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(54) **DISPLAY AND SERVICE ADJUSTMENTS TO ENABLE MULTI-TASKING DURING A VIDEO CALL**

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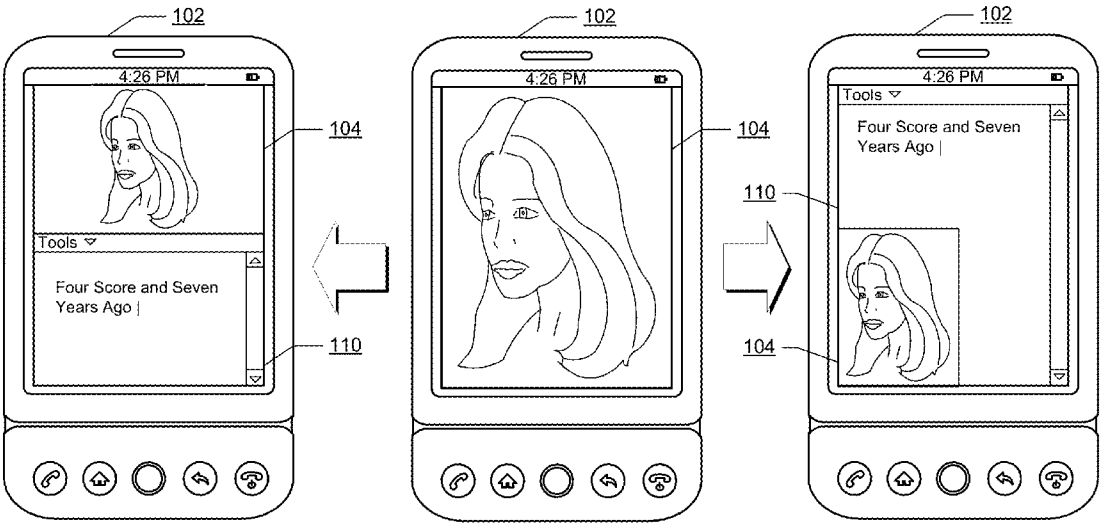
(57) **ABSTRACT**

A telecommunication device configured to enable a user to engage in a telecommunication device activity while participating in a video call is described herein. The telecommunication device concurrently displays user interfaces for the video call and the activity. The user interfaces may be displayed adjacent to each other, or one may be presented as an overlay in front of the other. The telecommunication device also informs a video call service that the video call user interface is not displayed in full-screen and, as a result, receives video call data at a reduced frame rate or reduced quality-of-service.



DISPLAY VIDEO CALL UI AND ACTIVITY UI, VIDEO CALL UI RESIZED 108

DISPLAY VIDEO CALL UI, RECEIVE INPUT INIT. ACTIVITY 106

DISPLAY VIDEO CALL UI AND ACTIVITY UI, VIDEO CALL UI AS OVERLAY 112

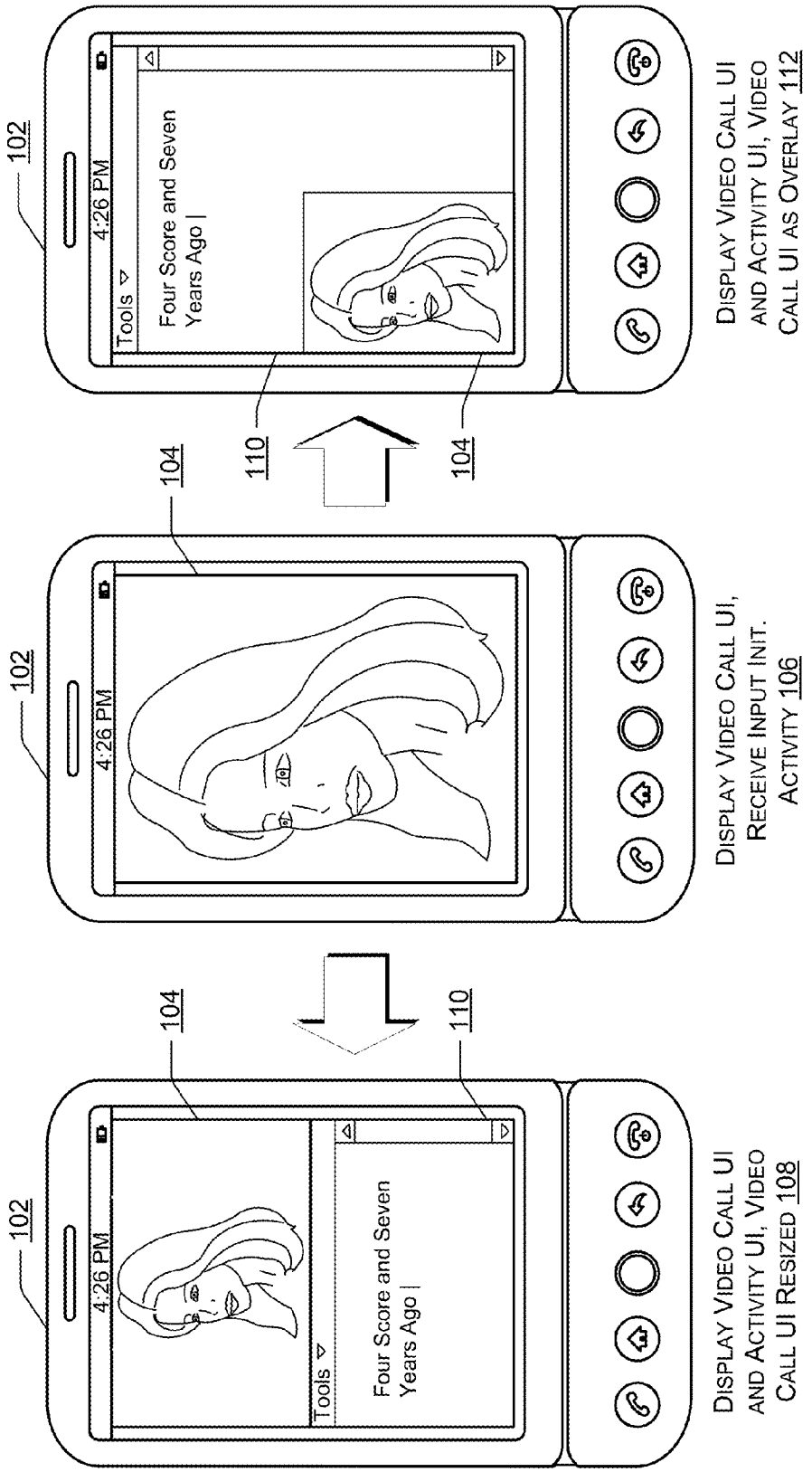

102
4:26 PM
Tools
Four Score and Seven
Years Ago
104
110
Display Video Call UI and Activity UI, Video Call UI Resized 108
Display Video Call UI, Receive Input Init. Activity 106
Display Video Call UI and Activity UI, Video Call UI as Overlay 112

