US 20110083111A1

(19) United States

(12) Patent Application Publication

Forutanpour et al.

(10) Pub. No.: US 2011/0083111 A1

(43) Pub. Date: Apr. 7, 2011

(54) USER INTERFACE GESTURES AND METHODS FOR PROVIDING FILE SHARING FUNCTIONALITY

(76) Inventors: **Babak Forutanpour**, Carlsbad, CA (US); **Ted Gooding**, San Diego, CA (US); **David Bednar**, San Diego, CA (US)

(21) Appl. No.: **12/578,892**

(22) Filed: **Oct. 14, 2009**

Related U.S. Application Data

(60) Provisional application No. 61/248,249, filed on Oct. 2, 2009.

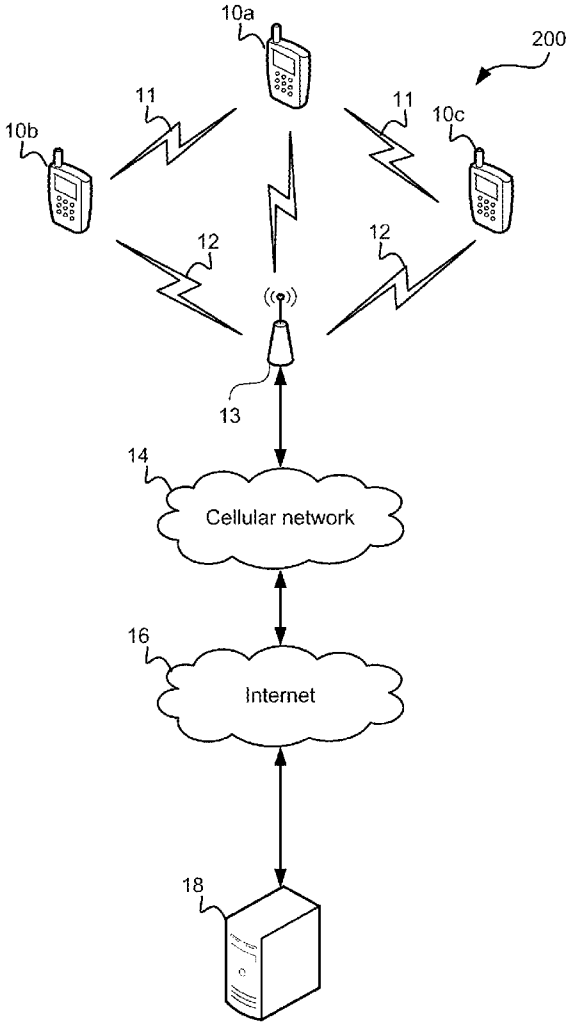
Publication Classification

(51) **Int. Cl.**
G06F 3/033 (2006.01)

(52) **U.S. Cl.** **715/863**

(57) **ABSTRACT**

Methods and devices provide a gesture activated file sharing functionality enabling users to share files with other nearby computing devices. The file sharing functionality may include establishing wireless links with nearby devices and determine their relative locations. The computing device may detect a file sharing gesture and transmit files to or request files from a nearby device in response to the gesture. Base on gesture parameters, e.g., direction, speed and shape, and computing device attitude parameters, e.g., tilt angle and pointing direction, the computing device may identify a targeted device to which a file may be transmitted. The computing device may request user verification of the identified device and send a request to transmit files to the targeted device. The computing devices may transmit files using networks and addresses provided over the device-to-device communication links.



MICROSOFT CORP.
EXHIBIT 1204

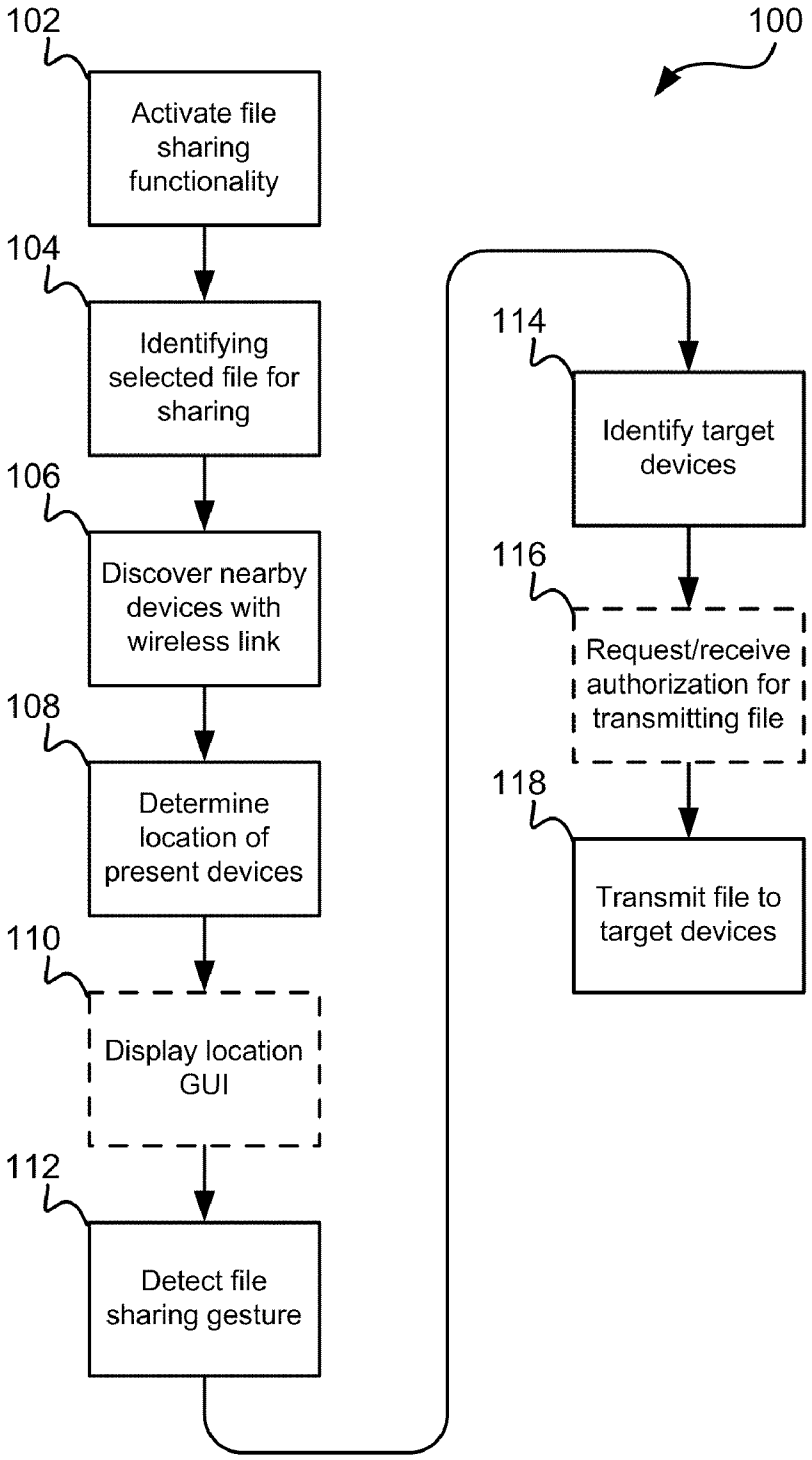

100
102
Activate file sharing functionality
104
Identifying selected file for sharing
106
Discover nearby devices with wireless link
108
Determine location of present devices
110
Display location GUI
112
Detect file sharing gesture
114
Identify target devices
116
Request/receive authorization for transmitting file
118
Transmit file to target devices

