried by the radio channels, or bearers, and provide a video stream to display interface 445. The display interface 445 may process the video stream into one or more formats to enable presentation at display 180. For example, the display interface 445 may process the video stream into HDMI, DVI, component video, S-Video, and the like.

[0056] In some exemplary embodiments, the base station may provide, at 720, an output to the display to enable presentation of the video at the display. For example, the output of display interface 445 may be provided to an input of display 180. Moreover, the output of display interface 445 may be formatted in a manner compatible with the input at display 180. For example, the output of display interface 445 may provide the video stream in one or more of the following formats: HDMI, DVI, component video, S-Video, Bluetooth, and the like. Thus, the base station may be used as a way to route video from the user equipment (e.g., a cellular phone, a tablet, a

smart phone, etc.) to a separate display 180, which may be better suited for video presentation than a user interface (and/or display) at the user equipment.

[0057] The features, structures, or characteristics described throughout this specification may be combined in any suitable manner in one or more embodiments. For example, the usage of the phrases “exemplary embodiments,” “example embodiments,” “some embodiments,” or other similar language, throughout this specification refers to the fact that a particular feature, structure, or characteristic described in connection with an embodiment may be included in at least one embodiment described herein. Thus, appearances of the phrases “exemplary embodiments,” “example embodiments,” “in some embodiments,” “in other embodiments,” or other similar language, throughout this specification do not necessarily all refer to the same group of embodiments, and the described features, structures, or characteristics can be combined in any suitable manner in one or more embodiments.

[0058] As discussed above, various embodiments of the invention may be configured in numerous physical elements, or can be configured at a single network element, or configured in a number of elements having various disclosed functions distributed throughout.

[0059] The subject matter described herein may be embodied in systems, apparatus, methods, and/or articles depending on the desired configuration. For example, the user equipment, base station, and/or the processes described herein can be implemented using one or more of the following: a processor executing program code, an application-specific integrated circuit (ASIC), a digital signal processor (DSP), an embedded processor, a field programmable gate array (FPGA), and/or combinations thereof. These various implementations may include implementation in one or more computer programs that are executable and/or interpretable on a programmable system including at least one programmable processor, which may be special or general purpose, coupled to receive data and instructions from, and to transmit data and instructions to, a storage system, at least

one input device, and at least one output device. These computer programs (also known as programs, software, software applications, applications, components, program code, or code) include machine instructions for a programmable processor, and may be implemented in a high-level procedural and/or object-oriented programming language, and/or in assembly/machine language. As used herein, the term “machine-readable medium” refers to any computer program product, computer-readable medium, apparatus and/or device (e.g., magnetic discs, optical disks, memory, Programmable Logic Devices (PLDs)) used to provide machine instructions and/or data to a programmable processor, including a machine-readable medium that receives machine instructions. Similarly, systems are also described herein that may include a processor and a memory coupled to the processor. The memory may include one or more programs that cause the processor to perform one or more of the operations described herein.

[0060] Although a few variations have been described in detail above, other modifications or additions are possible. In particular, further features and/or variations may be provided in addition to those set forth herein. For example, the implementations described above may be directed to various combinations and subcombinations of the disclosed features and/or combinations and subcombinations of several further features disclosed above. In addition, the logic flow depicted in the accompanying figures and/or described herein does not require the particular order shown, or sequential order, to achieve desirable results. Moreover, the term “exemplary” as used herein refers to an “example.” Other embodiments may be within the scope of the following claims.

WHAT IS CLAIMED:

1. A method comprising:
receiving an indication to establish a connection between a user equipment and a base station;
generating a video for transmission from the user equipment to the base station; and
transmitting, by the user equipment, the generated video to the connection and the base station to enable the base station to provide the generated video to a display coupled to the base station.
2. The method of claim 1, wherein the receiving further comprises:
receiving, from a user interface at the user equipment, the indication, wherein the indication represents a selection of the display for presentation of the video, and wherein the video comprises a high-definition video.
3. A method as in any of the preceding claims, wherein the generating further comprises:
compressing the video before storing or transmitting the video.
4. A method as in any of the preceding claims, wherein the generating further comprises:
decompressing, at the user equipment, the video, when the video is compressed and stored in a memory of the user equipment.