FIG. 1

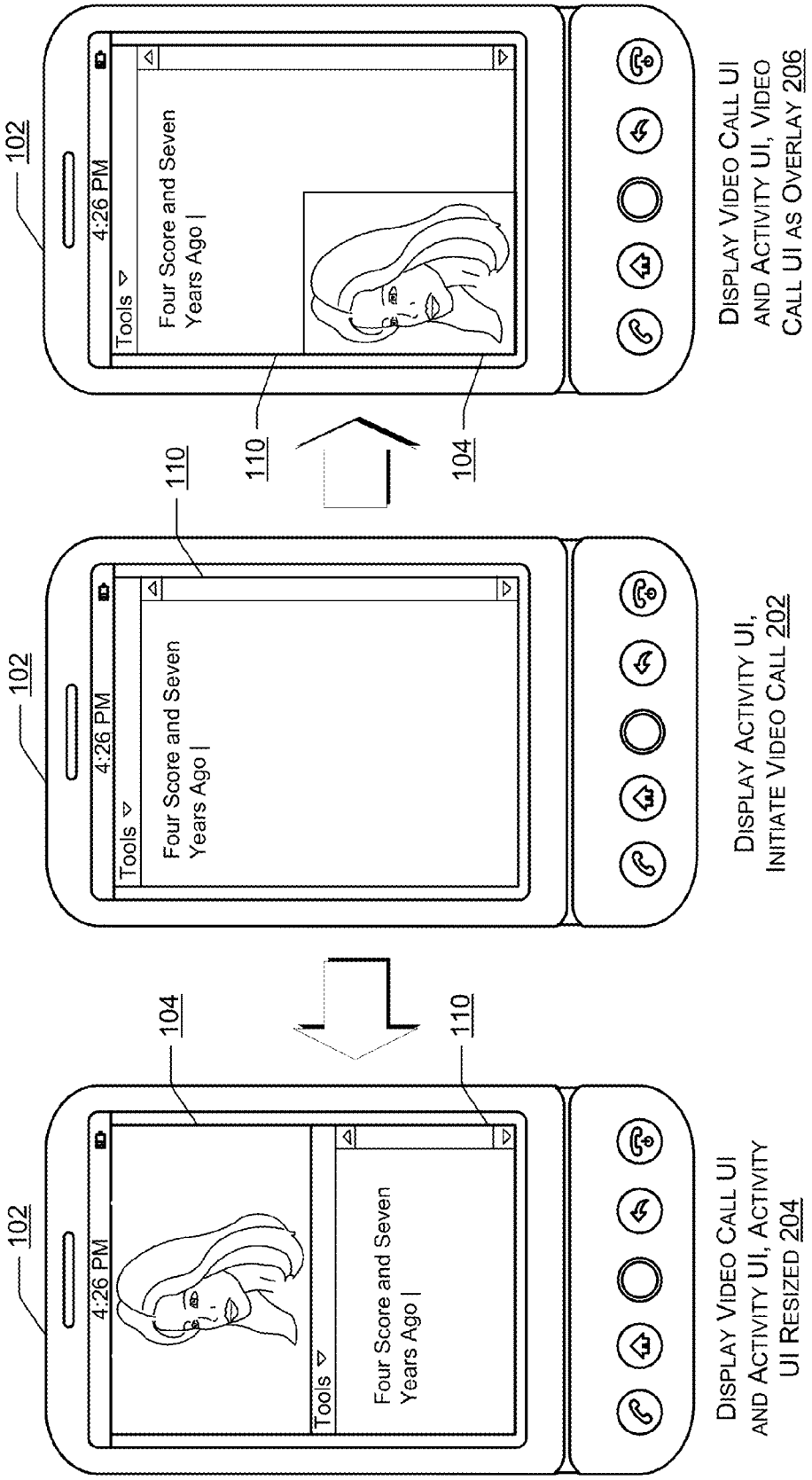

102
4:26 PM
Tools
Four Score and Seven Years Ago
104
110
Display Video Call UI and Activity UI, Activity UI Resized 204
Display Activity UI, Initiate Video Call 202
Display Video Call UI and Activity UI, Video Call UI as Overlay 206

FIG. 2

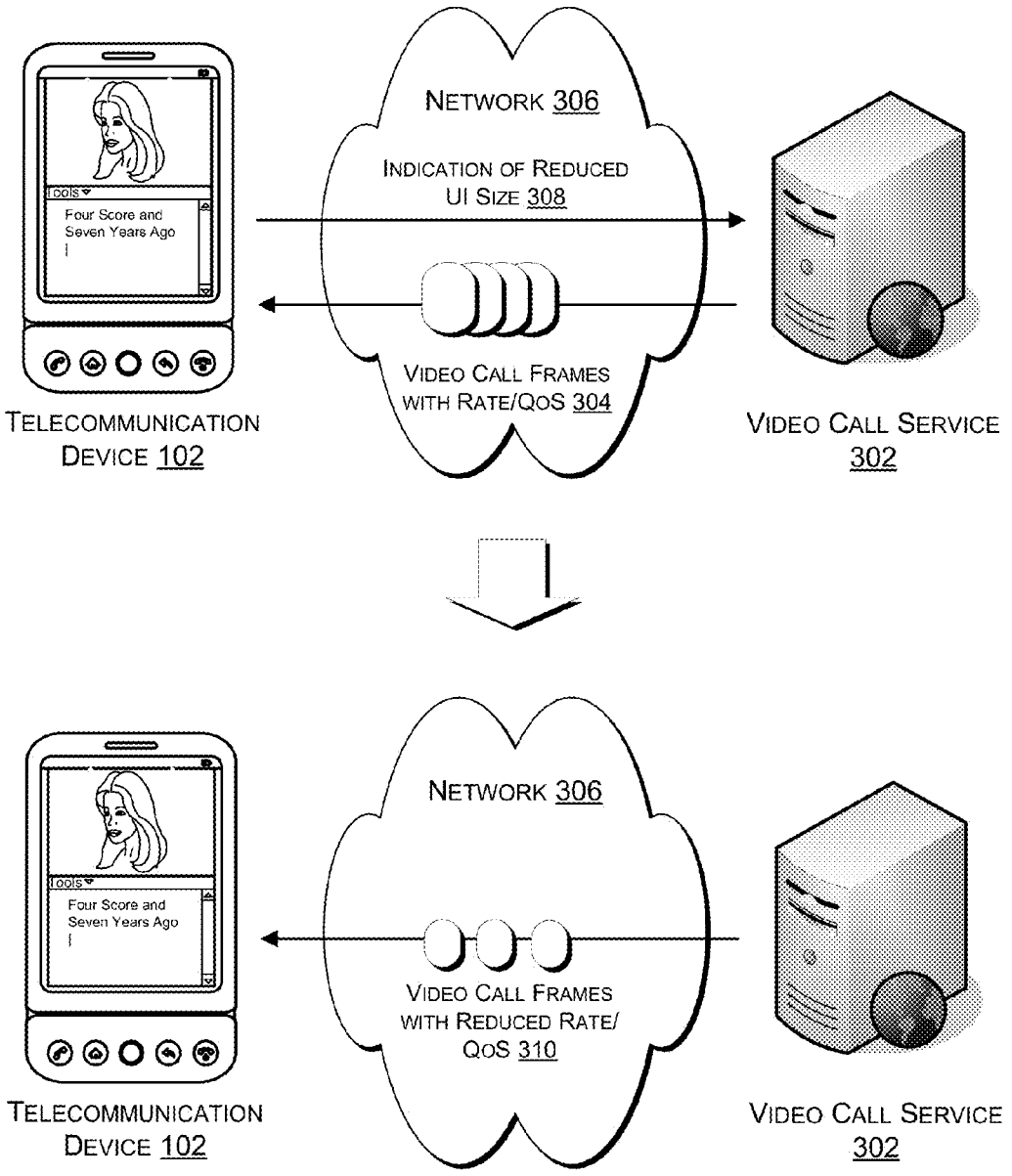

Tools
Four Score and
Seven Years Ago
Network 306
Indication of Reduced
UI Size 308
Video Call Frames
with Rate/QoS 304
Telecommunication
Device 102
Video Call Service
302
Tools
Four Score and
Seven Years Ago
Network 306
Video Call Frames
with Reduced Rate/
QoS 310
Telecommunication
Device 102
Video Call Service
302