FIG. 1

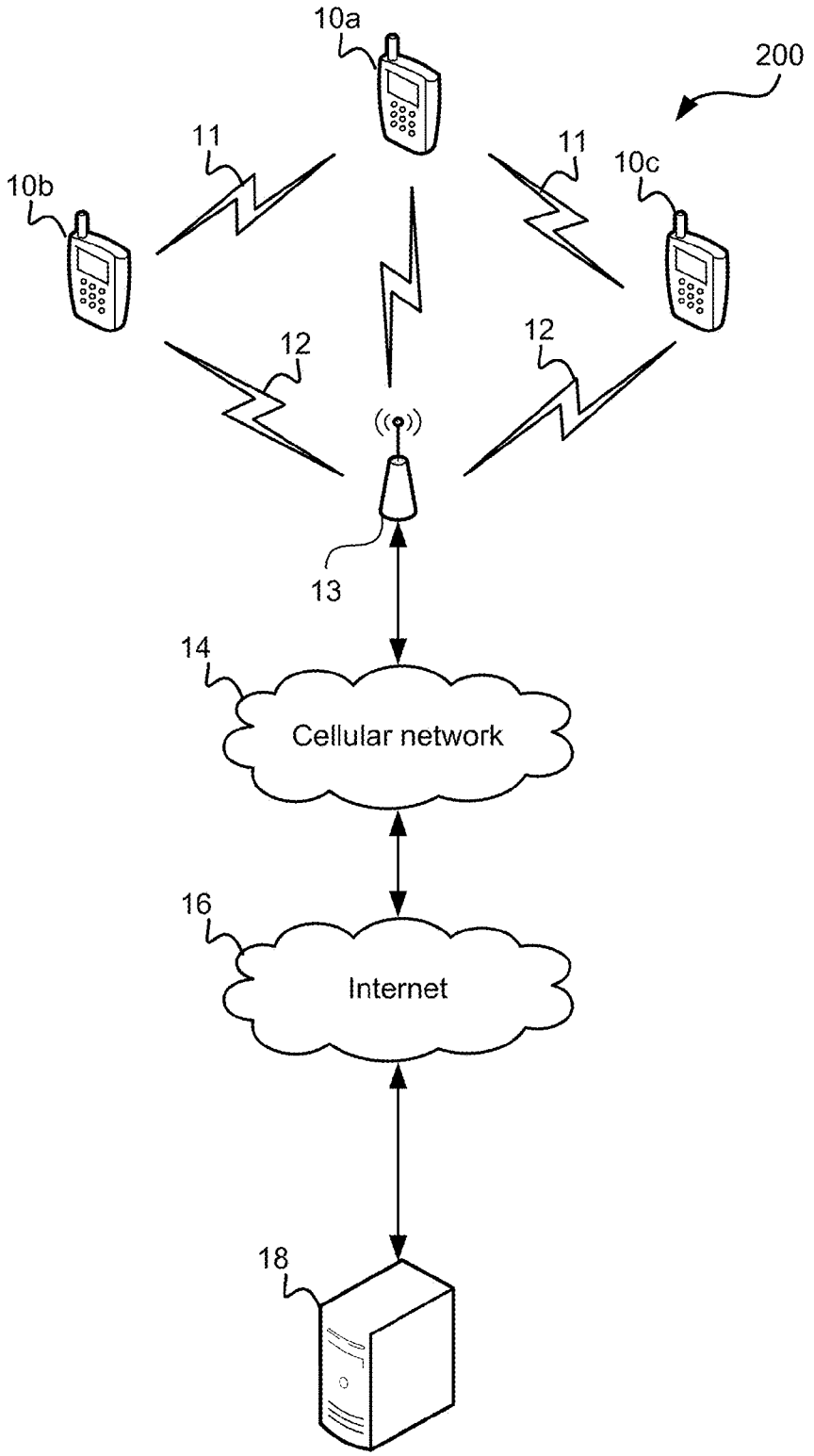

10a
200
11
11
10b
10c
12
12
13
14
Cellular network
16
Internet
18

FIG. 2A

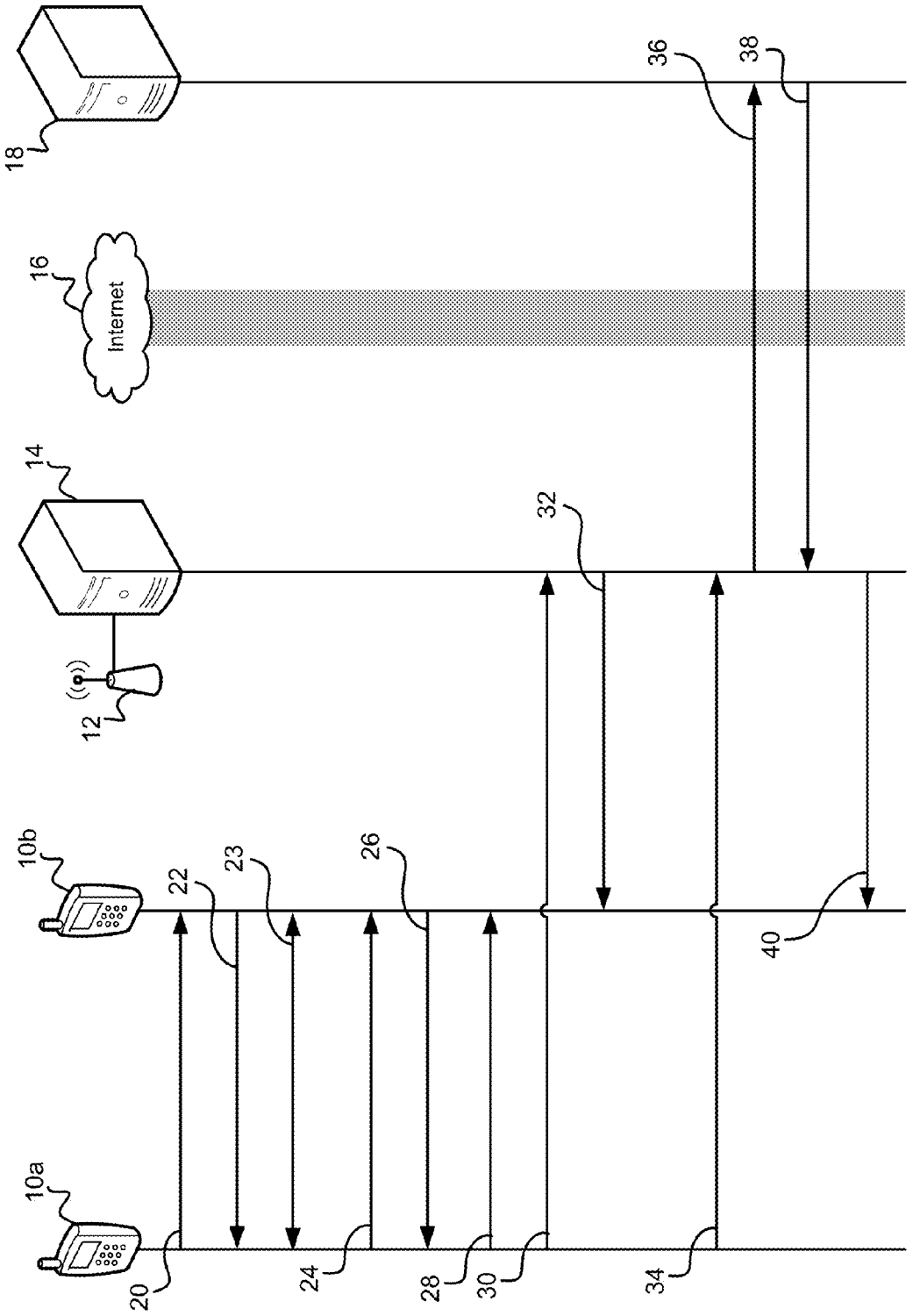


FIG. 2B

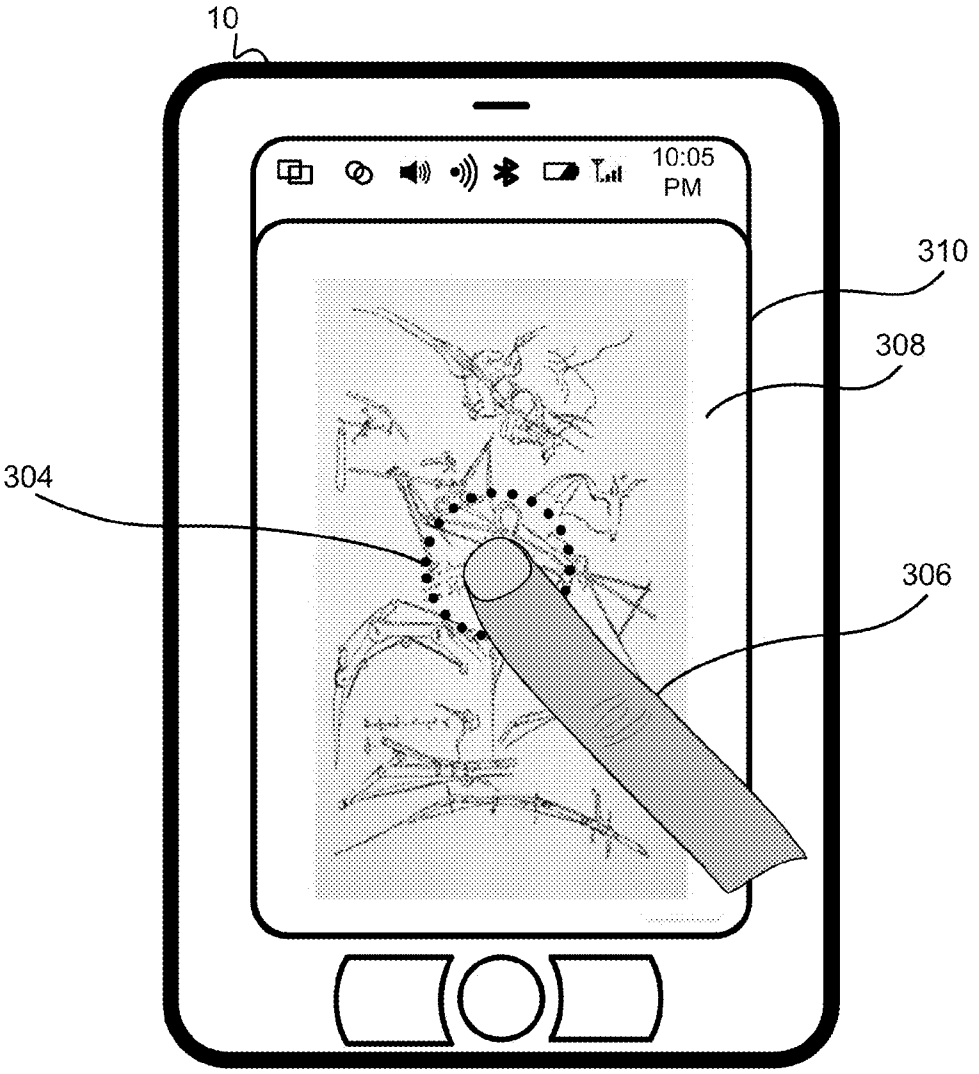


FIG. 3

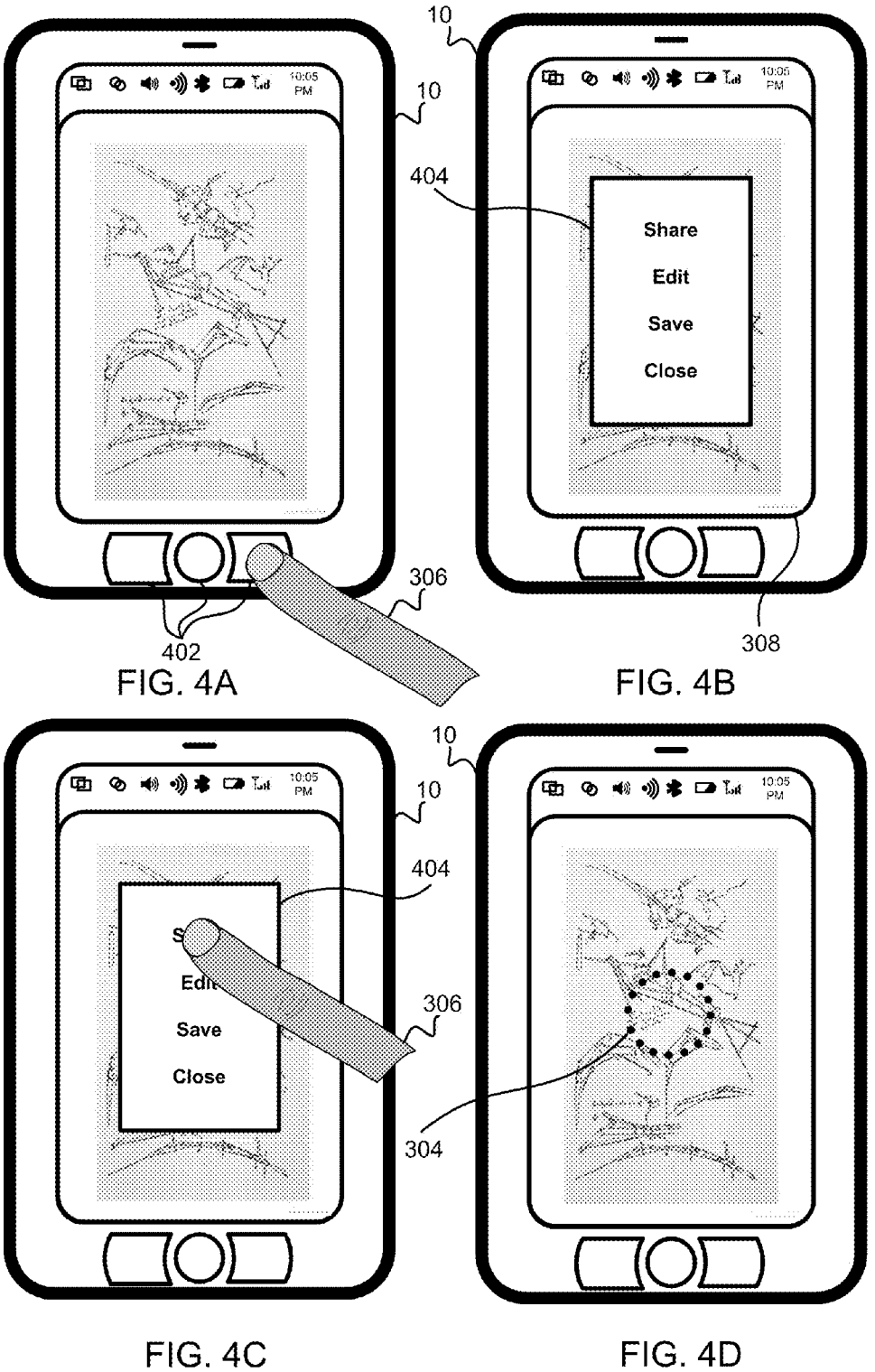


FIG. 4A

FIG. 4B

FIG. 4C

FIG. 4D

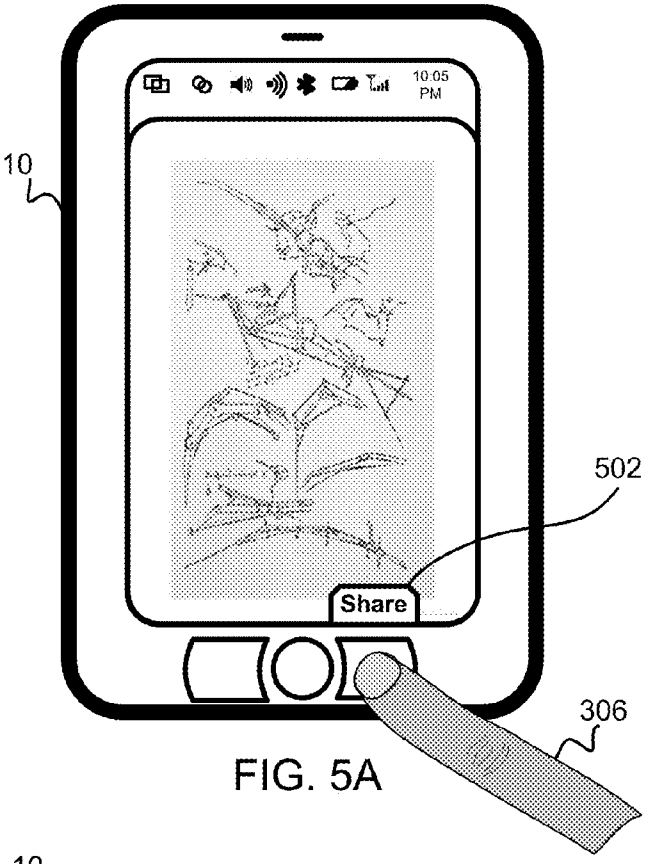


FIG. 5A