5. A method as in any of the preceding claims, wherein the transmitting further comprises:

transmitting, by the user equipment, the generated video to the connection comprising one or more radio bearers established between the user equipment and the base station, wherein the base station comprises a dongle coupled directly to an input of the display, and wherein the user equipment comprises at least one of a cell phone, a smart phone, and a tablet.

6. A method as in any of the preceding claims, wherein the transmitting further comprises:

transmitting to the base station the generated video comprising compressed video to enable the base station to decompress and provide the video to an input of the display.

7. A method as in any of the preceding claims further comprising:
authenticating the user equipment based on at least one of a virtual subscriber identity module and a public subscriber identity module.

8. An apparatus comprising
at least one processor; and
at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus at least to:

receive an indication to establish a connection between a user equipment and a base station;

generate a video for transmission from the user equipment to the base station; and

transmit, by the user equipment, the generated video to the connection and the base station to enable the base station to provide the generated video to a display coupled to the base station.

9. The apparatus of claim 8, wherein the receiving further comprises:
receiving, from a user interface at the user equipment, the indication, wherein the indication represents a selection of the display for presentation of the video, and wherein the video comprises a high-definition video.

10. An apparatus as in claims 8 or 9, wherein the generating further comprises:
compressing the video before storing or transmitting the video.

11. An apparatus as in claims 8-10, wherein the generating further comprises:
decompressing, at the user equipment, the video, when the video is compressed and stored in a memory of the user equipment.

12. An apparatus as in claims 8-11, wherein the transmitting further comprises:
transmitting, by the user equipment, the generated video to the connection comprising one or more radio bearers established between the user equipment and the base station, wherein the base station comprises a dongle coupled directly to an input of the display, and wherein the user equipment comprises at least one of a cell phone, a smart phone, and a tablet.

13. An apparatus as in claims 8-12, wherein the transmitting further comprises:
transmitting to the base station the generated video comprising compressed video to enable the base station to decompress and provide the video to an input of the display.

14. An apparatus as in claims 8-13 further comprising:

authenticating the user equipment based on at least one of a virtual subscriber identity module and a public subscriber identity module.

15. A computer program product comprising machine-readable medium storing instructions that, when executed by at least one processor, cause the at least one processor to perform operations comprising:

receiving an indication to establish a connection between a user equipment and a base station;

generating a video for transmission from the user equipment to the base station; and

transmitting, by the user equipment, the generated video to the connection and the base station to enable the base station to provide the generated video to a display coupled to the base station.

16. The computer program product of claim 15, wherein the receiving further comprises:

receiving, from a user interface at the user equipment, the indication, wherein the indication represents a selection of the display for presentation of the video, and wherein the video comprises a high-definition video.

17. A computer program product as in claims 15-16, wherein the generating further comprises:

compressing the video before storing or transmitting the video.

18. A computer program product as in claims 15-17, wherein the generating further comprises:

decompressing, at the user equipment, the video, when the video is compressed and stored in a memory of the user equipment.

19. A computer program product as in claims 15-18, wherein the transmitting further comprises:

transmitting, by the user equipment, the generated video to the connection comprising one or more radio bearers established between the user equipment and the base station, wherein the base station comprises a dongle coupled directly to an input of the display, and wherein the user equipment comprises at least one of a cell phone, a smart phone, and a tablet.

20. A computer program product as in claims 15-19, wherein the transmitting further comprises:

transmitting to the base station the generated video comprising compressed video to enable the base station to decompress and provide the video to an input of the display.

21. A computer program product as in claims 15-20 further comprising:
authenticating the user equipment based on at least one of a virtual subscriber identity module and a public subscriber identity module.

22. An apparatus comprising:

means for receiving an indication to establish a connection between a user equipment and a base station;

means for generating a video for transmission from the user equipment to the base station;
and

means for transmitting, by the user equipment, the generated video to the connection and the base station to enable the base station to provide the generated video to a display coupled to the base station.

23. A method comprising:

receiving, at a base station, a video transmitted by a user equipment; and

providing, at the base station, an output to a display coupled to the base station to enable the video to be presented on the display.