FIG. 3

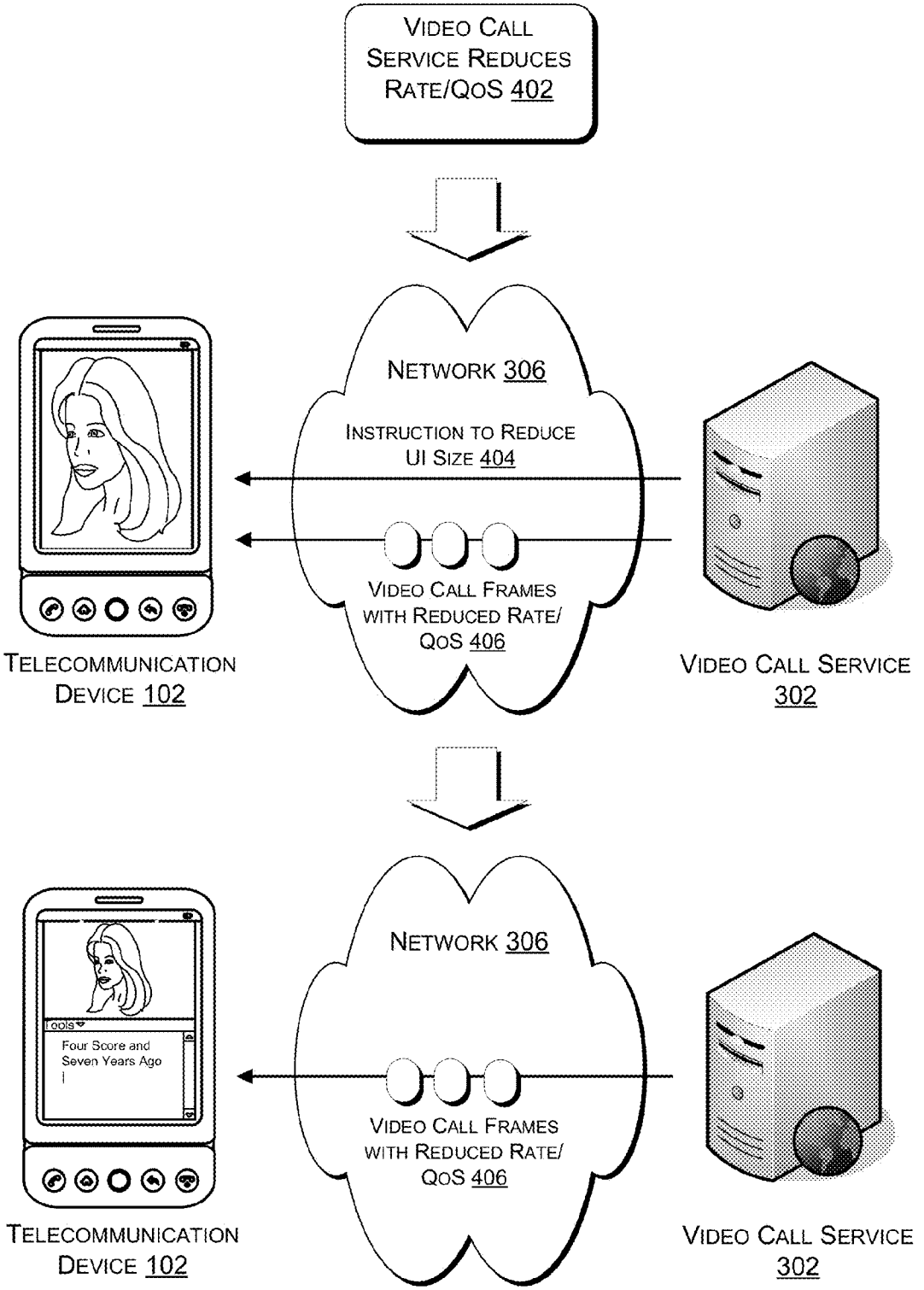

VIDEO CALL SERVICE REDUCES RATE/QOS 402
NETWORK 306
INSTRUCTION TO REDUCE UI SIZE 404
VIDEO CALL FRAMES WITH REDUCED RATE/ QOS 406
TELECOMMUNICATION DEVICE 102
VIDEO CALL SERVICE 302
NETWORK 306
Tools
Four Score and Seven Years Ago
VIDEO CALL FRAMES WITH REDUCED RATE/ QOS 406
TELECOMMUNICATION DEVICE 102
VIDEO CALL SERVICE 302

FIG. 4

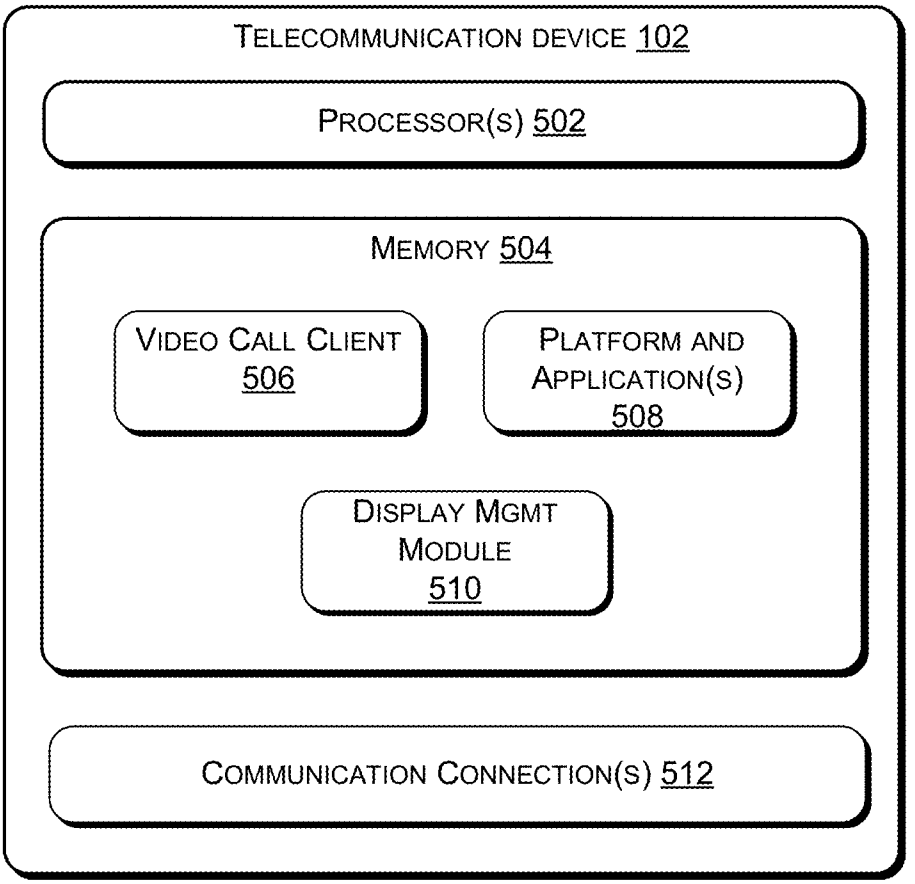

TELECOMMUNICATION DEVICE 102
PROCESSOR(S) 502
MEMORY 504
VIDEO CALL CLIENT 506
PLATFORM AND APPLICATION(S) 508
DISPLAY MGMT MODULE 510
COMMUNICATION CONNECTION(S) 512

FIG. 5

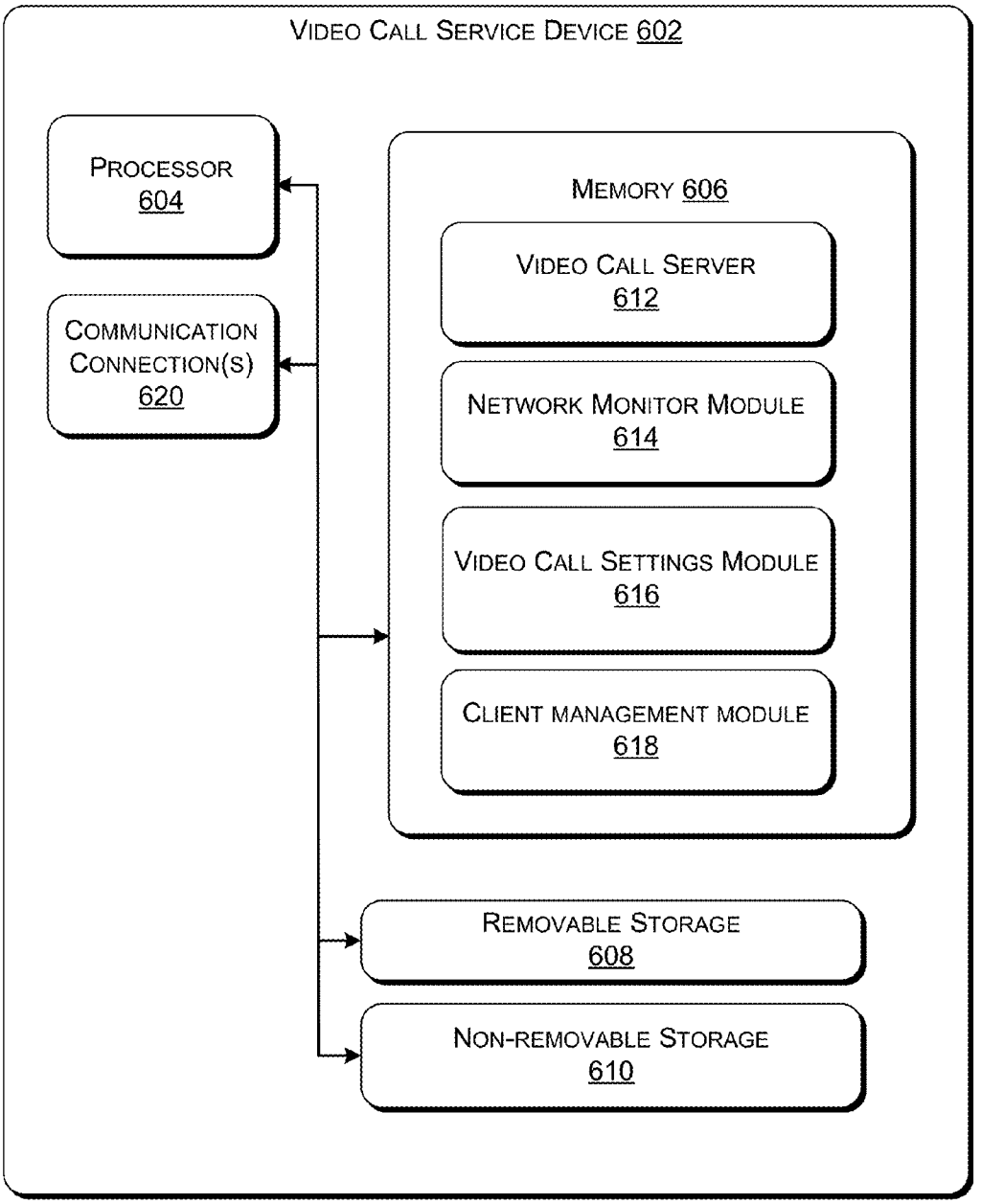

VIDEO CALL SERVICE DEVICE 602
PROCESSOR 604
COMMUNICATION CONNECTION(S) 620
MEMORY 606
VIDEO CALL SERVER 612
NETWORK MONITOR MODULE 614
VIDEO CALL SETTINGS MODULE 616
CLIENT MANAGEMENT MODULE 618
REMOVABLE STORAGE 608
NON-REMOVABLE STORAGE 610