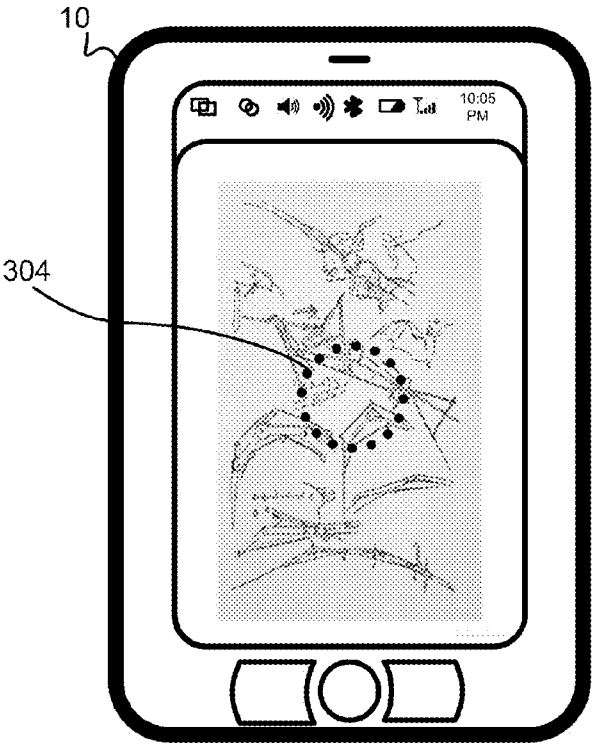


FIG. 5B

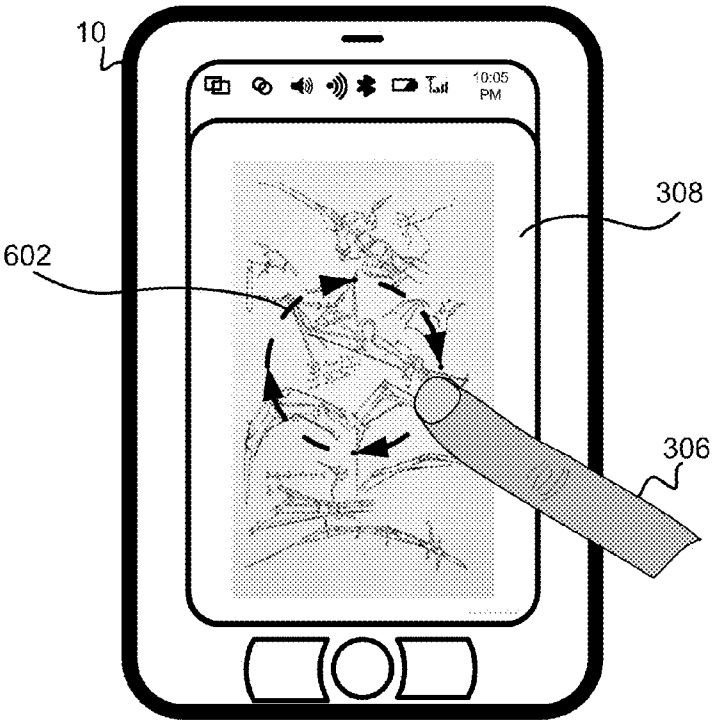


FIG. 6A

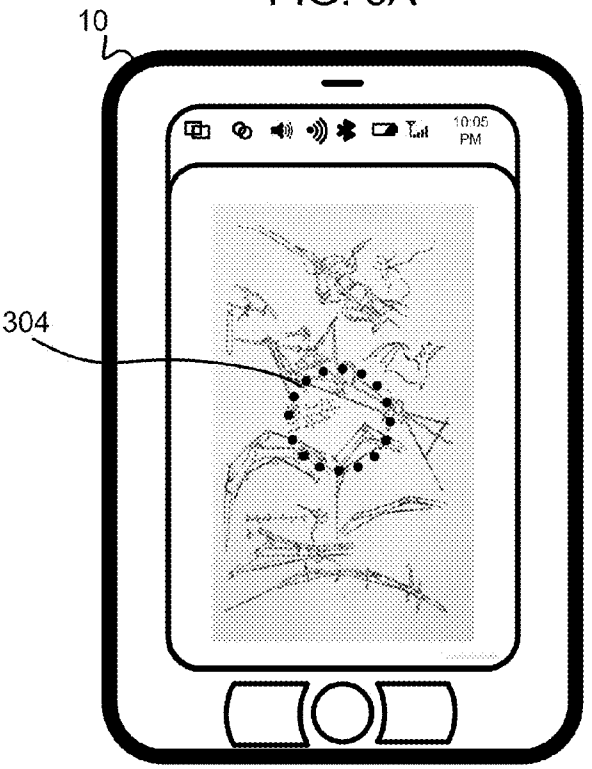


FIG. 6B

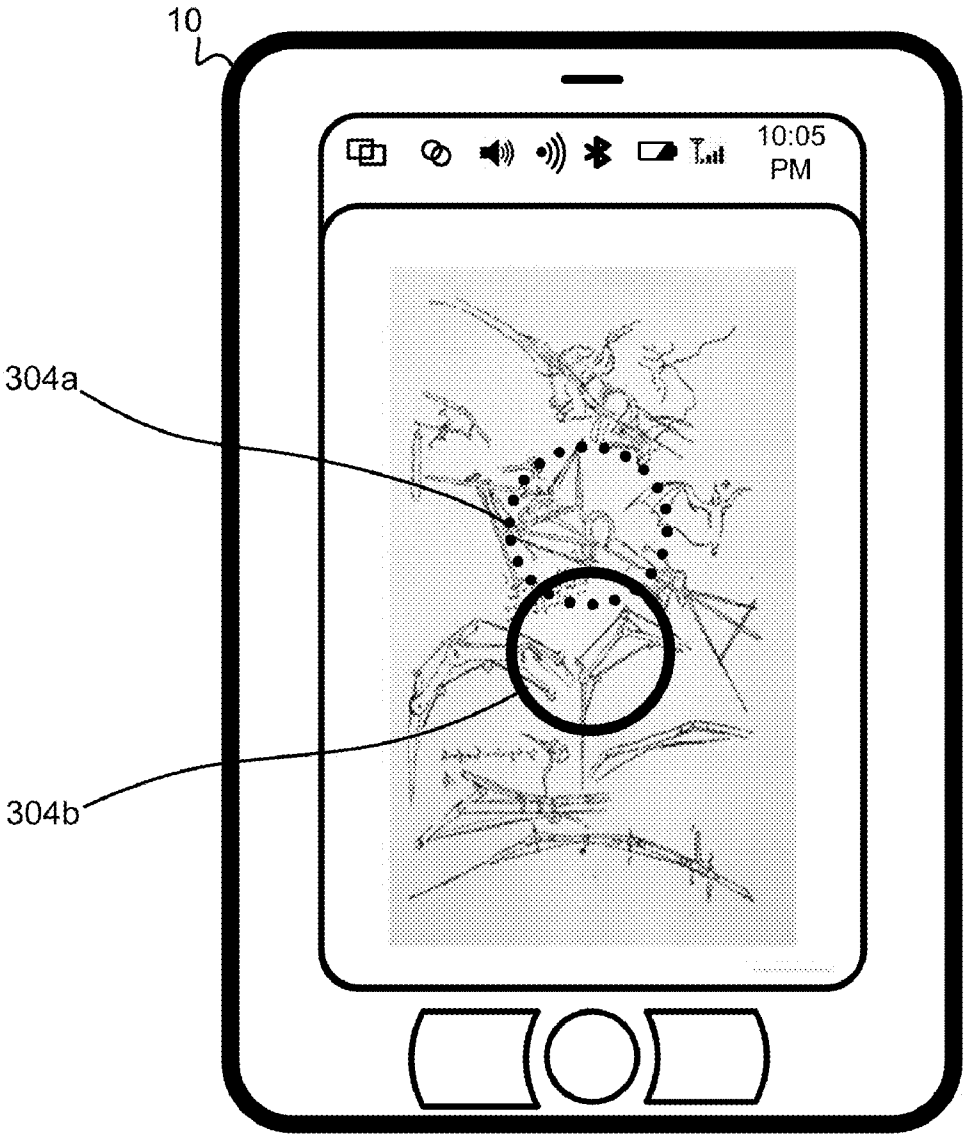


FIG. 7

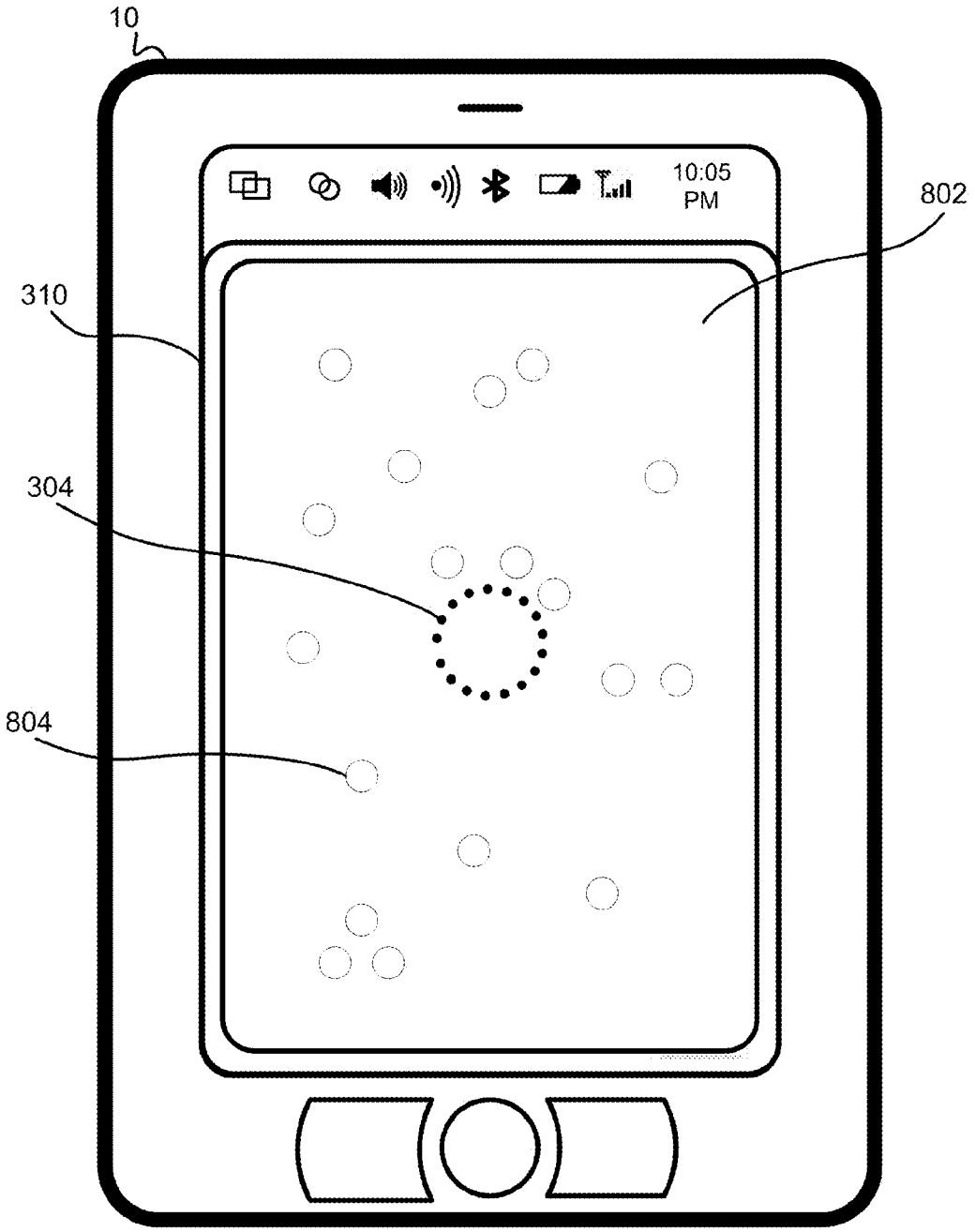


FIG. 8

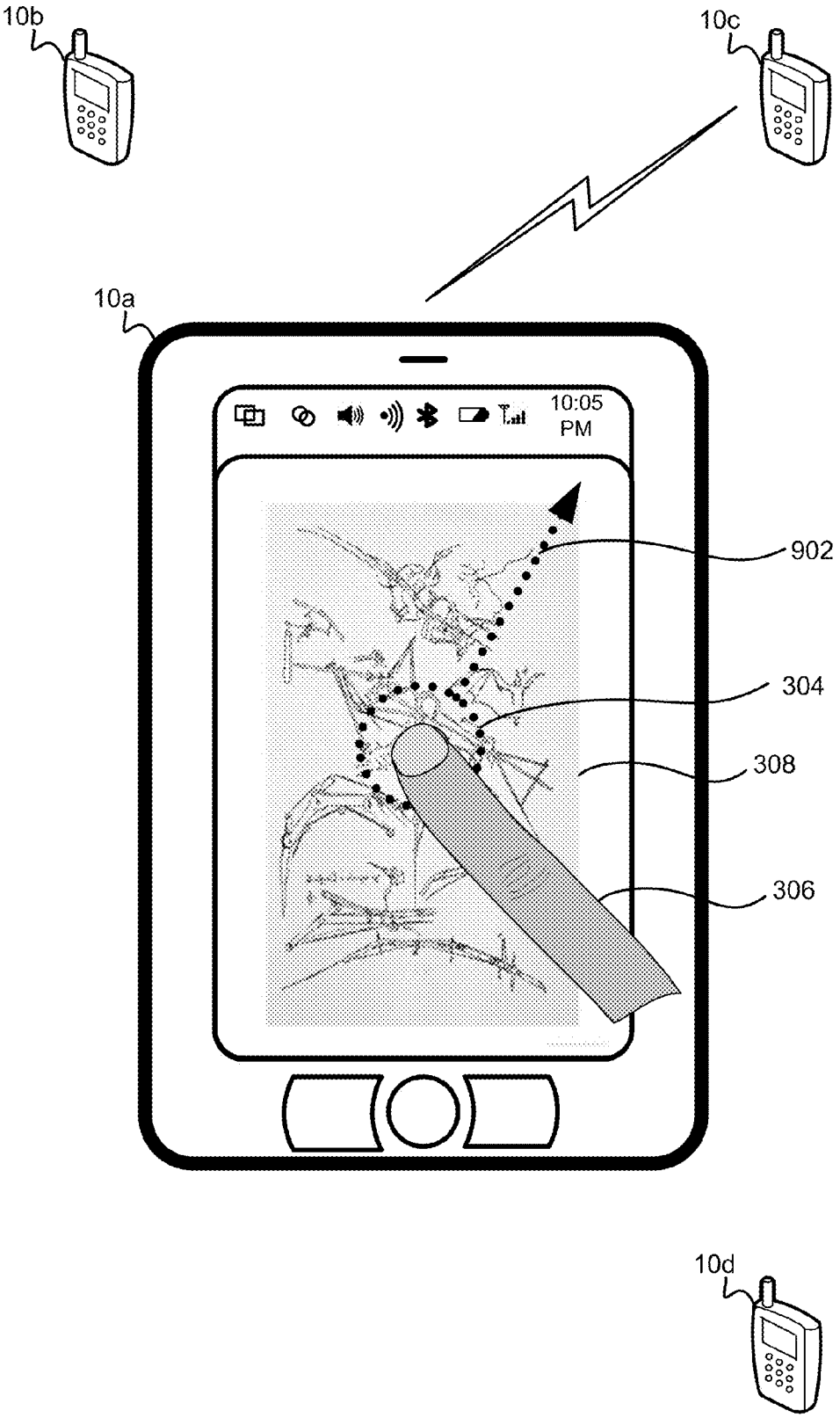


FIG. 9

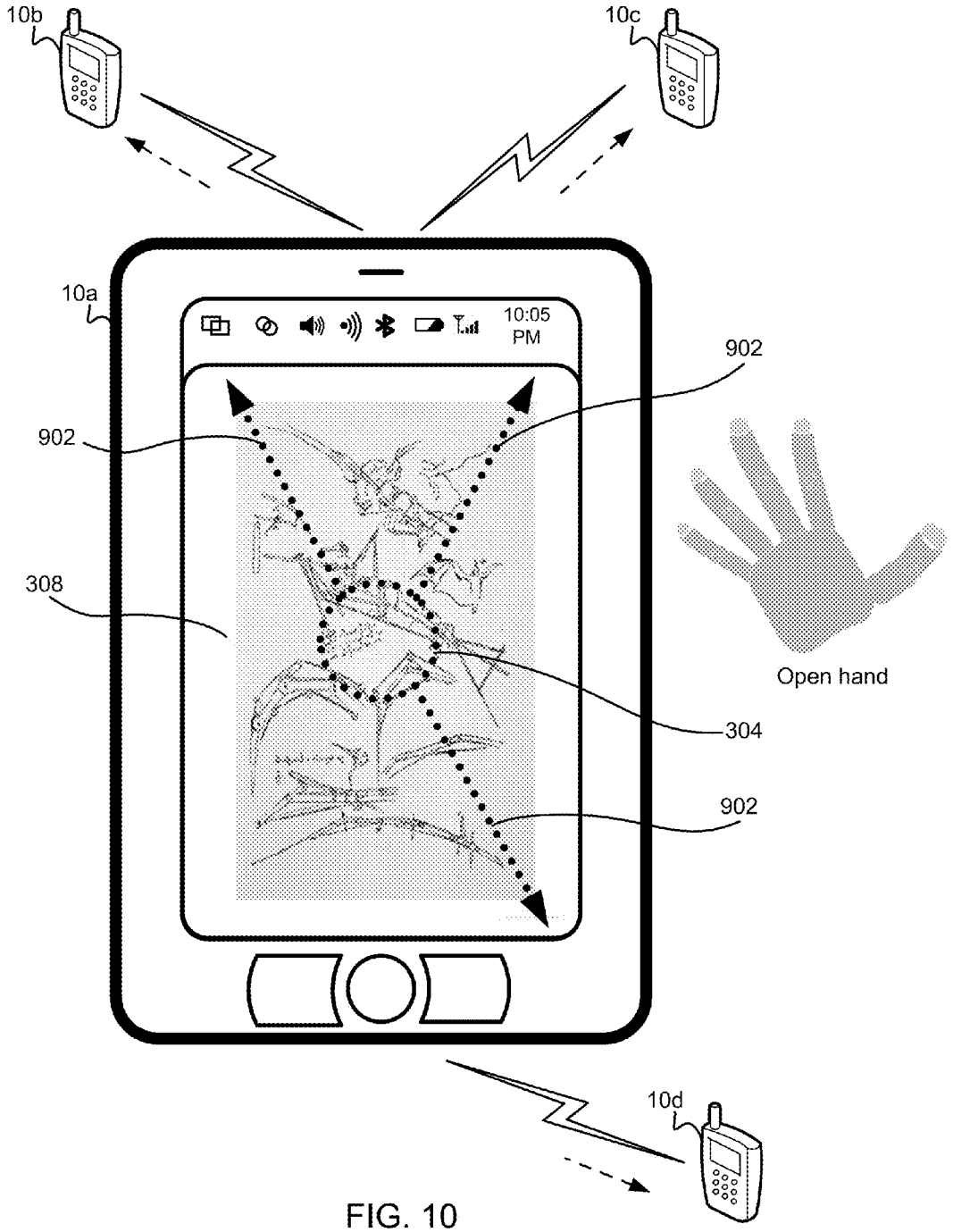


FIG. 10