24. The method of claim 23 further comprising:

decompressing, at the base station, the video, when the video is transmitted by the user equipment as compressed video, wherein the video comprises high-definition video.

25. A method as in claims 23 or 24, wherein the output comprises a video stream formatted in accordance with at least one of a high-definition multimedia interface (HDMI) and a component video.

26. A method as in claims 23-25, wherein the receiving further comprises:

receiving the video from one or more radio bearers, wherein the base station comprises a dongle coupled directly to an input of the display, and wherein the user equipment comprises at least one of a cell phone, a smart phone, and a tablet.

27. A method as in claims 23-26 further comprising:

authenticating based on at least one of a virtual subscriber identity module and a public subscriber identity module.

28. An apparatus comprising

at least one processor; and

at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the apparatus at least to:

receive, at a base station, a video transmitted by a user equipment; and

provide, at the base station, an output to a display coupled to the base station to enable the video to be presented on the display.

29. The apparatus of claim 28 further comprising:

decompressing, at the base station, the video, when the video is transmitted by the user equipment as compressed video, wherein the video comprises high-definition video.

30. An apparatus as in claims 28 or 29, wherein the output comprises a video stream formatted in accordance with at least one of a high-definition multimedia interface (HDMI) and a component video.

31. An apparatus as in claims 28-30, wherein the receiving further comprises:
receiving the video from one or more radio bearers, wherein the base station comprises a dongle coupled directly to an input of the display, and wherein the user equipment comprises at least one of a cell phone, a smart phone, and a tablet.

32. An apparatus as in claims 28-31 further comprising:
authenticating based on at least one of a virtual subscriber identity module and a public subscriber identity module.

33. A computer program product comprising machine-readable medium storing instructions that, when executed by at least one processor, cause the at least one processor to perform operations comprising:

receiving, at a base station, a video transmitted by a user equipment; and
providing, at the base station, an output to a display coupled to the base station to enable the video to be presented on the display.

34. The computer program product of claim 33 further comprising:
decompressing, at the base station, the video, when the video is transmitted by the user equipment as compressed video, wherein the video comprises high-definition video.

35. A computer program product as in claims 33 or 34, wherein the output comprises a video stream formatted in accordance with at least one of a high-definition multimedia interface (HDMI) and a component video.

36. A computer program product as in claims 33-35, wherein the receiving further comprises:

receiving the video from one or more radio bearers, wherein the base station comprises a dongle coupled directly to an input of the display, and wherein the user equipment comprises at least one of a cell phone, a smart phone, and a tablet.

37. A computer program product as in claims 33-36 further comprising:
authenticating based on at least one of a virtual subscriber identity module and a public subscriber identity module.

38. An apparatus comprising:

mean for receiving, at a base station, a video transmitted by a user equipment; and

mean for providing, at the base station, an output to a display coupled to the base station to enable the video to be presented on the display.