FIG. 6

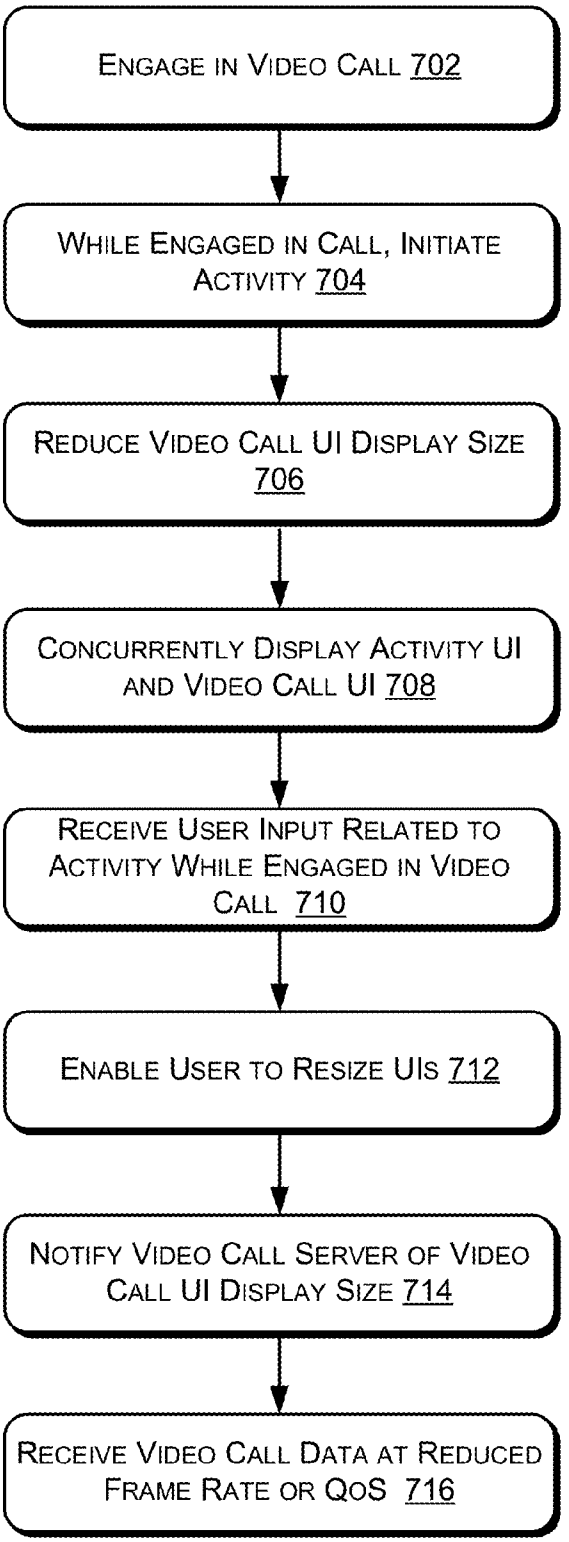

Engage in Video Call 702
While Engaged in Call, Initiate Activity 704
Reduce Video Call UI Display Size 706
Concurrently Display Activity UI and Video Call UI 708
Receive User Input Related to Activity While Engaged in Video Call 710
Enable User to Resize UIs 712
Notify Video Call Server of Video Call UI Display Size 714
Receive Video Call Data at Reduced Frame Rate or QoS 716

FIG. 7

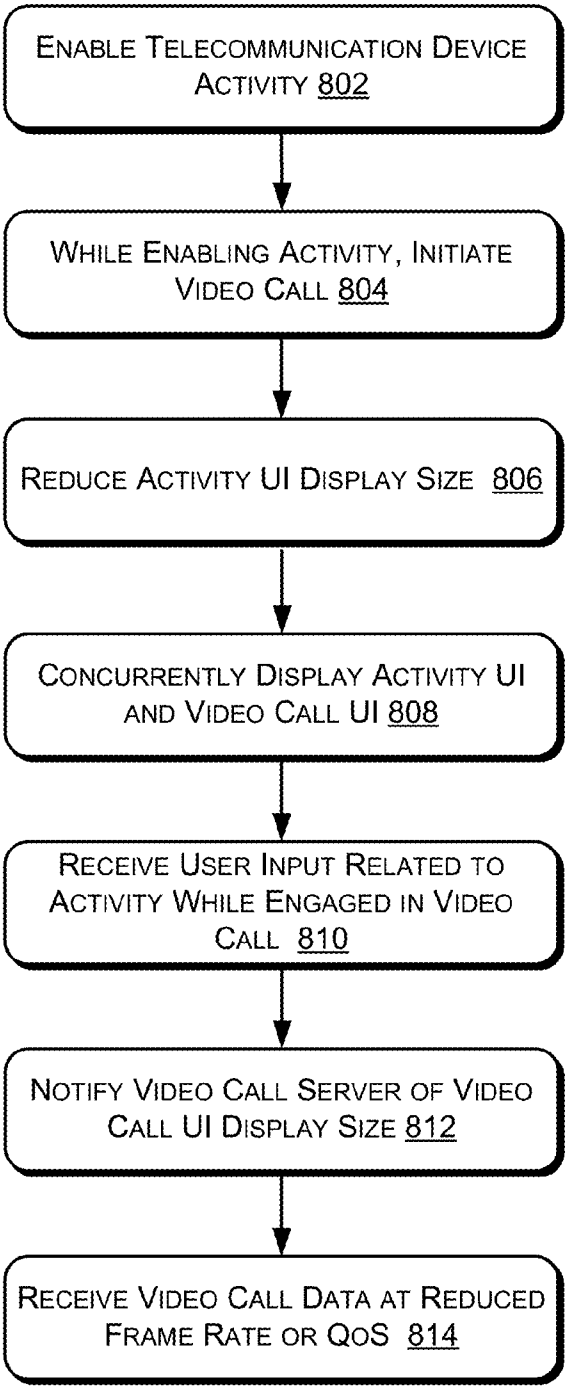

Enable Telecommunication Device Activity 802
While Enabling Activity, Initiate Video Call 804
Reduce Activity UI Display Size 806
Concurrently Display Activity UI and Video Call UI 808
Receive User Input Related to Activity While Engaged in Video Call 810
Notify Video Call Server of Video Call UI Display Size 812
Receive Video Call Data at Reduced Frame Rate or QoS 814

FIG. 8

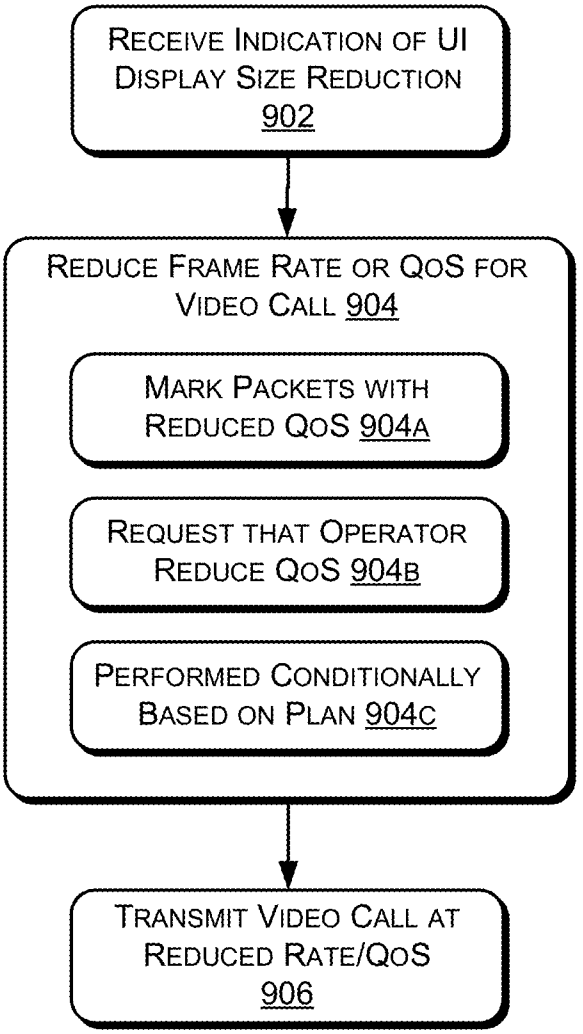

RECEIVE INDICATION OF UI DISPLAY SIZE REDUCTION 902
REDUCE FRAME RATE OR QOS FOR VIDEO CALL 904
MARK PACKETS WITH REDUCED QOS 904A
REQUEST THAT OPERATOR REDUCE QOS 904B
PERFORMED CONDITIONALLY BASED ON PLAN 904C
TRANSMIT VIDEO CALL AT REDUCED RATE/QOS 906

FIG. 9

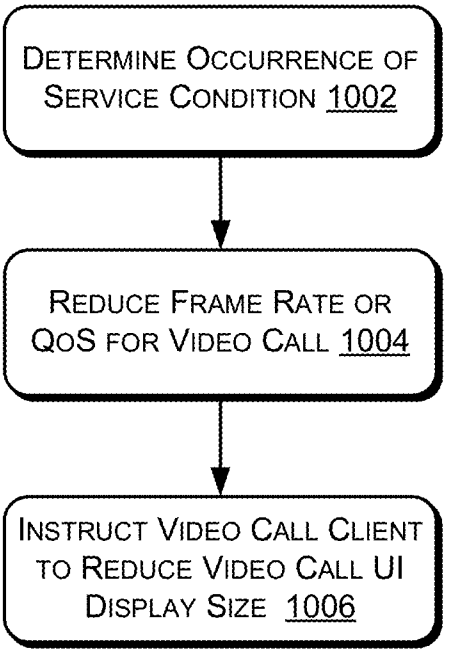

DETERMINE OCCURRENCE OF SERVICE CONDITION 1002
REDUCE FRAME RATE OR QOS FOR VIDEO CALL 1004
INSTRUCT VIDEO CALL CLIENT TO REDUCE VIDEO CALL UI DISPLAY SIZE 1006

FIG. 10

DISPLAY AND SERVICE ADJUSTMENTS TO ENABLE MULTI-TASKING DURING A VIDEO CALL

BACKGROUND

[0001] Telecommunication devices have evolved from mobile replacements for the telephone to all-in-one communication, media, and productivity solutions. In addition to voice calling, telecommunication devices now support video and song playback, calendaring, and a variety of features requiring communication of very large amounts of data over telecommunication and data networks. One such feature is video calling. The data associated with a video call is significantly larger than data associated with a voice call. The increasing popularity of video calling, then, results in a far greater demand being placed on network and telecommunication device resources. Network operators have recognized this increased demand by either increasing the cost of unlimited data plans or by eliminating such plans altogether. Consequently, a telecommunication device user that engages in frequent video calls may find himself or herself with very expensive service charges.