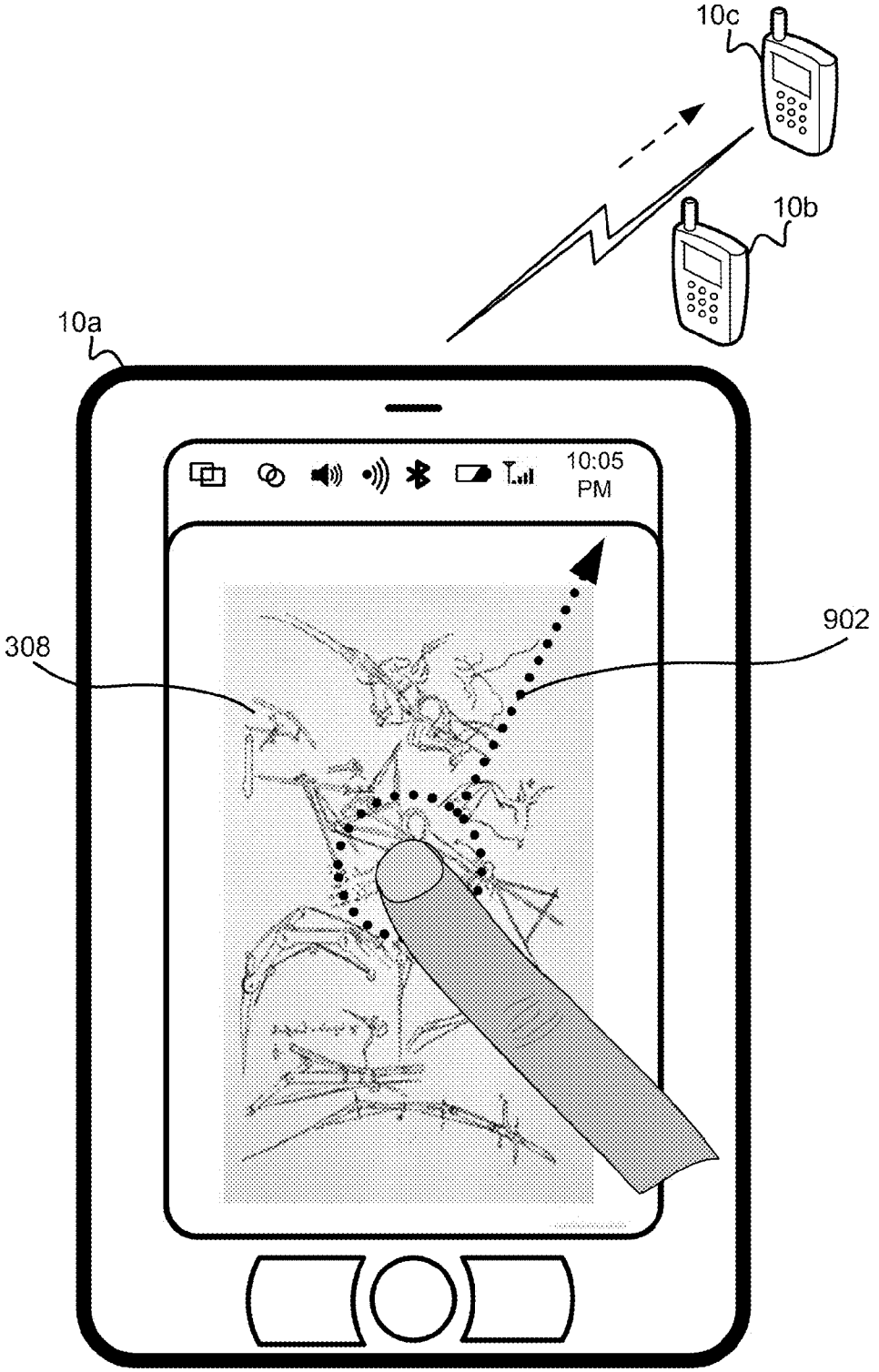


FIG. 11

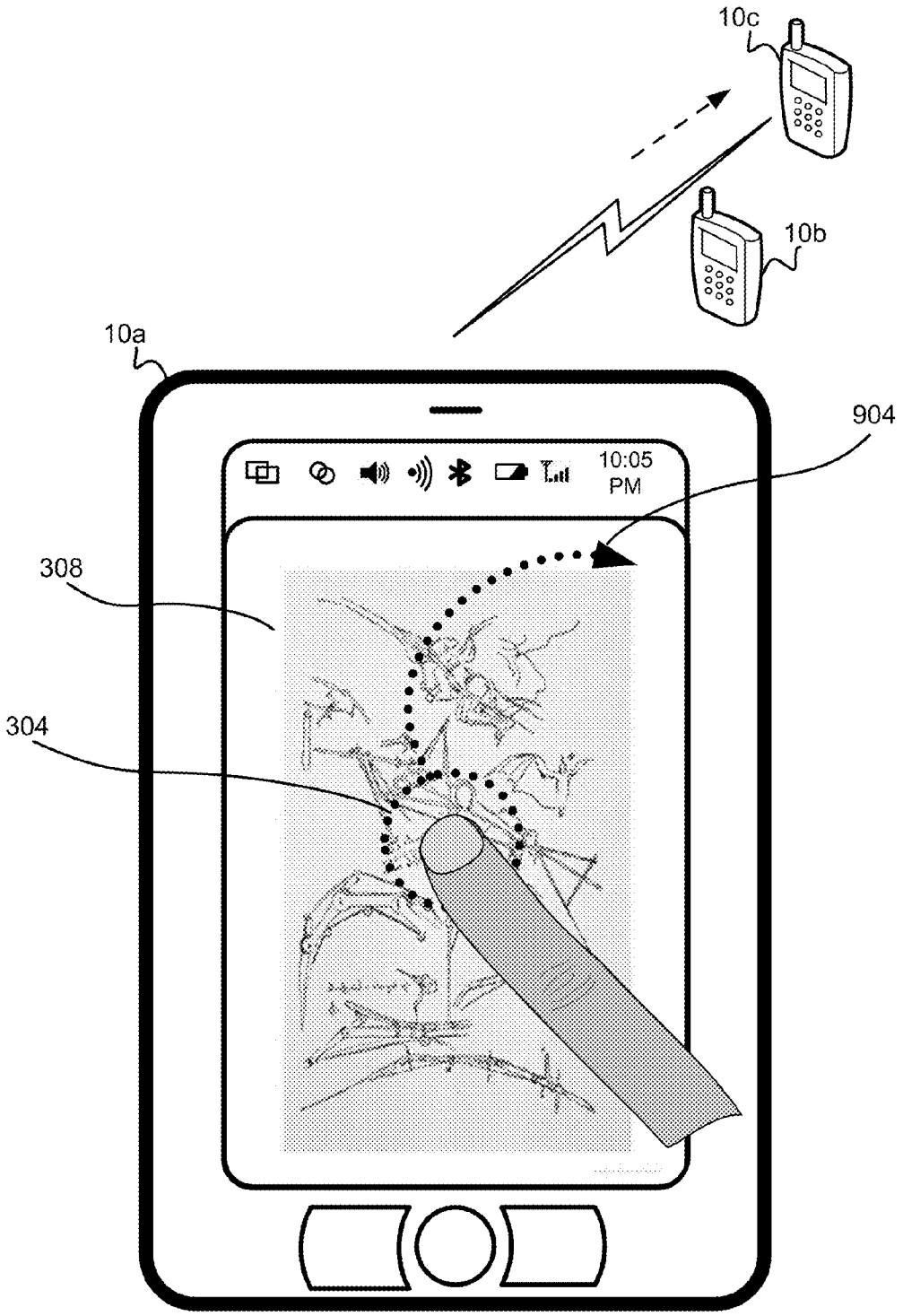


FIG. 12

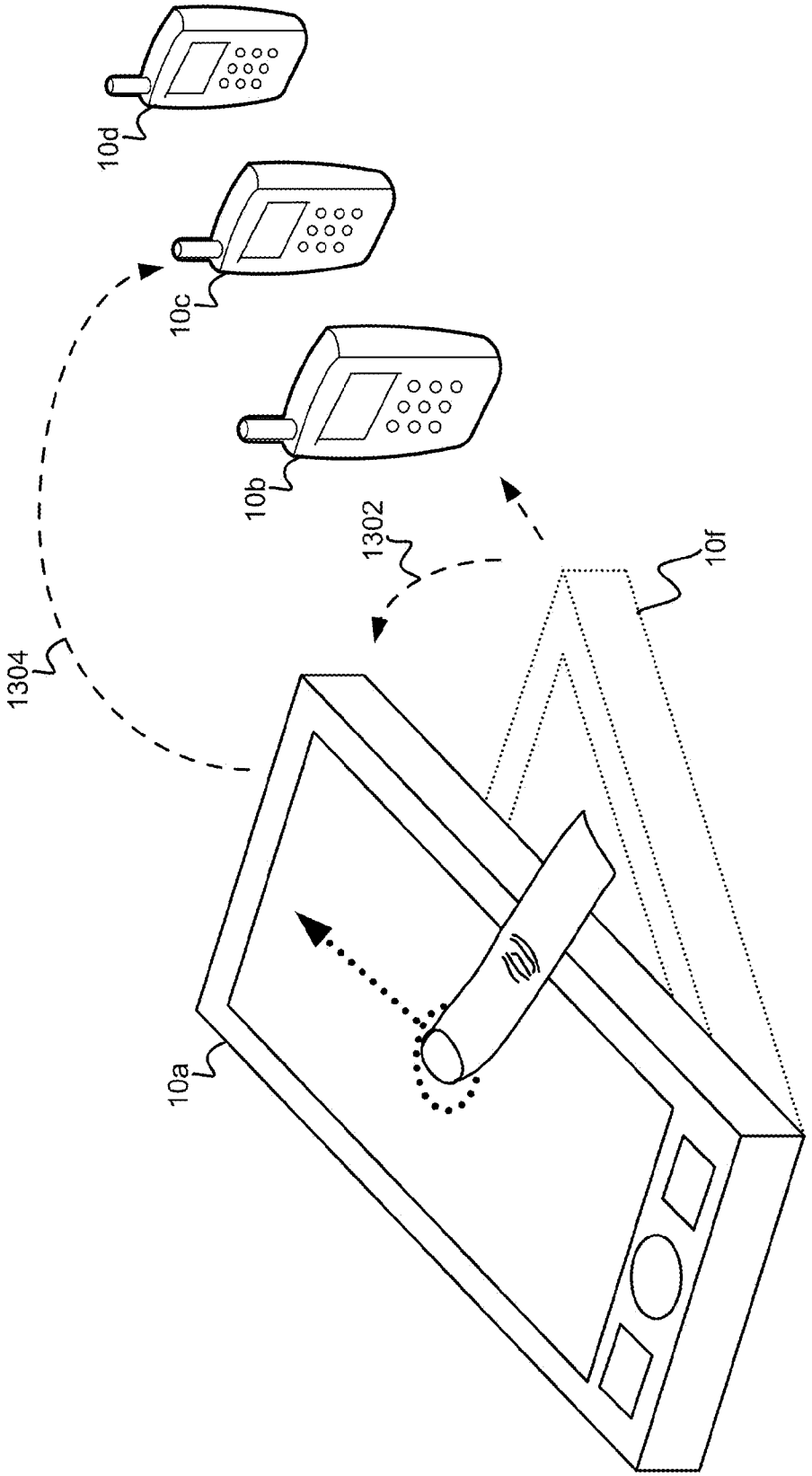


FIG. 13

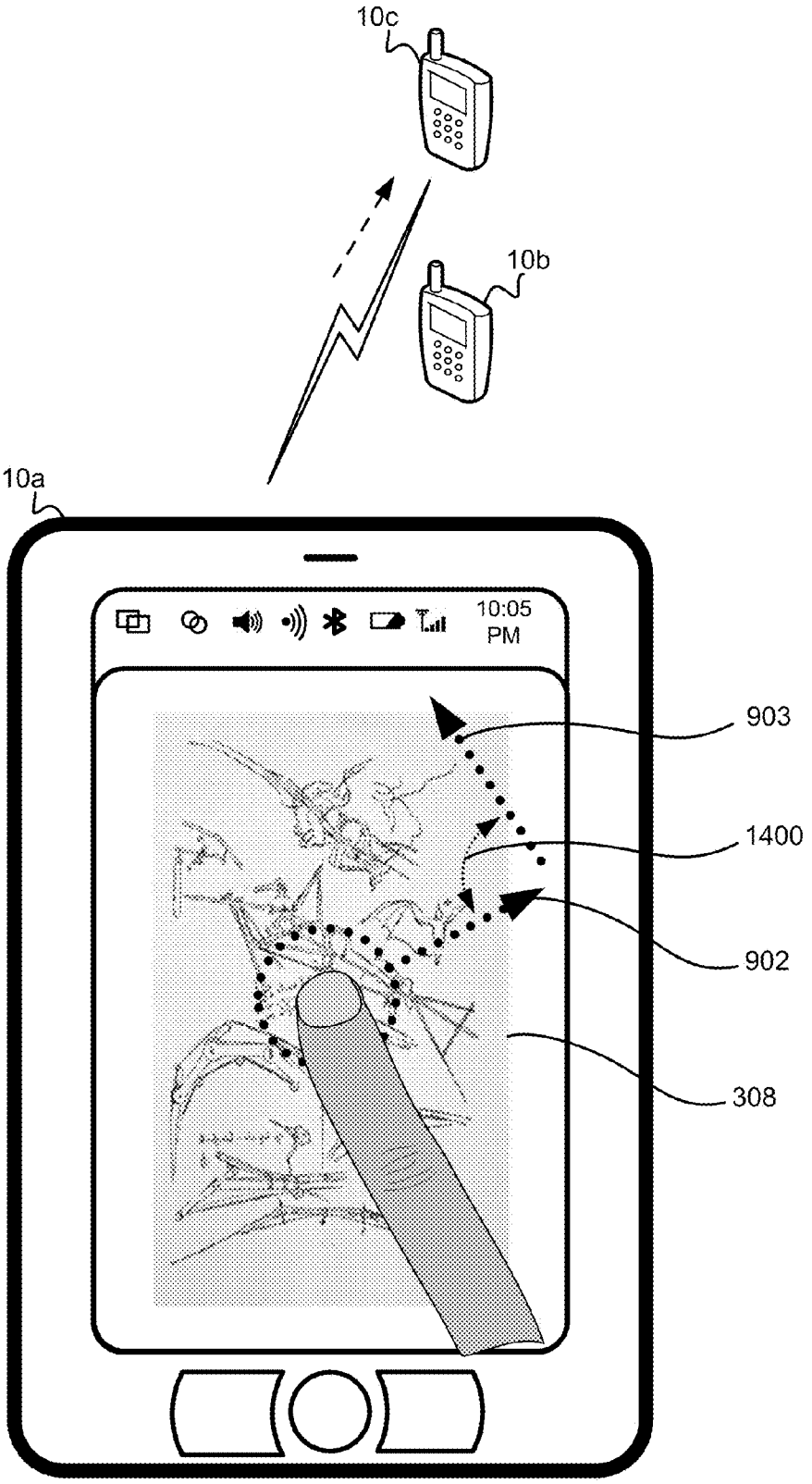


FIG. 14

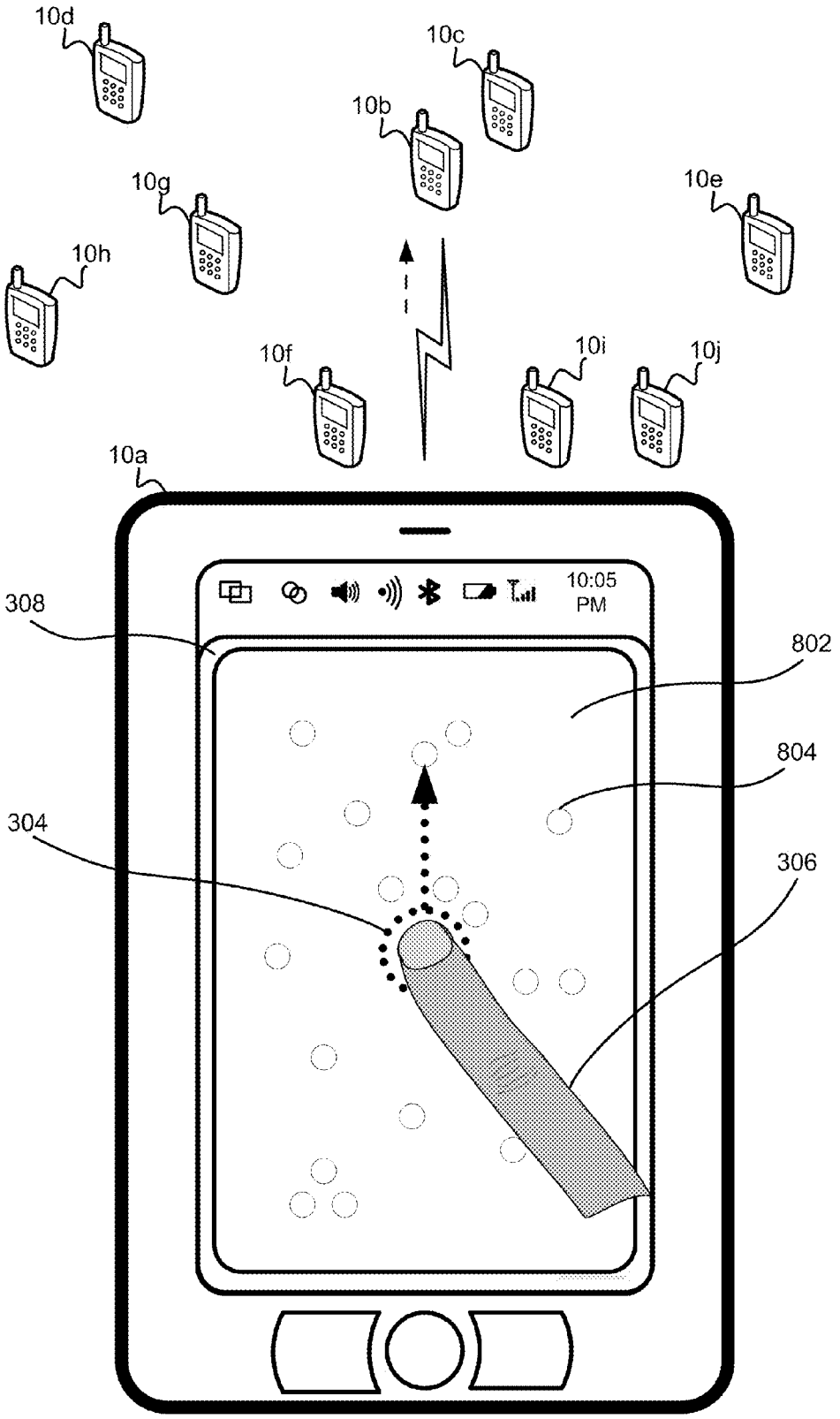

10d
10c
10b
10g
10e
10h
10f
10i
10j
10a
10:05
PM
308
802
804
304
306

FIG. 15

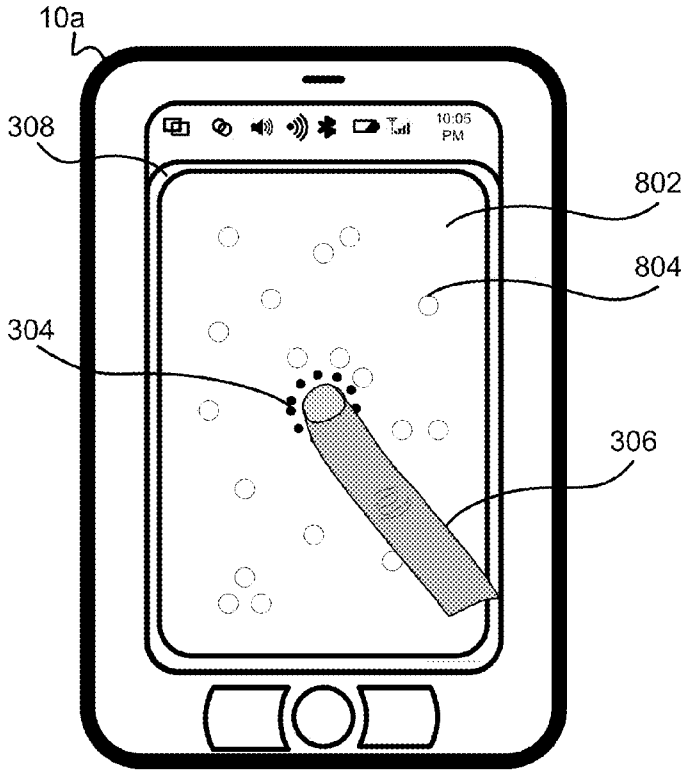