100

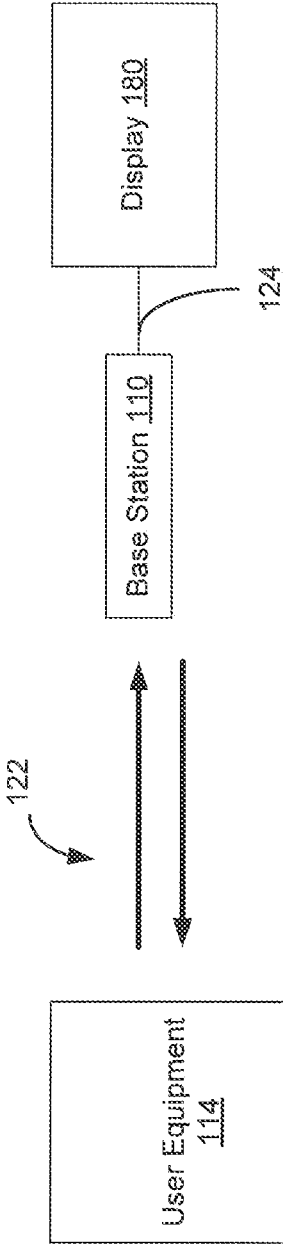


FIG. 1

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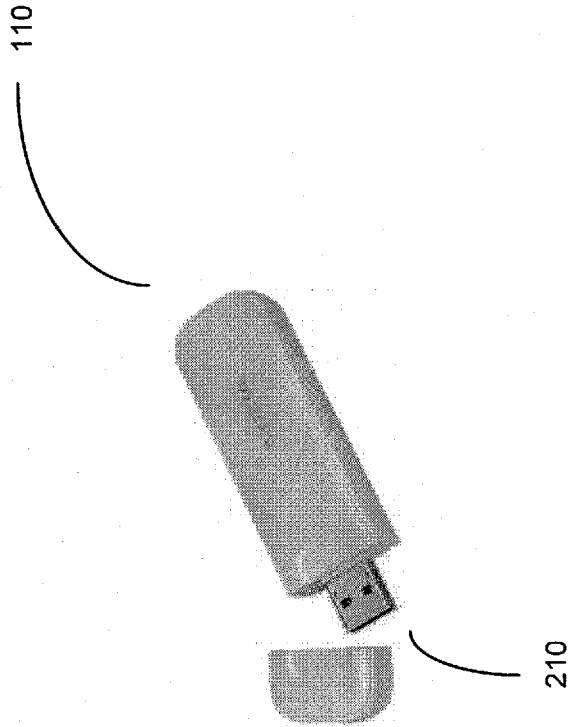