[0002] Typically, video calls are also delivered with high frame rates and high quality-of-service (QoS) to ensure positive user experiences. These high frame rates and high QoS assume that the video part of the video call will be displayed in full screen mode, as video calls are delivered in full screen mode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The detailed description is set forth with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The use of the same reference numbers in different figures indicates similar or identical items or features.

[0004] FIG. **1** illustrates example display adjustments made when a telecommunication device activity is initiated during a video call.

[0005] FIG. **2** illustrates example display adjustments made when a video call is initiated while a user engages in a telecommunication device activity.

[0006] FIG. **3** illustrates a video call service and telecommunication device communicating over a network, with the video call service reducing a frame rate or QoS for the transmission of video call data to the telecommunication device.

[0007] FIG. **4** illustrates a video call service reducing a frame rate or QoS for a video call and instructing a telecommunication device engaged in the video call to reduce a display size of its video call user interface.

[0008] FIG. **5** illustrates an example telecommunication device configured to enable a user to engage in a telecommunication device activity while participating in a video call.

[0009] FIG. **6** illustrates an example video call service device configured to reduce a frame rate or QoS responsive to receiving an indication from a telecommunication device that a video call user interface is displayed at a reduced display size.

[0010] FIG. **7** illustrates an example process for initiating an activity during a video call, concurrently displaying user interfaces for the video call and the activity, and receiving user input for the activity during the video call.

[0011] FIG. **8** illustrates an example process for initiating a video call while enabling an activity, concurrently displaying user interfaces for the video call and the activity, and receiving user input for the activity during the video call.

[0012] FIG. **9** illustrates an example process for receiving an indication that a user interface display size for a video call has been reduced, reducing a frame rate or QoS for the video call, and transmitting video call data at the reduced frame rate or QoS.

[0013] FIG. **10** illustrates an example process for reducing a frame rate or QoS for a video call and instructing a telecommunication device to reduce a user interface display size for the video call.

DETAILED DESCRIPTION

[0014] This disclosure describes, in part, a telecommunication device that allows a user to multi-task during a video call by concurrently displaying a video call user interface and an activity user interface. Many telecommunication device activities, including those unrelated to video calls, consume significant device and network resources. When added to the significant resources consumed by video calling, this may make multi-tasking seem costly and, perhaps, undesirable. The telecommunication device described herein, however, may reduce the consumption of network resources associated with the video call by causing a video call service to reduce a frame rate or QoS for a video call when the user of the telecommunication device is engaged in multi-tasking. Because the video call user interface displayed during multi-tasking has a reduced display size, the reduced frame rate or QoS does not negatively affect user experience. Thus, by reducing the display size for the video call user interface during multi-tasking and causing the video call service to use a reduced frame rate or QoS in delivering the video call, the telecommunication device provides its user with video calling and multi-tasking capabilities that do not require prohibitively costly resource consumption.

[0015] In various embodiments, the telecommunication device may initiate video call multi-tasking from either a video call or a telecommunication device activity. In the former case, the telecommunication device may be engaged in a video call and, while engaged in that call, receive input initiating a telecommunication device activity. The activity is a different activity from video calling, such as email texting, web browsing, gaming, media consumption (e.g., streaming or playback), or any other sort of activity. In the latter case, the telecommunication device may be enabling the user to engage in the telecommunication device activity and, while enabling the activity, may initiate a video call (e.g., responsive to an incoming video call).

[0016] Upon initiating video call multi-tasking, the telecommunication device concurrently displays user interfaces for the video call and the activity. The concurrent display may involve reducing a display size of a video call user interface or providing a new video call user interface with a display size that is less than the total display size of the telecommunication device's display screen. The user interfaces of the video call and activity may be display adjacent to each other or with one as an overlay in front of a portion of the other. During the video call, the user may begin or continue providing input associated with the telecommunication device activity.

[0017] Upon reducing the display size of the video call user interface (or upon providing the new video call user interface with the reduced display size), the telecommunication device

notifies a video call service of the reduced display size. In response, the telecommunication device begins to receive the transmission of the video call at a reduced frame rate or QoS, conserving network resources.

[0018] In some embodiments, reduction of the display size for the video call user interface may be initiated by the video call service responsive to detecting a service condition (e.g., network congestion). Upon detecting the service condition, the video call service may reduce the frame rate or QoS for transmission of a video call and instruct the recipient of the transmission to reduce the display size.

Example Display Adjustment

[0019] FIG. **1** illustrates example display adjustments made when a telecommunication device activity is initiated during a video call. As illustrated, a telecommunication device **102** may display a video call user interface (video call UI) **104** in full screen mode, with the display size of the video call UI **104** being substantially the same as the display size of the display screen of the telecommunication device **102**. While displaying the video call UI **104** in full screen mode, the telecommunication device **102** may receive 106 input initiating a telecommunication device activity that is different from the video call. Responsive to the input, the telecommunication device **102** may display **108** the video call UI **104** at a reduced display size and concurrently display **108** a telecommunication device activity user interface (activity UI) **110**, the video call UI **104** and activity UI **110** display **108** adjacent to each other. Alternatively, the telecommunication device **102** may display **112** the video call UI **104** as a reduced-display-size overlay in front of a portion of the activity UI **110**.

[0020] In various embodiments, the telecommunications device **102** may be any sort of device capable of engaging in a video call and of offering other telecommunication device activities. For example the telecommunication device **102** may be any of a smart phone, a tablet computer, a personal digital assistant (PDA), a personal computer (PC), a laptop computer, a media center, a work station, etc. An example telecommunications device **102**, including a video call client for video calling and a platform and applications associated with telecommunication device activities, is illustrated in FIG. **5** and described below with reference to that figure.

[0021] As shown in FIG. **1**, a user of a telecommunication device **102** may be engaged in a video call, and a video call UI **104** for that video call may be displayed using substantially the full display screen of the telecommunication device **102**. Such a use of a substantial portion of the display screen by a single user interface may be referred to as displaying in a full screen mode. The video call UI **104** may be a streaming video of a conversation partner, of the user of the telecommunication device **102**, of both the user and the conversation partner, or of some other content.

[0022] While displaying the video call UI **104**, the telecommunication device **102** receives **106** input initiating a telecommunication device activity. The input may be input from the user of the telecommunication device **102**, such as a press of a home screen key, or some soft key or physical key or button. Alternatively, the input may be from a remote service, a network operator, or from the telecommunication device activity itself. For example, a calendar application may be configured to surface alerts in advance of meeting times.

[0023] In response to receiving the input, the telecommunication device **102** may either display **108** an activity UI **110** adjacent to a reduced-size video call UI **104** or display **112** a reduced-size video call UI **104** as an overlay to the activity UI **110**. Also, the telecommunication device **102** could display the activity UI **110** as an overlay to the video call UI **104**. The telecommunication device **102** may select among these display arrangements based on user preferences or default, suggested, or required settings. In some embodiments, different telecommunication device activities may be displayed in different arrangements, some displayed adjacent and some with one user interface **104/110** or the other as an overlay. This may also be the result of user preferences or default, suggested, or required application settings.

[0024] In various embodiments, displaying **108** the video call UI **104** and activity UI **110** adjacent to each other may involve reducing a display size of the video call UI **104**. Such a reduction in display size may be performed automatically and may reduce the display size to resultant display size specified by user preferences or other settings. In some embodiments, the magnitude of the reduction may be based on display size preferences or settings for the telecommunication device activity. The reduction of the display size of the video call UI **104** is performed simultaneously with the addition of the activity UI **110** to the display, resulting in concurrent, adjacent display **108** of the video call UI **104** and activity UI **110**. As shown in FIG. **1**, the activity UI **110** may be associated with any sort of telecommunication device activity that is different from a video call, such as writing in a word processing application.