FIG. 16A

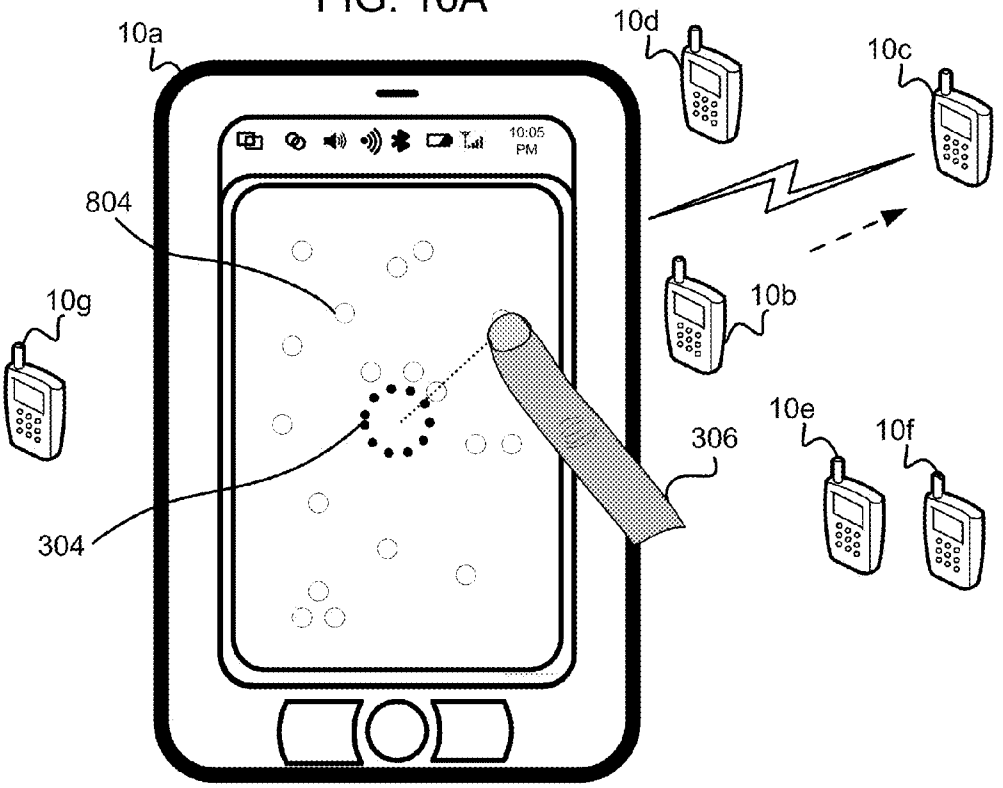


FIG. 16B

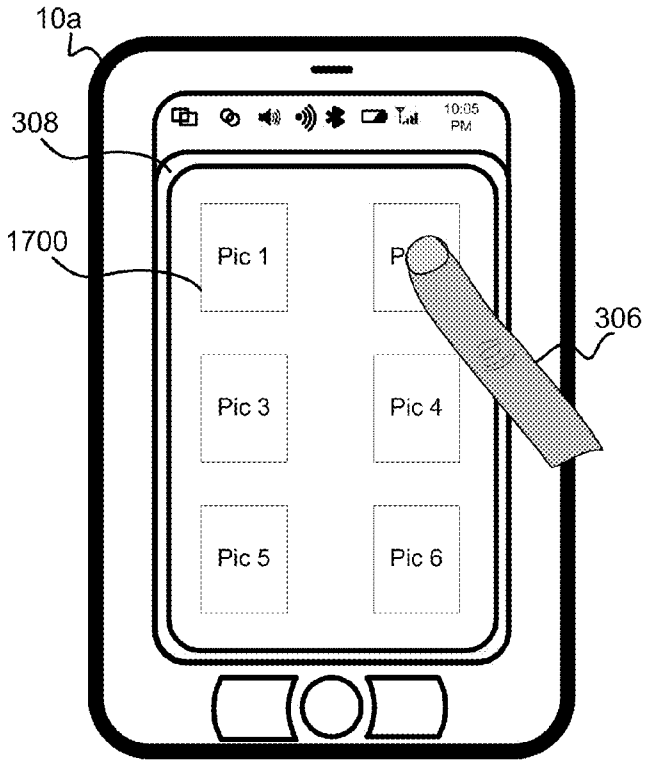

10a
308
1700
Pic 1
Pic 3
Pic 4
Pic 5
Pic 6
306
10:05 PM

FIG. 17

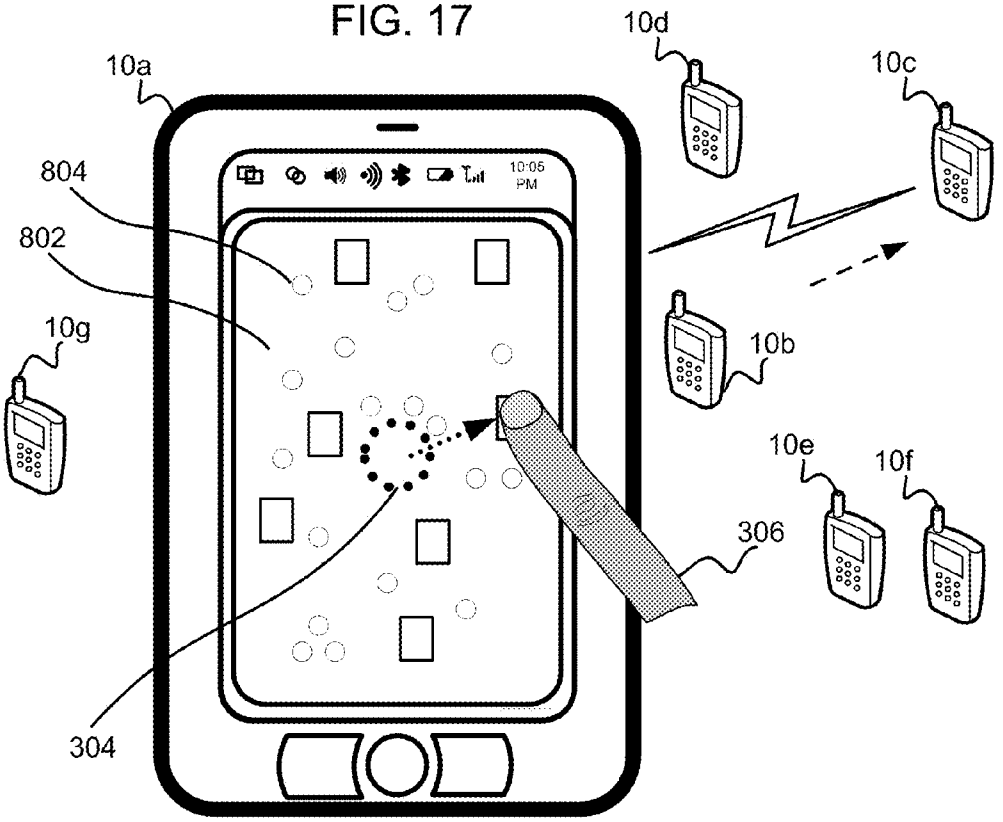

10a
804
802
10g
304
10d
10c
10b
10e
10f
306
10:05 PM

FIG. 18

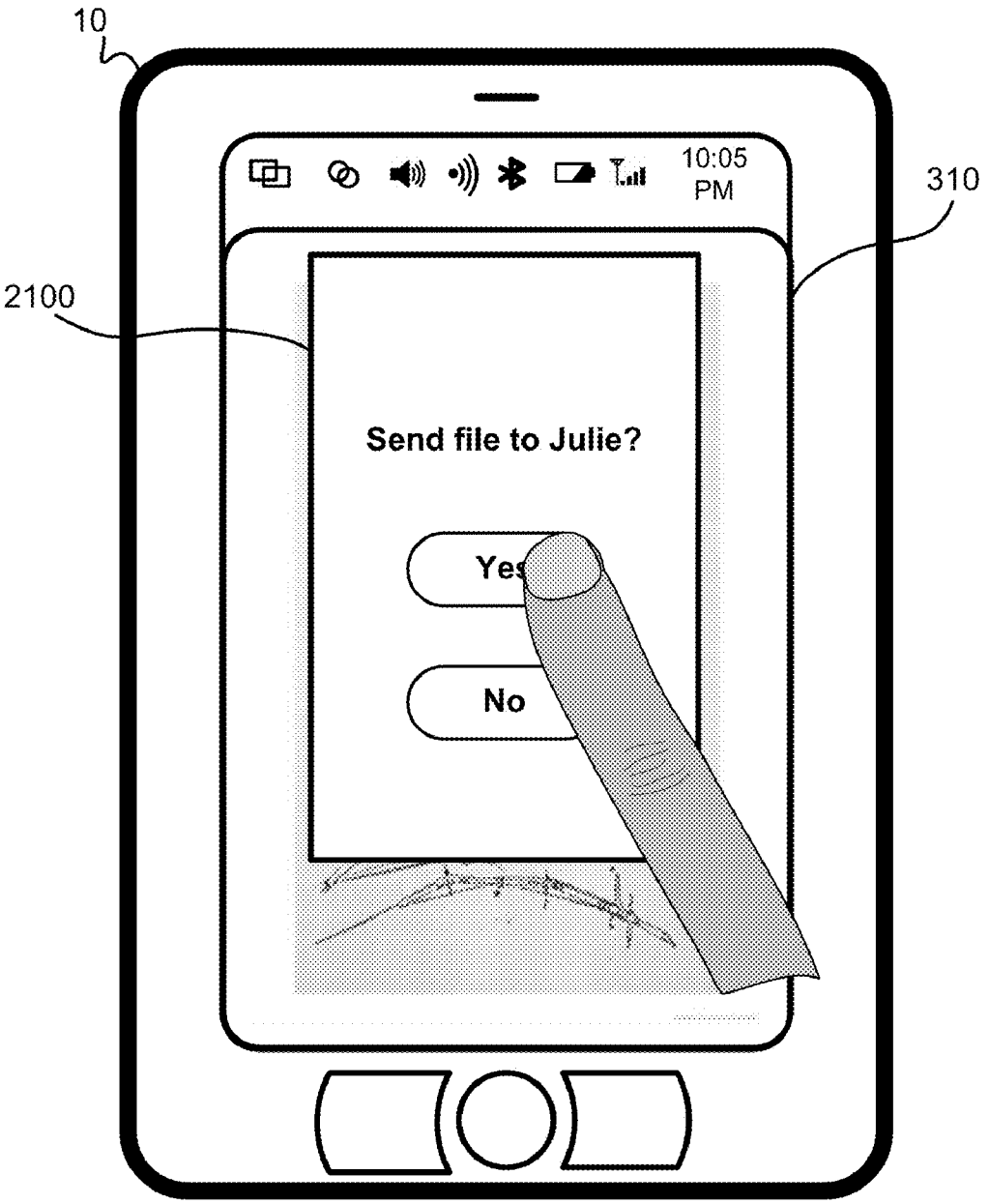


FIG. 19

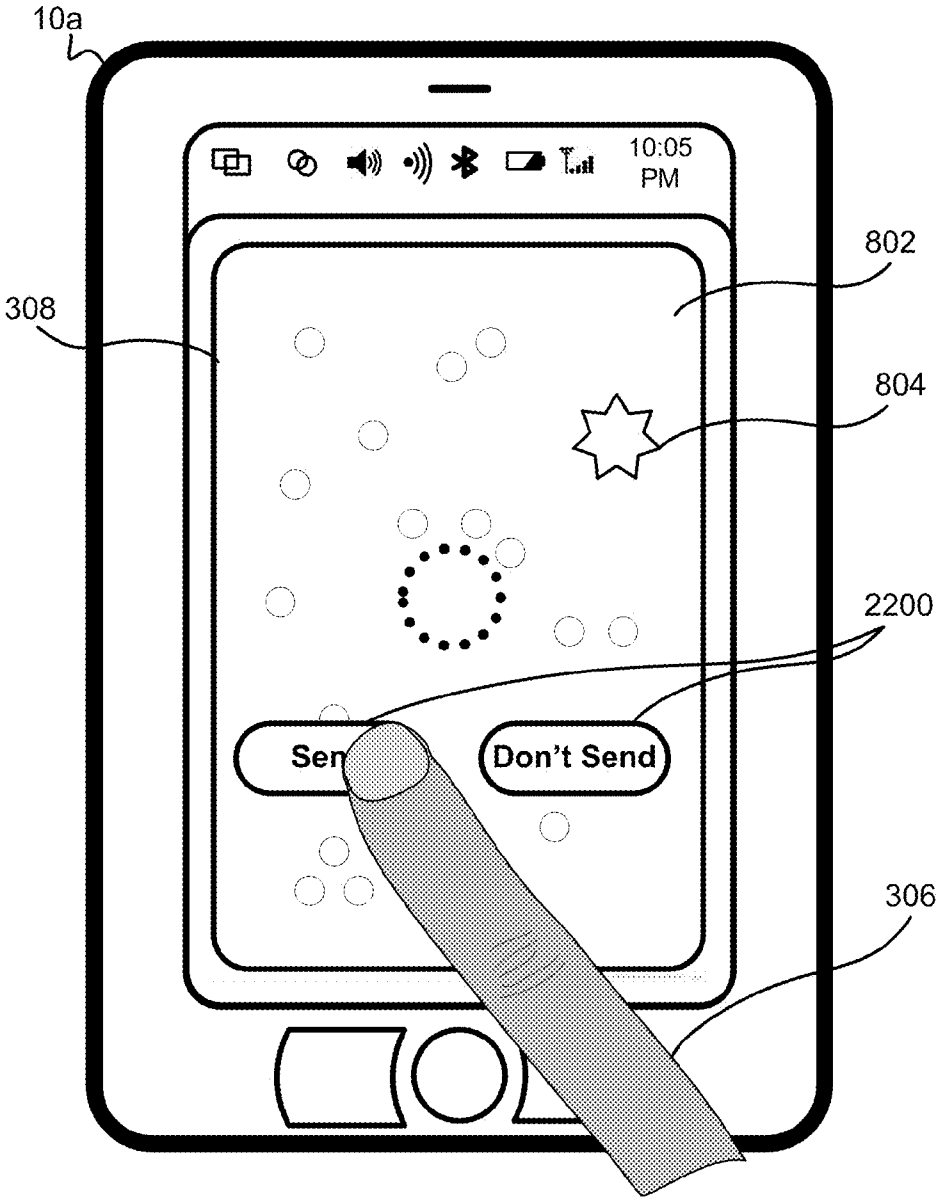