FIG. 2

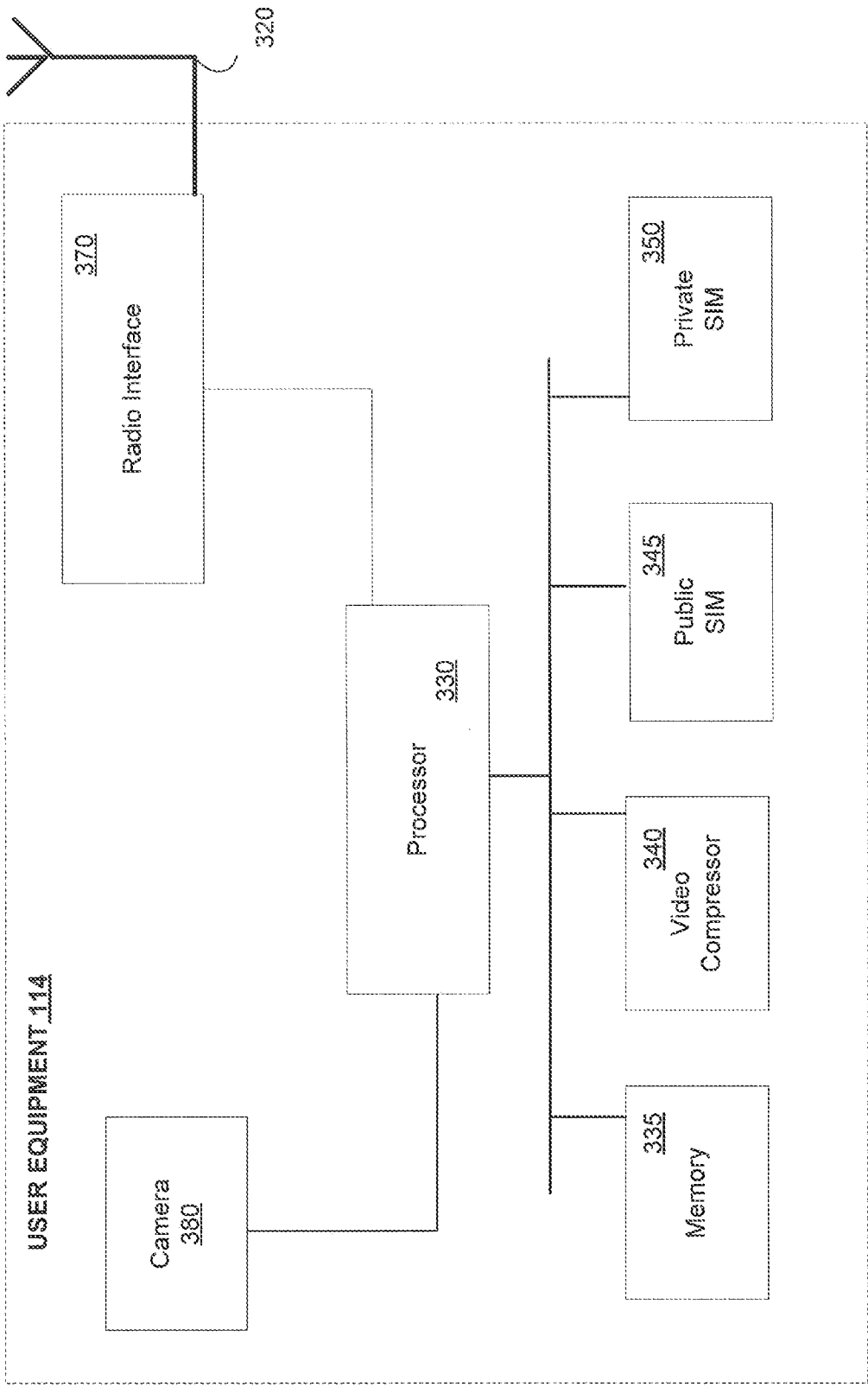


FIG. 3

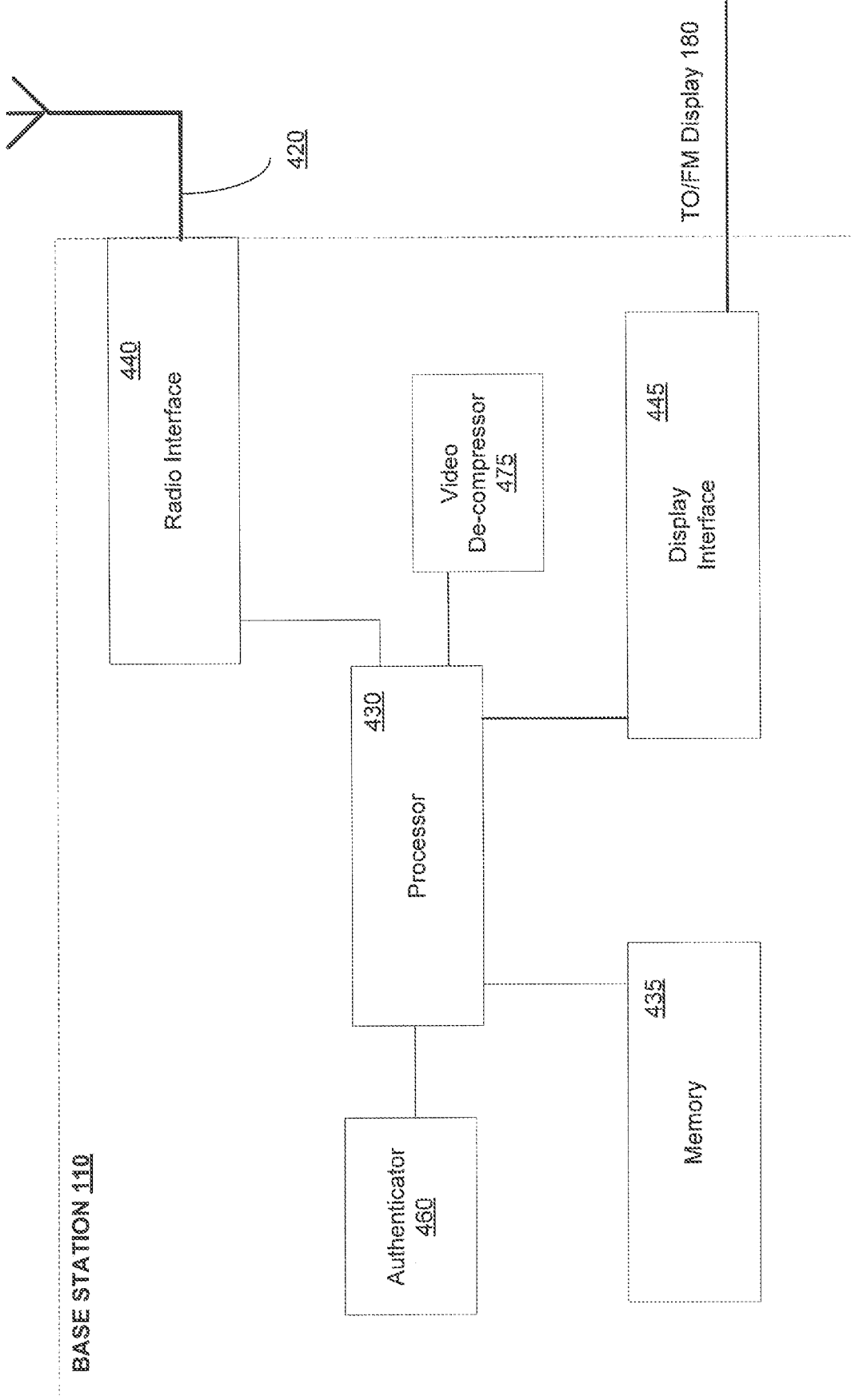


FIG. 4

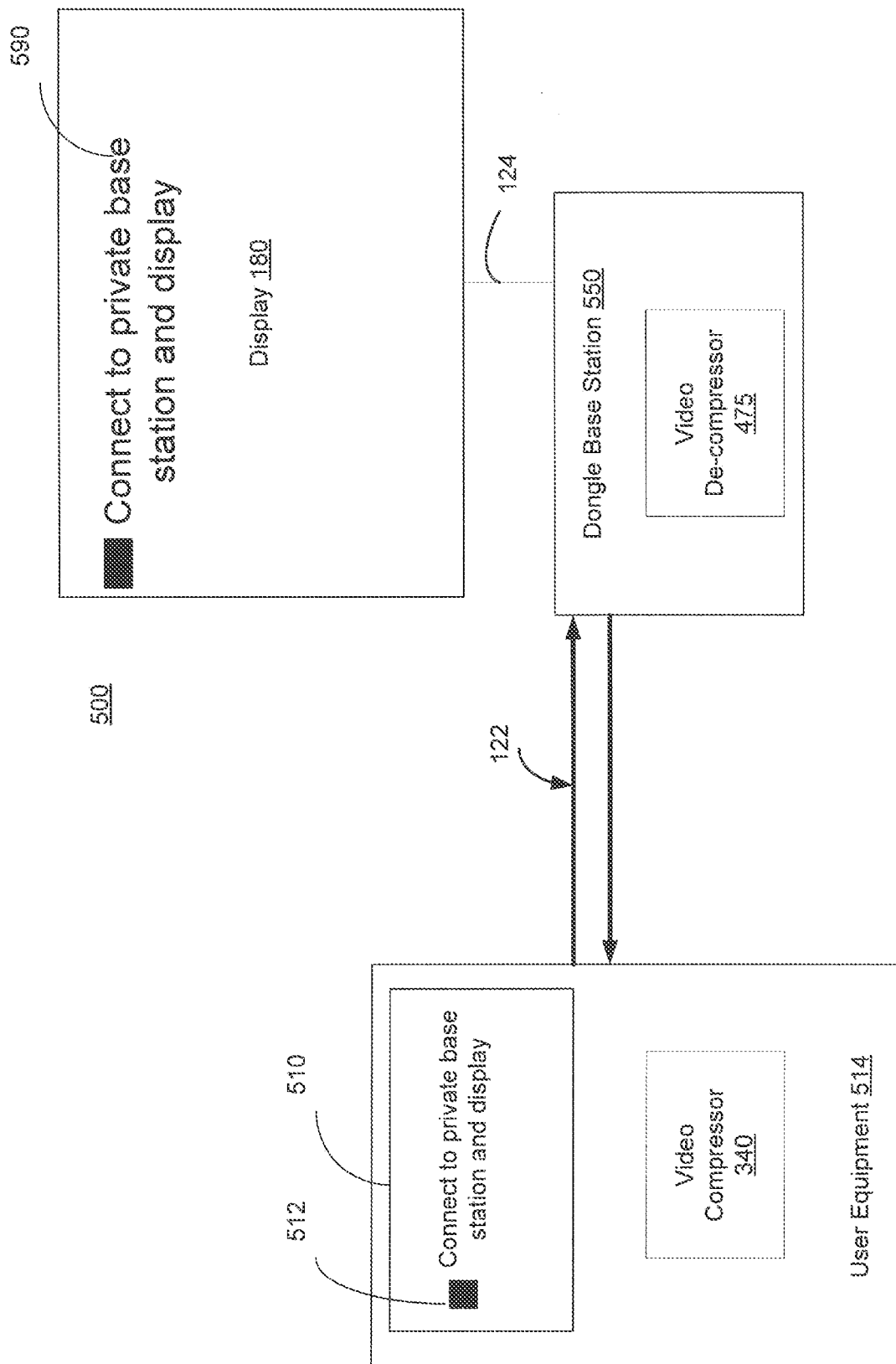


FIG. 5

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600

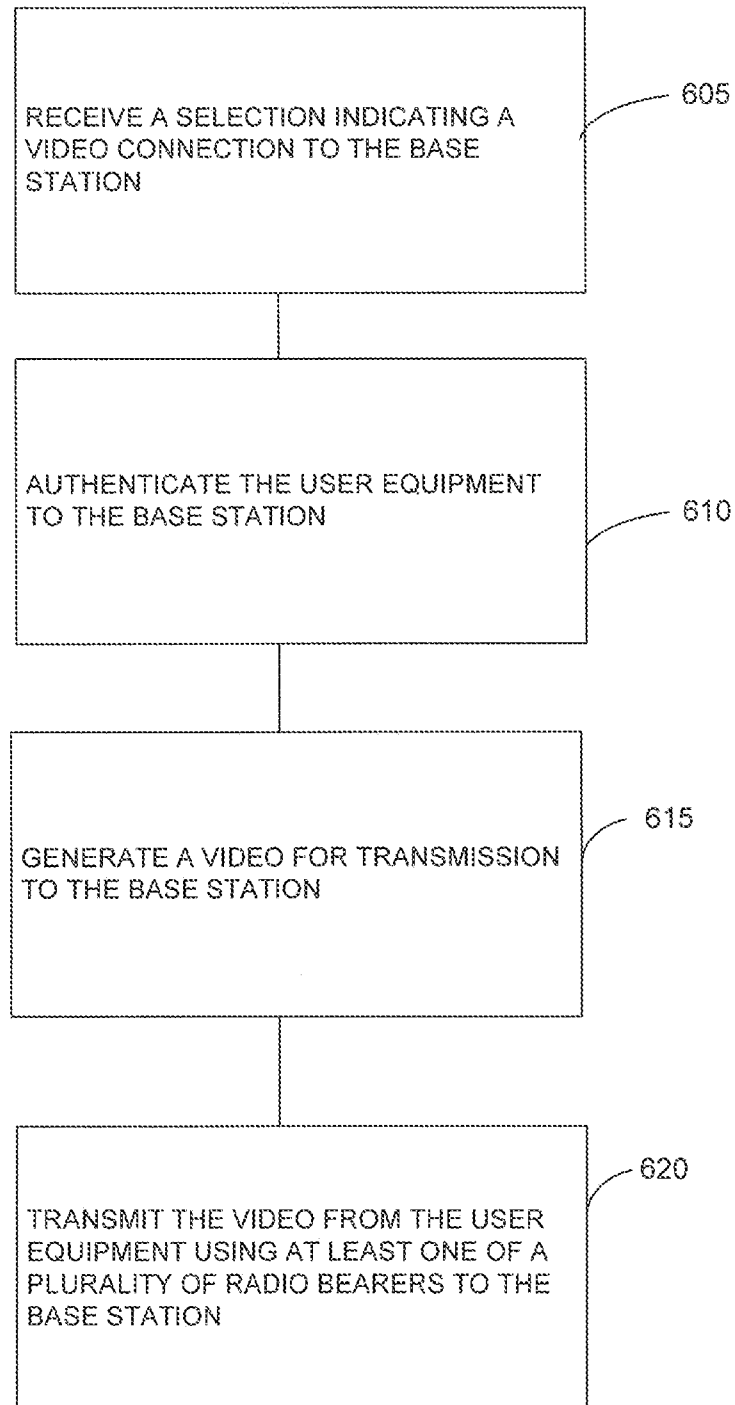


FIG. 6

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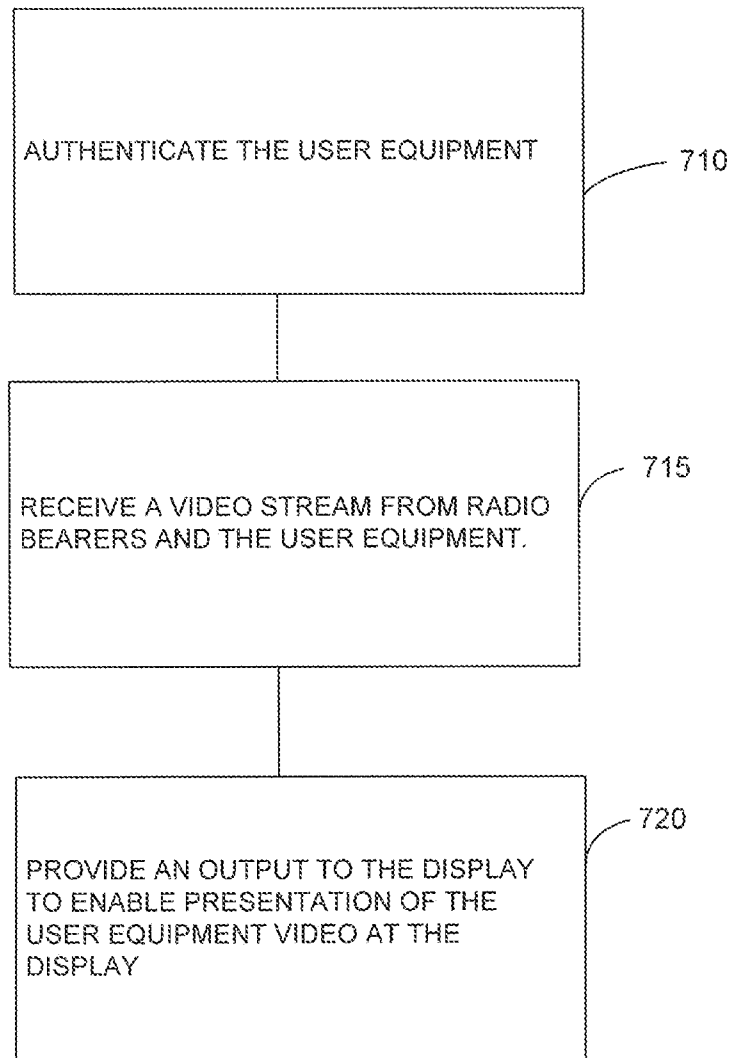
700

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/033602

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/14 H04N7/173