[0025] Displaying **112** the video call UI **104** as an overlay to a portion of the activity UI **110** may involve reducing a display size of the video call UI **104**. Such a reduction in display size may be performed automatically and may reduce the display size to resultant display size specified by user preferences or other settings. In some embodiments, the magnitude of the reduction may be based on display size preferences or settings for the telecommunication device activity. The reduction of the display size of the video call UI **104** is performed simultaneously with the addition of the activity UI **110** to the display, resulting in concurrent display **112** of the video call UI **104** and activity UI **110**, with the video call UI **104** as an overlay.

[0026] While either concurrently displaying **108** adjacent user interfaces **104** and **110** or concurrently displaying **112** one user interface **104/110** in front of the other, the telecommunication device **102** may receive both continued video and audio to be transmitted as part of the video call and other user input related to the telecommunication device activity. For example, a user may continue to look into a telecommunication device camera and talk to a friend while entering text into a word processing application.

[0027] FIG. **2** illustrates example display adjustments made when a video call is initiated while a user engages in a telecommunication device activity. As illustrated, a telecommunication device **102** may display an activity UI **110** in full screen mode, with the display size of the activity UI **110** being substantially the same as the display size of the display screen of the telecommunication device **102**. While displaying the activity UI **110** in full screen mode, the telecommunication device **102** may initiate **202** a video call that is different from the telecommunication device activity. Responsive to the input, the telecommunication device **102** may display **204** a video call UI **104** with a display size less than that of the full display screen and concurrently display **204** the activity UI **110** with a reduced display size, the video call UI **104** and

activity UI **110** displayed **204** adjacent to each other. Alternatively, the telecommunication device **102** may display **206** the video call UI **104** as a reduced-display-size overlay in front of a portion of the activity UI **110**.

[0028] As shown in FIG. **2**, a user of a telecommunication device **102** may be engaged in a telecommunication device activity that is separate and distinct from a video call, and an activity UI **110** for that telecommunication device activity may be displayed using substantially the full display screen of the telecommunication device **102**. The activity UI **110** may be any sort of graphic display associated with a telecommunication device activity. For example, if the telecommunication device activity is text entry in a word processing application, the activity **110** may display a document view, various settings or controls of the word processing application, text already entered by a user, and a cursor indicating where further text will be entered.

[0029] While displaying the activity UI **110**, the telecommunication device **102** initiates **202** a video call. The telecommunication device **102** may initiate **202** the video call by answering an incoming video call or may initiate such a video call responsive to input from a user of the telecommunication device **102**, from a remote service, such as a video call service, or from a network operator. The telecommunication device **102** may answer an incoming video call automatically or responsive to a user electing to answer the video call. User input may be a press of a home screen key, or some soft key or physical key or button.

[0030] In response to initiating the video call, the telecommunication device **102** may either display **204** a reduced-size activity UI **110** adjacent to a video call UI **104** or display **206** a video call UI **104** as an overlay to the activity UI **110**. Also, the telecommunication device **102** could display the activity UI **110** as an overlay to the video call UI **104**. The telecommunication device **102** may select among these display arrangements based on user preferences or default, suggested, or required settings. In some embodiments, different telecommunication device activities may be displayed in different arrangements, some displayed adjacent and some with one user interface **104/110** or the other as an overlay. This may also be the result of user preferences or default, suggested, or required application settings.

[0031] In various embodiments, displaying **204** the video call UI **104** and activity UI **110** adjacent to each other involves displaying video call UI **104** with a display size that is reduced from a display size typically used in full screen mode. For example, as shown in FIG. **2**, the video call UI **104** may be displayed with a display size that is approximately half the display size of the display screen of the telecommunication device **102**. Such display at a smaller size may be performed automatically and may set the display size to resultant display size specified by user preferences or other settings. In some embodiments, the relative display sizes of the video call UI **104** and activity UI **110** may be based on preferences or settings for the telecommunication device activity. The reduction of the display size of the activity UI **110** is performed simultaneously with the addition of the video call UI **104** to the display, resulting in concurrent, adjacent display **204** of the video call UI **104** and activity UI **110**.

[0032] Displaying **206** the video call UI **104** as an overlay to a portion of the activity UI **110** involves displaying video call UI **104** with a display size that is reduced from a display size typically used in full screen mode. Such display at a smaller size may be performed automatically and may set the display size to resultant display size specified by user preferences or other settings. In some embodiments, the relative display sizes of the video call UI **104** and activity UI **110** may be based on preferences or settings for the telecommunication device activity. The reduction of the display size of the activity UI **110** is performed simultaneously with the addition of the video call UI **104** to the display, resulting in concurrent display **206** of the video call UI **104** and activity UI **110**, with the video call UI **104** as an overlay.

[0033] While either concurrently displaying **204** adjacent user interfaces **104** and **110** or concurrently displaying **206** one user interface **104/110** in front of the other, the telecommunication device **102** may receive both continued video and audio to be transmitted as part of the video call and other user input related to the telecommunication device activity. For example, a user may continue to look into a telecommunication device camera and talk to a friend while entering text into a word processing application.

Example Video Call Transmission Adjustments

[0034] FIG. **3** illustrates a video call service and telecommunication device communicating over a network, with the video call service reducing a frame rate or QoS for the transmission of video call data to the telecommunication device. As illustrated, a telecommunication device **102** communicates with a video call service **302**, receiving video call data **304** transmitted with a specific frame rate and QoS. The telecommunication device **102** receives the video call data **304** over a network **306** that connects the telecommunication device **102** and the video call service **302**. At some point in time, the telecommunication device **102** may reduce a display size of a video call UI associated with the video call data **304** and may send a notification **308** of the display size reduction to the video call service **302**. Responsive to the notification **308**, the video call service **302** reduces the specific frame rate or QoS for the video call and transmits video call data **310** at the reduced frame rate or QoS to the telecommunication device **102**.

[0035] In various embodiments, the video call service **302** may include any one or more computing devices acting alone or as a service cloud connected by a local or private network. For example a video call service device may be any of a tablet computer, a personal computer (PC), a laptop computer, a media center, a work station, a server device, a mainframe computer, etc. An example video call service device is illustrated in FIG. **6** and described below with reference to that figure.

[0036] The video call data **304** may comprise frames of video and an audio stream, which may be provided in separate delivery channels or in a same channel. The video call data **304** may be organized into network packets, such as Internet Protocol (IP) packets or may be provided as a bit stream to be delivered in a circuit-switched manner. The packets or bit stream may vary in quantity or size based on the frame rate. The higher the frame rate, the more video call data **304** is transmitted. The QoS indicates the priority and transmission quality a network operator of the network **306** is to provide. Packets of the video call data **304** may be marked with the specific QoS.

[0037] In some embodiments, the network **306** is a packet-based network, such as a WiFi network, an LTE network, an HSPA+ network, a Bluetooth network, or a network associated with infrared technology. The network **306** may also be

or include a circuit-switched network, such as a 2G or 3G network. Further, the network **306** may be or include a cellular network operated by a network operator. The network **306** may include a base station transceiver, base station controller, a node B, or an eNode B. Also, such a network **306** may include one or more access networks and a core network. The video call service **302** may be part of the core network or may be independent of the network operator, connected to the network **306** through an access network.

[0038] In various embodiments, the telecommunication device **102** may provide a notification **308** when the video call associated with the video call data **304** is not displayed in full screen mode. This may result from a reduction of the display size, as illustrated in FIG. **1**, or from initially providing the video call UI **104** for the video call at a display size that is less than full screen mode, as shown in FIG. **2**. The notification **308** may simply indicate that the display size is reduced, or may specify the reduced display size used to display the video call UI **104**.

[0039] Upon receiving a notification **308**, the video call service **302** may reduce the frame rate or QoS associated with the video call. The reduction may be to some specific or default level, or may vary based on a specified display size included in the notification **308**. If the latter, the video call service **302** may have rules or a model that associates specific display sizes with specific frame rates or QoSes. To achieve the reduced frame rate, the video call service **302** may alter a video call service setting for the frame rate which may either cause frames received from a communication partner for the telecommunication device **102** to be dropped or which may cause the video call service **302** to instruct the communication partner to reduce the frame rate it is using for the video call. To achieve a reduced QoS, the video call service may mark packets transmitting the video call data **310** with the reduced QoS or may request that the network operator associated with network **306** utilize a lower QoS when transmitting the video call data **310**. In some embodiments, the reduction of the frame rate or QoS may be performed conditionally based on a service plan offered by the video call service **302** or network operator of the network **306**.

[0040] In some embodiments, the video call service **302** then transmits the video call data **310** at the reduced frame rate or QoS. At some later point in time, if the video call UI **104** is returned or set to full screen mode, a further notification may be sent from the telecommunication device **102** to the video call service **302**. The video call service **302** may then return the frame rate or QoS to the specific frame rate or QoS and continue transmitting the video call as video call data **304**.

[0041] FIG. **4** illustrates a video call service reducing a frame rate or QoS for a video call and instructing a telecommunication device engaged in the video call to reduce a display size of its video call user interface. As illustrated, at **402**, a video call service **302** may reduce a frame rate or QoS for a video call. Such a reduction may be responsive to detecting a service condition. The video call service **302** may then transmit instructions **404** to the telecommunication device **102**, instructing the telecommunication device **102** to reduce a display size used for a video call UI **104** of the video call. Also, the video call service **302** may transmit the video call data **406** at the reduced frame rate or QoS. The telecommunication device **102** may then display the video call UI **104** at the reduced display size while it receives the video call data **406** with the reduced frame rate or QoS.