FIG. 20

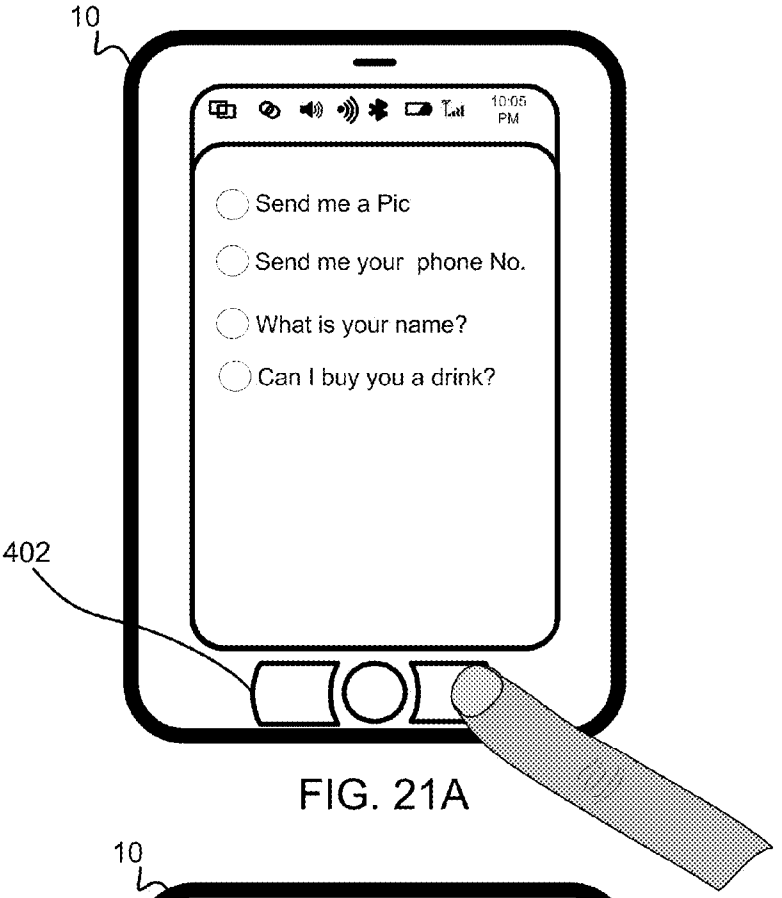


FIG. 21A

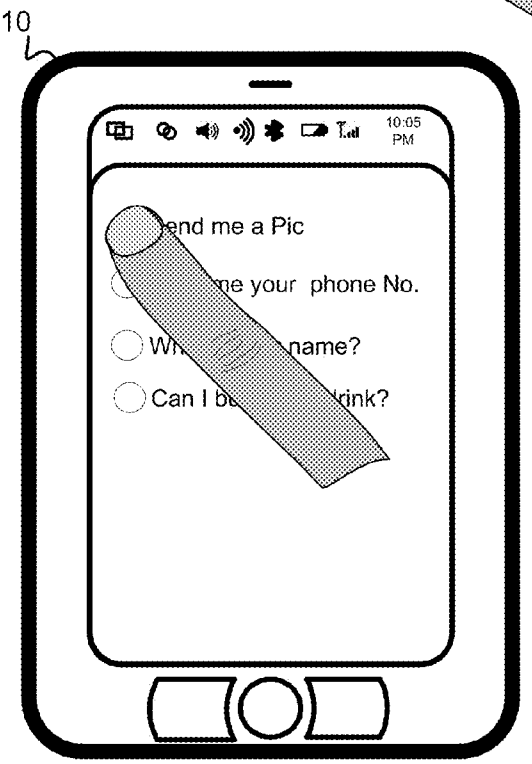


FIG. 21B

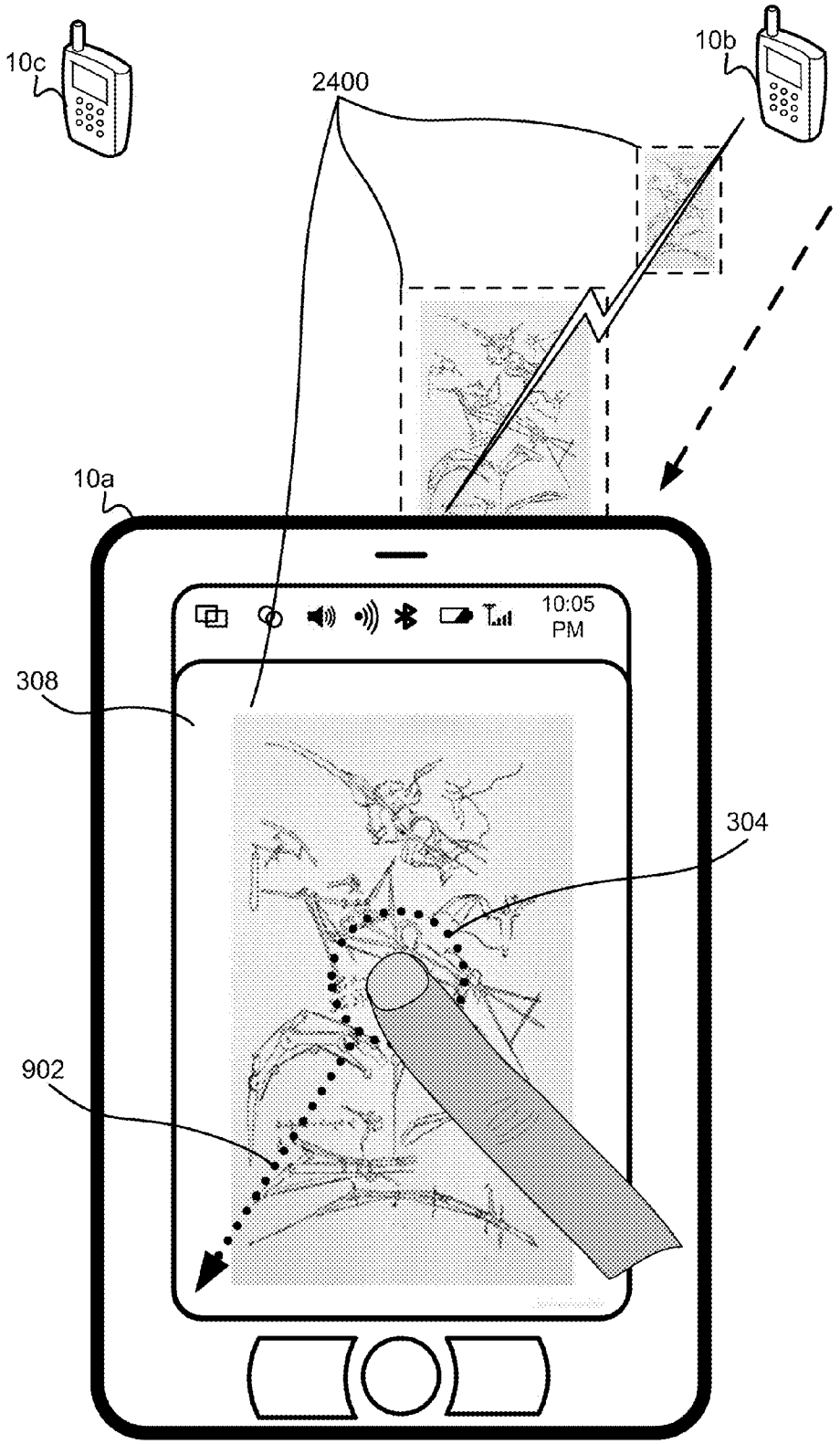


FIG. 22

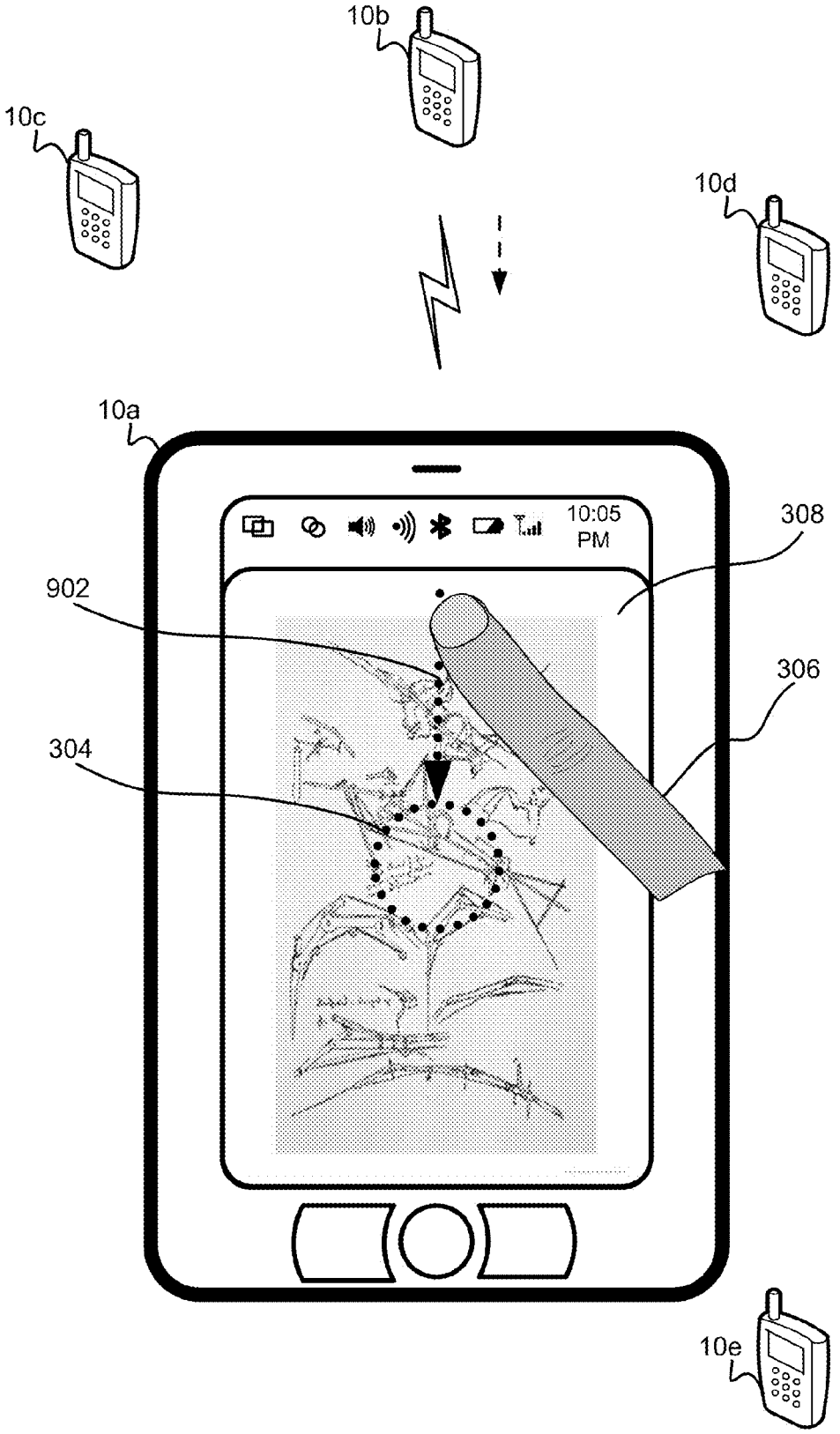


FIG. 23

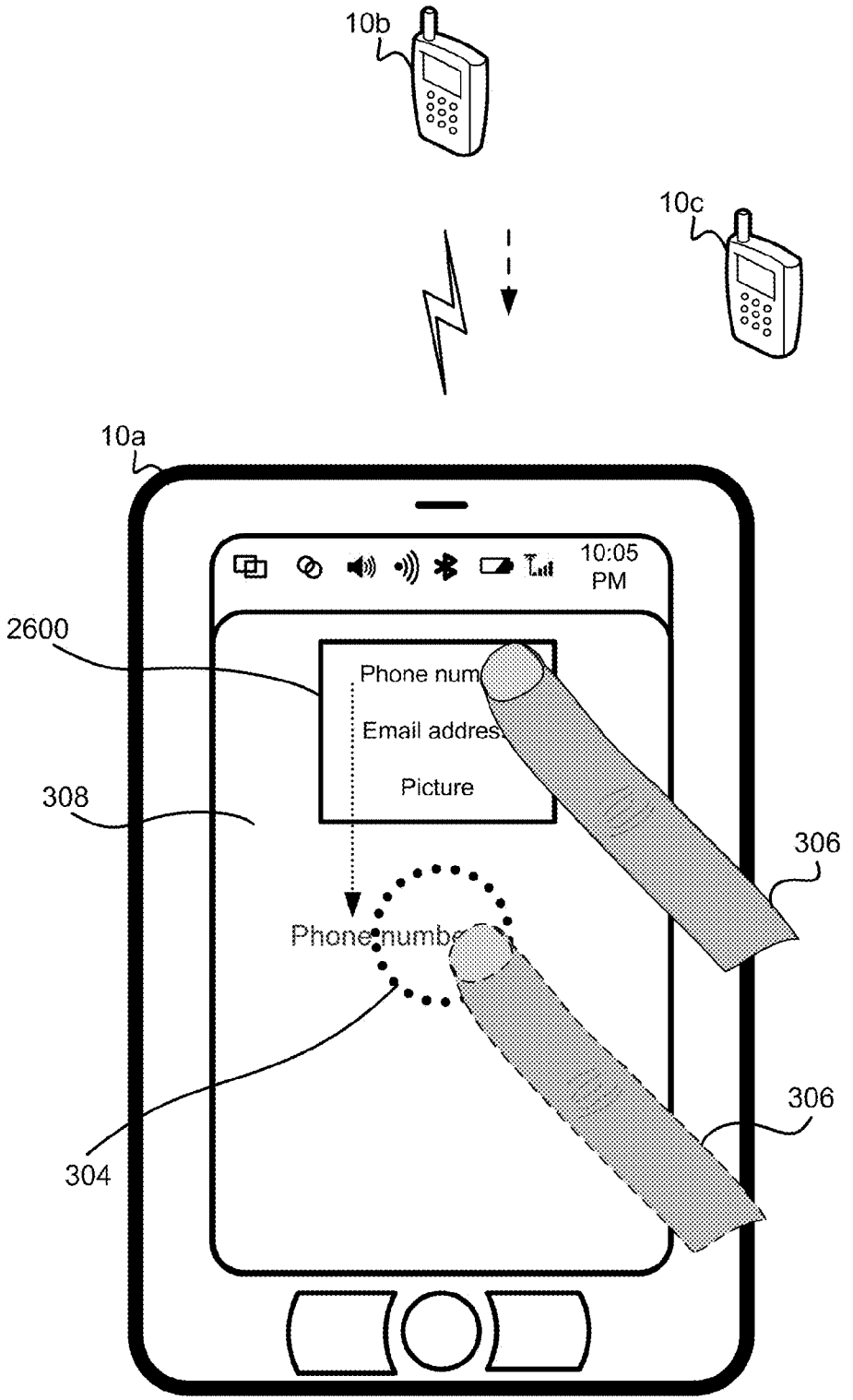

10b
10c
10a
10:05
PM
2600
Phone num
Email addres
Picture
308
306
Phone numbe
306
304