ADD.

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)
H04W H04N

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 practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 2 209 314 A1 (BROADCOM CORP [US]) 21 July 2010 (2010-07-21)	1-4, 6-11, 13-18, 20-25, 27-30, 32-35, 37,38
Y	paragraphs [0013], [0 23], [0 27] - [0028], [0 39], [0 48] figures 1a,1b,2-3	5,12,19, 26,31,36
Y	WO 2006/101801 A2 (RADIOSPIRE NETWORKS INC [US]; MAC MULLAN SAMUEL J [US]; FASTERT STEVEN) 28 September 2006 (2006-09-28) paragraph [0270] - paragraph [0286] figures 31-33	5,12,19, 26,31,36
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

10 June 2011

Date of mailing of the international search report

21/06/2011

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/033602

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 2 209 347 A2 (BROADCOM CORP [US]) 21 July 2010 (2010-07-21) paragraph [0083] -----	1-38
A	PICOCHIP: "The Case for Home Basestations", INTERNET CITATION, 30 September 2008 (2008-09-30), pages 1-22, XP002576477, Retrieved from the Internet: URL:http://www.picochip.com/assets/downloa ds/femtocell_wp.pdf [retrieved on 2010-10-06] sections 1 and 5 -----	1-38

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2011/033602

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			US 2010186027 A1	22-07-2010

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