[0042] In various embodiments, the video call service **302** may reduce, at **402**, the frame rate or QoS of a video call responsive to any sort of service condition. For example, the downlink channel to the telecommunication device **102** (downlink referring to transmission of data from network **306** to the telecommunication device **102**) may be congested or otherwise available at reduced signal strength. Upon detecting or being notified of such a condition, the video call service **302** may reduced the frame rate or QoS to continue delivering the video call while improving the service conditions. The video call service **302** may reduce the frame rate or QoS in the manner described above.

[0043] The instructions **404** may simply indicate that the video call UI display size should be reduced or may specify the reduced display size that the telecommunication device **102** should use. Upon receiving the instruction **404** and the video call data **406** at the reduced frame rate or QoS, the telecommunication device **102** may display the video call UI **104** at the reduced size and may also, optionally, initiate or enable multi-tasking by initiating, or allowing a user to initiate, a telecommunication device activity.

Example Devices

[0044] FIG. **5** illustrates an example telecommunication device configured to enable a user to engage in a telecommunication device activity while participating in a video call. As illustrated, telecommunication device **102** comprises processor(s) **502** and memory **504** storing a video call client **506**, platform and application(s) **508**, and display management module **510**. Also, the telecommunication device **102** includes communication connection(s) **512**.

[0045] In some embodiments, the processor(s) **502** is a central processing unit (CPU), a graphics processing unit (GPU), or both CPU and GPU, or other processing unit or component known in the art.

[0046] In various embodiments, memory **502** is volatile (such as RAM), non-volatile (such as ROM, flash memory, etc.) or some combination of the two. The video call client **506**, platform and application(s) **508**, and display management module **510** may comprise methods, threads, processes, applications or any other sort of executable instructions. The video call client **506**, platform and application(s) **508**, and display management module **510** may also include files and databases.

[0047] In various embodiments, the video call client **506** may be any sort of video call client capable of receiving and rendering video and audio streams and, if needed, synchronizing those streams. The video call client **506** may also retrieve a video feed from a camera of the telecommunication device **102** and an audio feed from a speaker of the telecommunication device **102** and may transmit the retrieved video and audio to a video call service **302** for relay to a conversation partner. The video call client **506** may also include one or more settings, such as a minimum display size. Additionally, the video call client **506** may be configured to determine when the video call UI **104** associated with a video call is not displayed in full screen mode and, in response, to notify a video call service **302** of the reduced display size. In further embodiments, the video call client **506** may also receive instructions **404** from the video call service **302** to reduce the display size of the video call UI **104** and request that the display management module **110** render the video call UI **104** at the reduced display size.

[0048] In some embodiments, the platform and application (s) **508** may include an operating system, applications installed with the operating system, and third party applications installed by a user or service. These platform and application(s) **508** may offer the telecommunication device activities that are different from the video call. The telecommunication device activities may include email, texting, web browsing, gaming, media consumption (e.g., streaming or playback), productivity tools (e.g., word processing), or any other sort of activity. In some embodiments, each platform/application **508** may be associated with one or more settings, such as a minimum display size or a reduced display size to use in a multi-tasking mode.

[0049] In various embodiments, the display management module **510** may receive user interface data from the video call client **506** and/or from the platform and application(s) **508**. If receiving user interface data from only one of the video call client **506** or the platform and application(s) **508**, the display management module **510** may render that user interface data to the display in a full screen mode. If receiving user interface data from both the video call client **506** and the platform and application(s) **508**, the display management module **510** may determine what portion of the display to allocate to each of the video call client **506** and the platform and application(s) **508**. The display management module **510** may make the determination based on minimum display size settings, based on reduced display size settings for the platform or application(s) **508**, or based on other user preferences or settings. Such other preferences or settings could include preferences or settings for rendering the user interfaces adjacent to each other or for rendering one as an overlay in front of a portion of the other. Upon making the determination, the display management module **510** may render the user interface data for the video call client **506** and the platform and application(s) **508** in the manner determined. In addition to determining and rendering, the display management module **510** may receive user input to resize one of the video call UI **104** or activity UI **110** and may adjust the portions of the display allocated to each of the video call client **506** and the platform and application(s) **508**. Such adjustments and resizing may not reduce a display size for user interface data from the video call client **506** or the platform and application(s) **508** below a minimum display size setting.

[0050] In some embodiments, the display management module **510** may also receive touch input and may associate the touch input with either the video call client **506** or with the platform and application(s) **508** based on what part of the display is touched (i.e., based on whether the part associated with the video call client **506** is touched or whether the part associated with the platform and application(s) **508** is touched. In other embodiments, input may be associated with either the video call client **506** or with the platform and application(s) **508** based on the source of the input (e.g., camera, speaker, display, keypad). For instance, input received from the camera and speaker may be transmitted to the video call client **104**, and input received from the display or keypad may be sent to the platform and application(s) **508**.

[0051] Memory **504** may include tangible computer-readable media. Such tangible computer-readable media may include volatile and nonvolatile, removable and non-removable memory devices. Tangible computer-readable media include, but are not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, etc.

[0052] Telecommunication device **102** also has input device(s), such as a keypad, a cursor control, a touch-sensitive display, voice input device, etc., and output device(s) such as a display, speakers, etc. These devices are well known in the art and need not be discussed at length here.

[0053] As illustrated in FIG. **5**, the telecommunication device **102** also includes one or more communication connections **512** to enable communication with other local or remote devices, such as the device(s) of the video call service. These communication connections **512** may represent wireless transceivers capable of sending and receiving wireless, radio frequency (RF) and WiFi communications.

[0054] FIG. **6** illustrates an example video call service device configured to reduce a frame rate or QoS responsive to receiving an indication from a telecommunication device that a video call user interface is displayed at a reduced display size. As illustrated, a video call service device **602** comprises processor(s) **604**, memory **606**, a removable storage **608** and non-removable storage **610**. The memory **606** may store a video call server **612**, a network monitor module **614**, a video call settings module **616**, and a client management module **618**. Also, the video call service device **602** includes communication connections **620** to enable communications with other local and remote devices.

[0055] In some embodiments, the processor(s) **604** is a central processing unit (CPU), a graphics processing unit (GPU), or both CPU and GPU, or other processing unit or component known in the art.

[0056] In various embodiments, memory **606** is volatile (such as RAM), non-volatile (such as ROM, flash memory, etc.) or some combination of the two. The video call server **612**, a network monitor module **614**, a video call settings module **616**, and a client management module **618** may comprise methods, threads, processes, applications or any other sort of executable instructions. The video call server **612**, a network monitor module **614**, a video call settings module **616**, and a client management module **618** may also include files and databases.

[0057] In some embodiments, the video call server **612** may connect video calls between telecommunication devices **102** and exchange video and audio streams between the telecommunication devices **102**. The video call server **612** may also set and coordinate frame rates and QoSes used by the telecommunication devices **102**. The video call server **612** may also receive notifications **308** from telecommunication devices **102** of reduced display sizes and may invoke the video call settings module **616** to reduce the frame rate or QoS used for the video call.

[0058] In various embodiments, the network monitor module **614** may detect various service or network conditions, such as congestion or impaired signal strength, associated with a specific video call connection between the video call service **302** and a telecommunication device **102**. Responsive to detecting such conditions, the network monitor module **614** invokes the video call settings module **616** to reduce the frame rate or QoS for a video call and invokes the client management module **618** to instruct the video call client **504** to reduce the display size.

[0059] In some embodiments, the video call settings module **616** is invoked by the video call server **612** or network monitor module **614** to reduce a frame rate or QoS for a video

call. The video call settings module **616** affects the reduction in the manner described above.

[0060] In various embodiments, the client management module **618**, when invoked, instructs a video call client **506** to reduce a display size used for a video call UI **104**.

[0061] The video call service device **602** also includes additional data storage devices (removable and/or non-removable) such as, for example, magnetic disks, optical disks, or tape. Such additional storage is illustrated in FIG. **6** by removable storage **608** and non-removable storage **610**. Tangible computer-readable media may include volatile and nonvolatile, removable and non-removable memory devices. Memory **606**, removable storage **608** and non-removable storage **610** are all examples of tangible computer-readable media. Tangible computer-readable media include, but are not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, etc. Any such tangible computer-readable media may be part of the video call service device **602**.

[0062] Video call service device **602** also has input device (s), such as a keypad, a cursor control, a touch-sensitive display, voice input device, etc., and output device(s) such as a display, speakers, etc. These devices are well known in the art and need not be discussed at length here.

[0063] As illustrated in FIG. **6**, the video call service device **602** also includes one or more communication connections **620** to enable communication with other local or remote devices, such as the telecommunication device **102**. These communication connections **620** may represent wireless transceivers capable of sending and receiving wireless, radio frequency (RF) and WiFi communications. They may also represent wired modems, such as Ethernet connectors.