FIG. 24

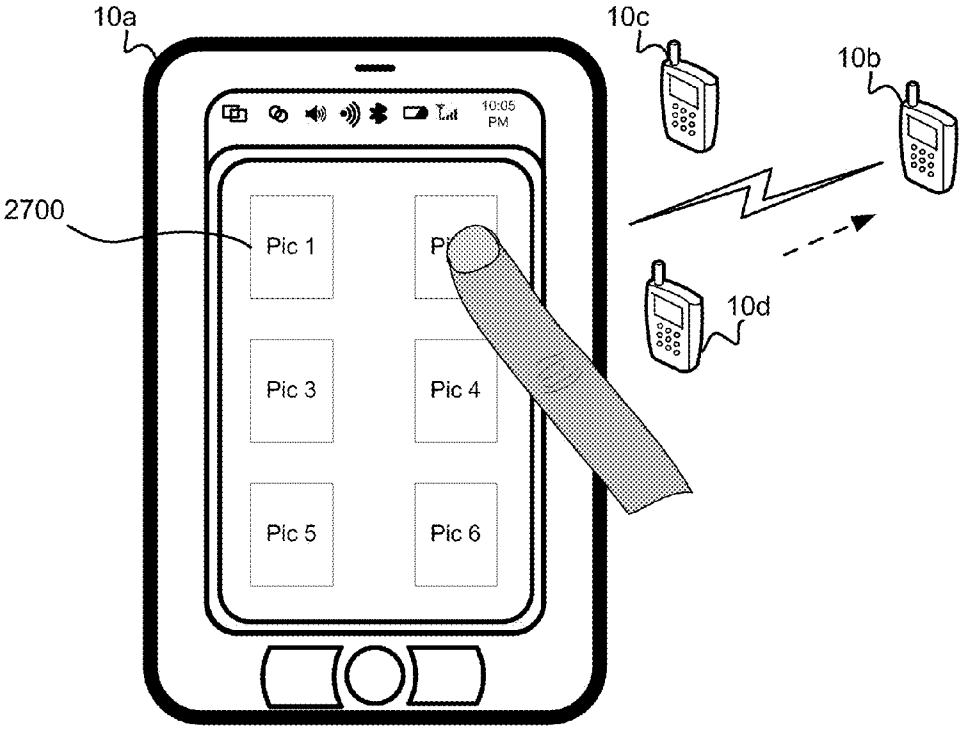

10a
10c
10b
10:05 PM
2700
Pic 1
Pic 3
Pic 4
Pic 5
Pic 6
10d

FIG. 25

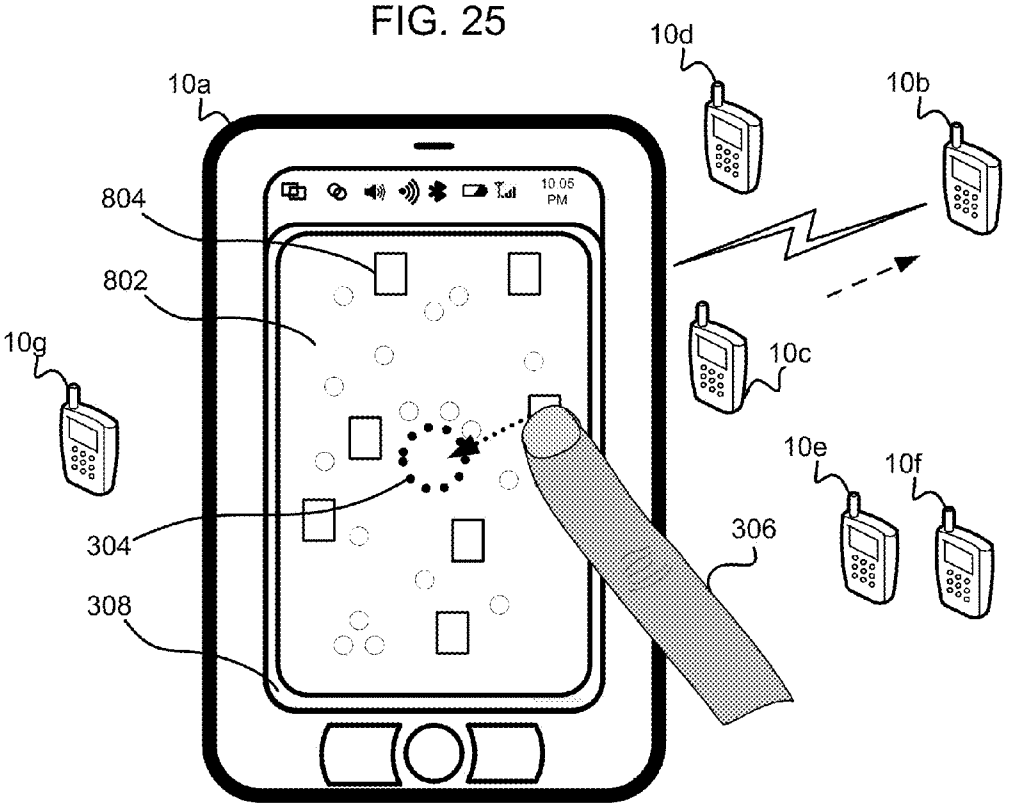

10d
10a
10b
10:05 PM
804
802
10g
10c
10e
10f
304
306
308

FIG. 26

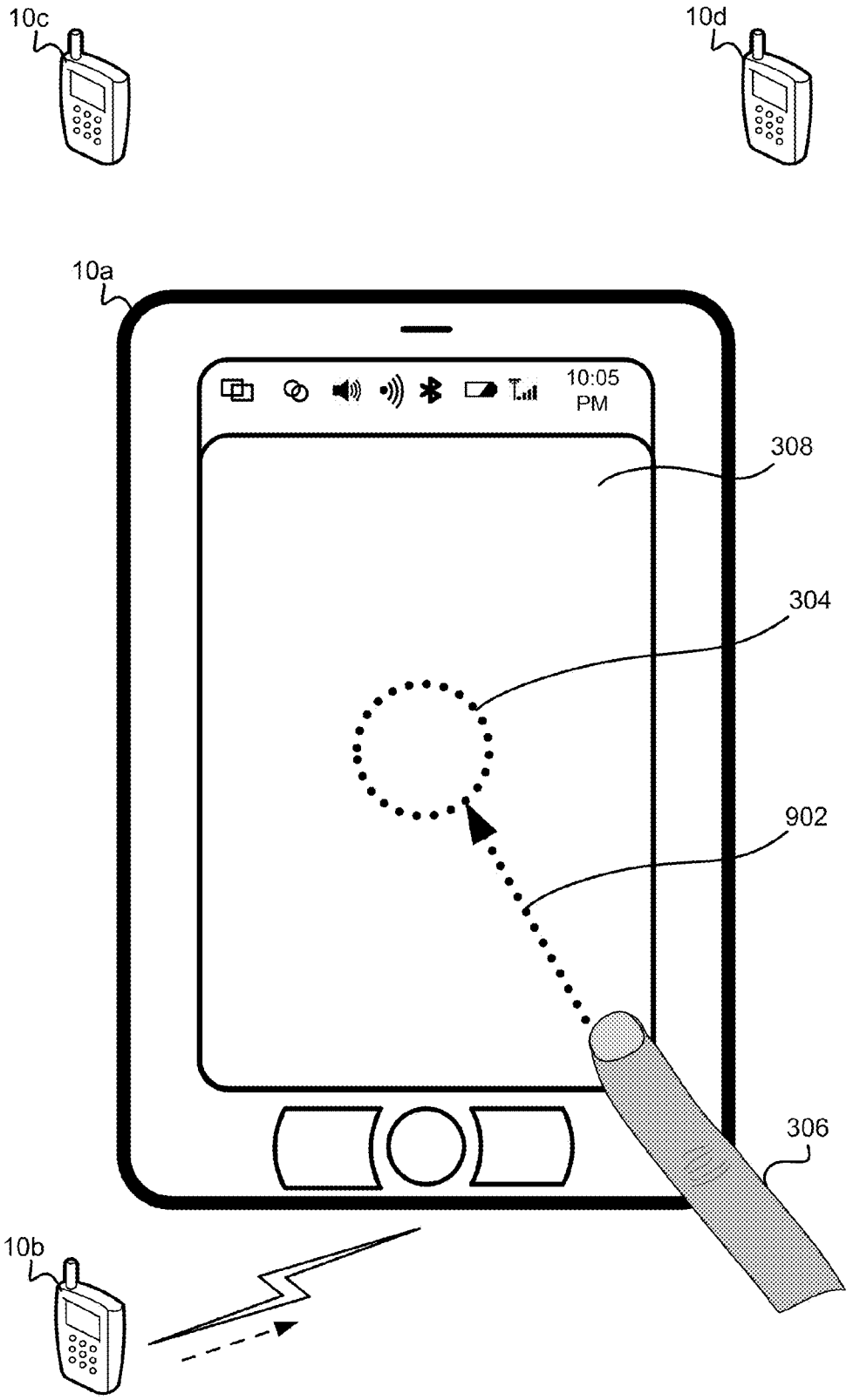


FIG. 27

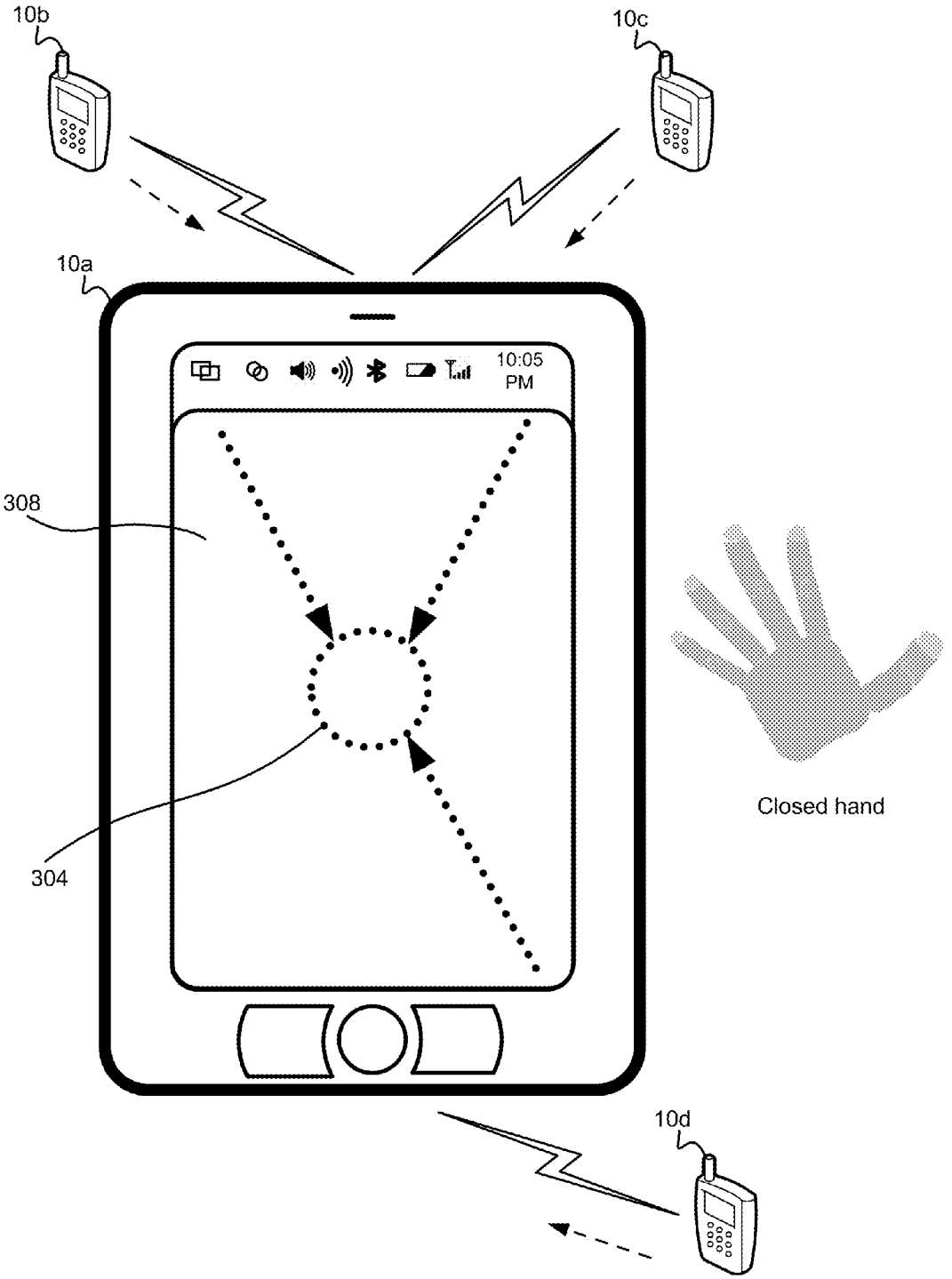


FIG. 28

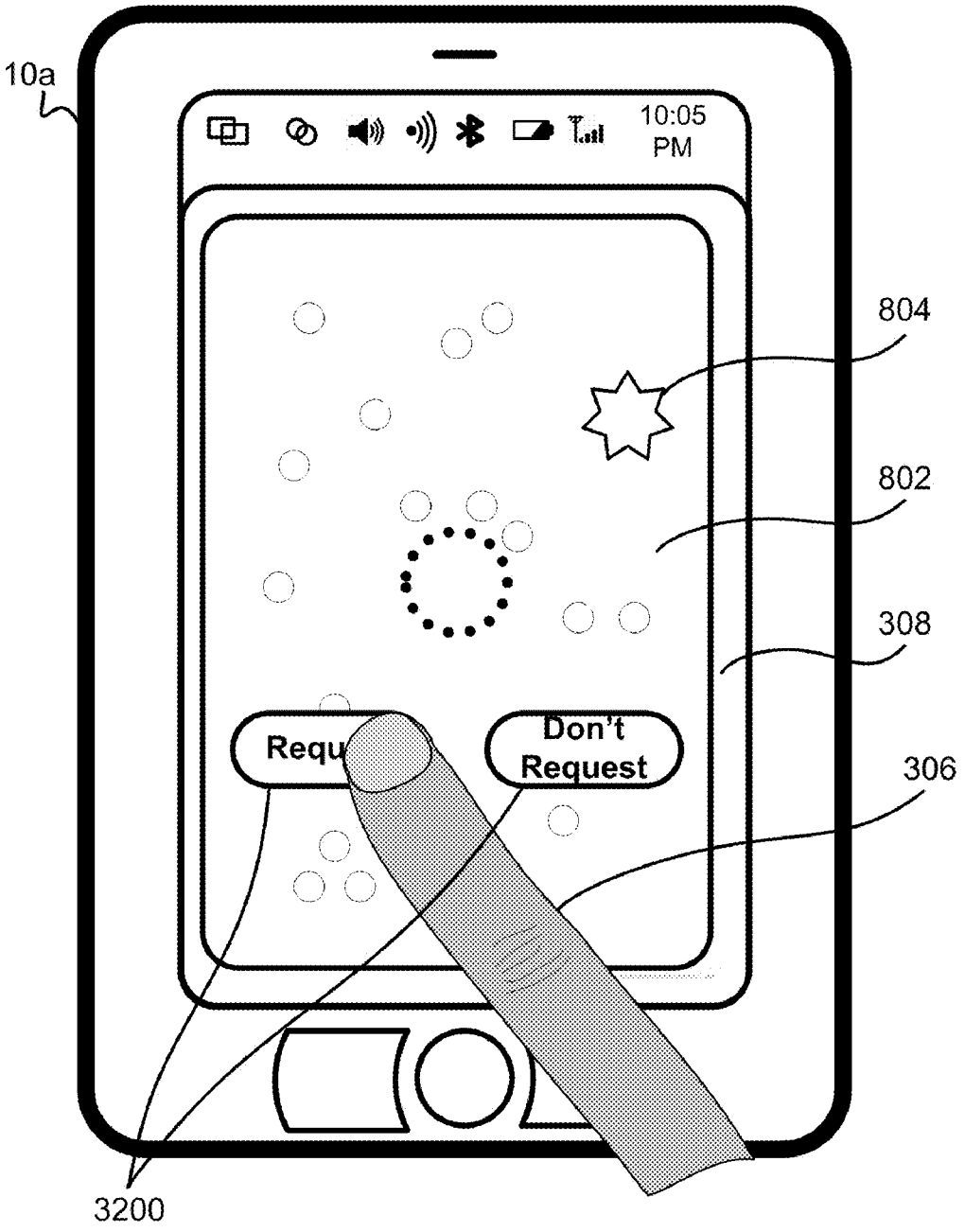


FIG. 29

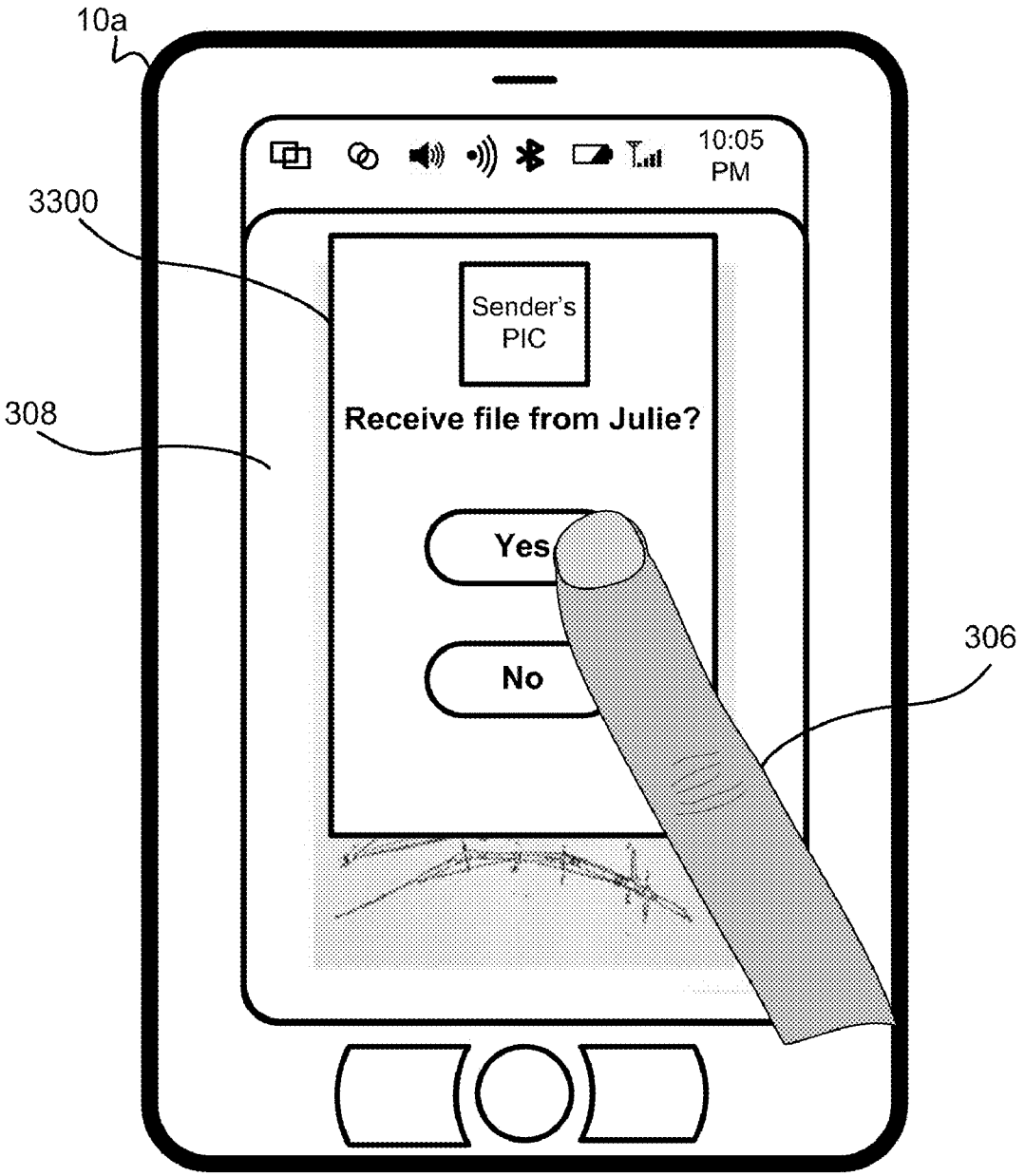

10a
10:05
PM
3300