Example Processes

[0064] FIGS. **7-10** illustrate example processes. These processes are illustrated as logical flow graphs, each operation of which represents a sequence of operations that can be implemented in hardware, software, or a combination thereof. In the context of software, the operations represent computer-executable instructions stored on one or more computer-readable storage media that, when executed by one or more processors, perform the recited operations. Generally, computer-executable instructions include routines, programs, objects, components, data structures, and the like that perform particular functions or implement particular abstract data types. The order in which the operations are described is not intended to be construed as a limitation, and any number of the described operations can be combined in any order and/or in parallel to implement the processes.

[0065] FIG. **7** illustrates an example process for initiating an activity during a video call, concurrently displaying user interfaces for the video call and the activity, and receiving user input for the activity during the video call. The process includes, at **702**, engaging, by a telecommunication device, in a video call with another telecommunication device. The video call may be facilitated by a video call service.

[0066] At **704**, while engaged in the video call, the telecommunication device may receive input initiating a telecommunication device activity that is different from the video call. The telecommunication device activity may be unrelated to the video call. The input may be user input or a prompt from a telecommunication device application or from a remote service.

[0067] At **706**, the telecommunication device reduces a video call user interface display size to accommodate concurrent display of the video call user interface and a telecommunication device activity user interface. The magnitude of the reduction in the display size of the video call user interface may be based on a type of the telecommunication device activity.

[0068] At **708**, the telecommunication device concurrently displays the video call user interface and the telecommunication device activity user interface. The concurrent display may include displaying the telecommunication device activity user interface adjacent to the reduced-display-size video call user interface or displaying the reduced-display-size video call user interface as an overlay to a portion of the telecommunication device activity user interface.

[0069] At **710**, the telecommunication device receives user input related to the telecommunication device activity while a user of the telecommunication device engages in the video call.

[0070] At **712**, the telecommunication device enables the user of the telecommunication device to resize either or both of the concurrently displayed user interfaces. At least one of the telecommunication device activity user interface or the video call user interface may have a minimum display size below which that user interface cannot be reduced or resized.

[0071] At **714**, the telecommunication device notifies the video call service of the reducing of the display size.

[0072] At **716**, in response to the notifying, the telecommunication device receives video call data at a reduced frame rate or reduced quality of service.

[0073] FIG. **8** illustrates an example process for initiating a video call while enabling an activity, concurrently displaying user interfaces for the video call and the activity, and receiving user input for the activity during the video call. The process includes, at **802**, enabling a telecommunication device activity that is different from a video call, and possibly unrelated to a video call.

[0074] At **804**, while enabling the telecommunication device activity, the telecommunication device initiates a video call. The initiating may be responsive to receiving an incoming voice call or responsive to user input.

[0075] At **806**, the telecommunication device reduces a telecommunication device activity user interface display size to accommodate concurrent display of the telecommunication device activity user interface and of a video call user interface. The magnitude of the reduction in the display size of the telecommunication device activity user interface may be based on a type of the telecommunication device activity.

[0076] At **808**, the telecommunication device concurrently displays the telecommunication device activity user interface and the video call user interface. The concurrent display may include displaying the telecommunication device activity user interface adjacent to the reduced-display-size video call user interface or displaying the reduced-display-size video call user interface as an overlay to a portion of the telecommunication device activity user interface.

[0077] At **810**, the telecommunication device receives user input related to the telecommunication device activity while a user of the telecommunication device engages in the video call.

[0078] At **812**, the telecommunication device notifies the video call service that the display size of the video call user interface is less than a display size of the full display screen of the telecommunication device.

[0079] At **814**, in response to the notifying, the telecommunication device receives video call data at a reduced frame rate or reduced quality of service.

[0080] FIG. **9** illustrates an example process for receiving an indication that a user interface display size for a video call has been reduced, reducing a frame rate or QoS for the video call, and transmitting video call data at the reduced frame rate or QoS. The process includes, at **902**, receiving, by a video call service, an indication that a display size of a video call interface rendered on a telecommunication device has been reduced. The indication may specify the reduced display size.

[0081] At **904**, in response to receiving the indication, the video call service reduces a frame rate or quality of service associated with transmission of video call data to the telecommunication device. At **904***a*, the video call service effects the reduction by marking packets transmitting the video call data with the reduced quality of service. At **904***b*, the video call service effects the reduction by requesting that a network operator reduce the quality of service used in transmitting the video call data. At **904***c*, the reducing is performed conditionally based on a service plan or service agreement with a user of the telecommunication device.

[0082] At **906**, the video call service transmits the video call data at the reduced frame rate or the reduced quality of service.

[0083] FIG. **10** illustrates an example process for reducing a frame rate or QoS for a video call and instructing a telecommunication device to reduce a user interface display size for the video call. The process includes, at **1002**, determining the occurrence of a service condition, such as network congestion or impaired signal strength.

[0084] At **1004**, in response to determining the occurrence of the service condition, a video call service reduces a frame rate or a quality of service associated with transmission of a video call to a video call client.

[0085] At **1006**, the video call service instructs the video call client to reduce a display size of a video call interface responsive to the reduced frame rate or quality of service. The \instruction to reduce the display size of the video call interface may specify the reduced display size. Also, the instruction to reduce the display size of the video call interface may cause a telecommunication device associated with the video call client to suggest the reduction to a user of the telecommunication device.

CONCLUSION

[0086] Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as exemplary forms of implementing the claims.

What is claimed is:

1. A method comprising:

during a video call, receiving, by a telecommunication device, input initiating a telecommunication device activity that is different from the video call;

responsive to the input, concurrently displaying, by the telecommunication device, an activity interface associated with the telecommunication device activity and a video call interface associated with the video call, the concurrently displaying including reducing a display size of the video call interface to accommodate the activity interface; and

receiving, by the telecommunication device, user input related to the telecommunication device activity while a user of the telecommunication device engages in the video call.

2. The method of claim **1**, wherein the concurrently displaying includes displaying the activity interface adjacent to the reduced-display-size video call interface or displaying the reduced-display-size video call interface as an overlay to a portion of the activity interface.

3. The method of claim **1**, wherein the telecommunication device activity is unrelated to the video call.

4. The method of claim **1**, wherein the input is user input or is a prompt from a telecommunication device application or from a remote service.

5. The method of claim **1**, further comprising notifying a video call server of the reducing of the display size.

6. The method of claim **5**, further comprising, in response to the notifying, receiving video call data at a reduced frame rate or reduced quality of service.

7. The method of claim **1**, wherein a magnitude of the reduction in the display size of the video call interface is based on a type of the telecommunication device activity.

8. The method of claim **1**, further comprising enabling the user to resize either or both of the concurrently displayed interfaces.

9. The method of claim **1**, wherein at least one of the activity interface or the video call interface has a minimum display size.

10. One or more tangible computer-readable media having stored thereon computer-readable instructions that, when executed by a telecommunication device, perform operations comprising:

while enabling a user to engage in a telecommunication device activity, initiating a video call that is separate and distinct from the telecommunication device activity;

concurrently displaying an activity interface associated with the telecommunication device activity and a video call interface associated with the video call, the concurrently displaying including either reducing a display size of the activity interface to accommodate the video call interface or overlaying the video call interface in front of a portion of the activity interface; and

receiving user input related to the telecommunication device activity while the user engages in the video call.

11. The one or more tangible computer-readable media of claim **10**, wherein the initiating is responsive to receiving an incoming voice call or is responsive to user input.

12. The one or more tangible computer-readable media of claim **10**, wherein the telecommunication device activity is unrelated to the video call.

13. The one or more tangible computer-readable media of claim **10**, wherein the operations further comprise notifying a video call server that the video call interface will have a display size that is less than a total display size of a display of the telecommunication device.

14. The one or more tangible computer-readable media of claim **13**, wherein the operations further comprise, in response to the notifying, receiving video call data at a reduced frame rate or reduced quality of service.

15. The one or more tangible computer-readable media of claim **10**, wherein a magnitude of the reduction in the display size of the activity interface is based on a type of the telecommunication device activity.

16. A computer-implemented method comprising:

receiving, by a video call service, an indication that a display size of a video call interface rendered on a telecommunication device has been reduced;

in response to the indication, reducing, by the video call service, a frame rate or quality of service associated with transmission of video call data to the telecommunication device; and

transmitting, by the video call service, the video call data at the reduced frame rate or the reduced quality of service.

17. The method of claim **16**, wherein the indication specifies the reduced display size.

18. The method of claim **16**, wherein reducing the quality of service comprises marking packets transmitting the video call data with the reduced quality of service or requesting that a network operator reduce the quality of service used in transmitting the video call data.

19. The method of claim **16**, wherein the reducing is performed conditionally based on a service plan or service agreement with a user of the telecommunication device.

20. A computing device comprising:

a processor; and

a video call service configured to be operated by the processor to reduce a frame rate or a quality of service associated with transmission of a video call to a video call client and to instruct the video call client to reduce a display size of a video call interface responsive to the reduced frame rate or quality of service.

21. The computing device of claim **20**, wherein the instruction to reduce the display size of the video call interface specifies the reduced display size.

22. The computing device of claim **20**, wherein the instruction to reduce the display size of the video call interface causes a telecommunication device associated with the video call client to suggest the reduction to a user of the telecommunication device.

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