Sender's
PIC
308
Receive file from Julie?
Yes
No
306

FIG. 30

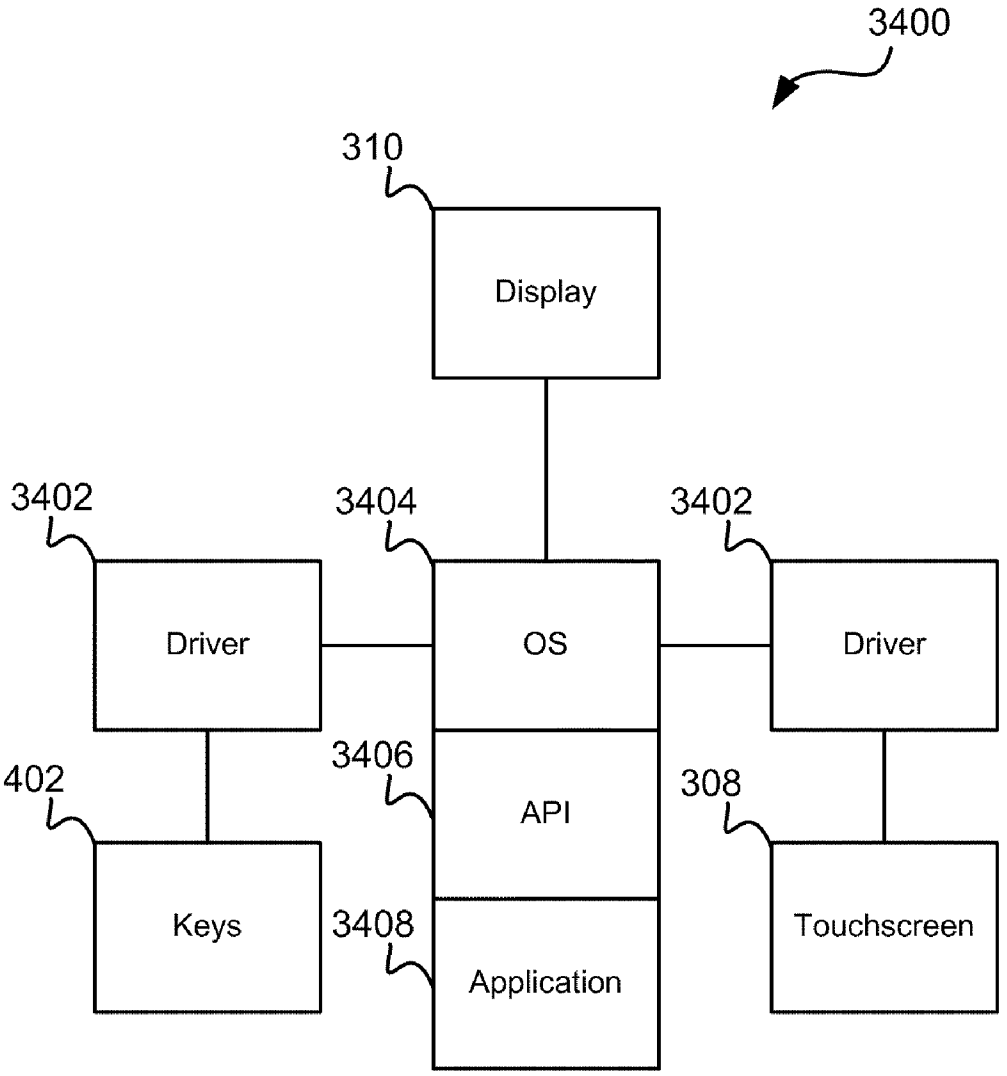

3400
310
Display
3402
3404
3402
Driver
OS
Driver
3406
API
402
308
Keys
3408
Application
Touchscreen

FIG. 31

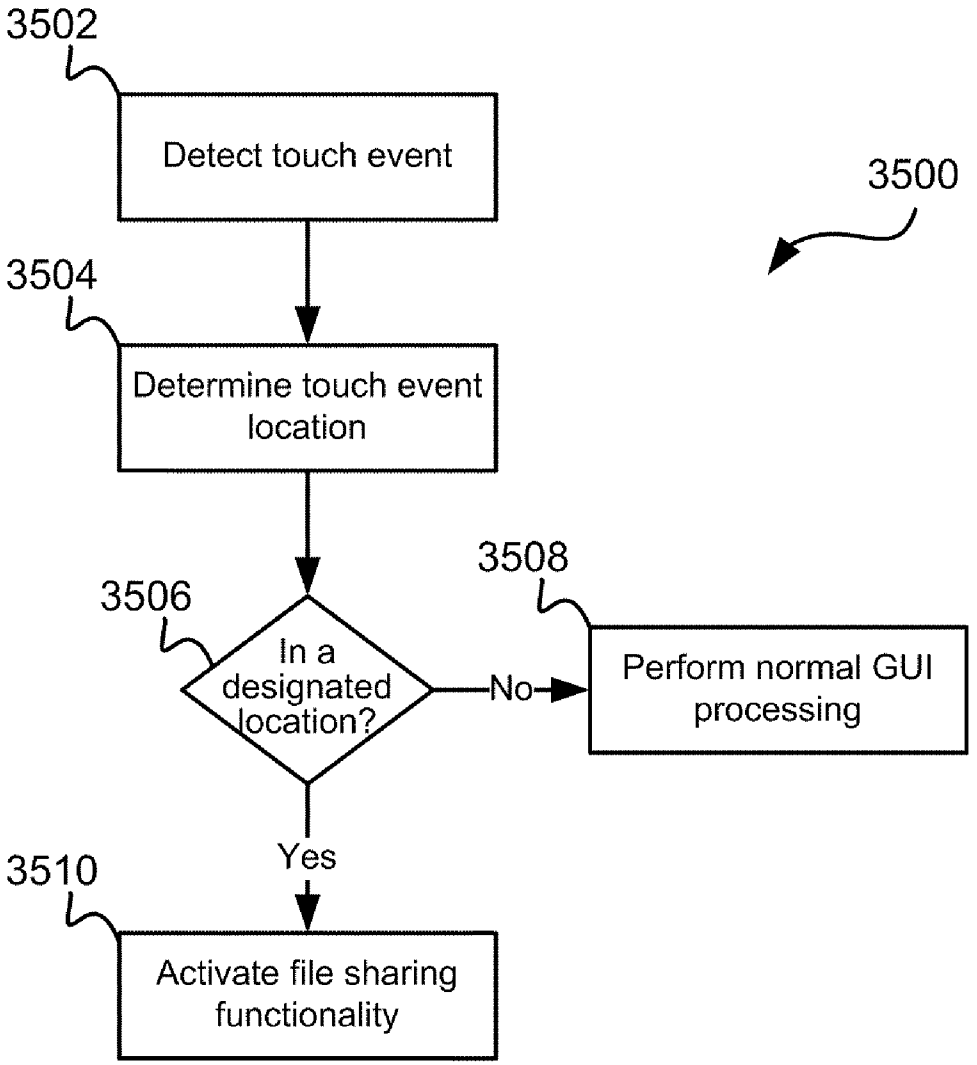

3502
Detect touch event
3500
3504
Determine touch event location
3508
3506
In a designated location?
No
Perform normal GUI processing
Yes
3510
Activate file sharing functionality

FIG. 32

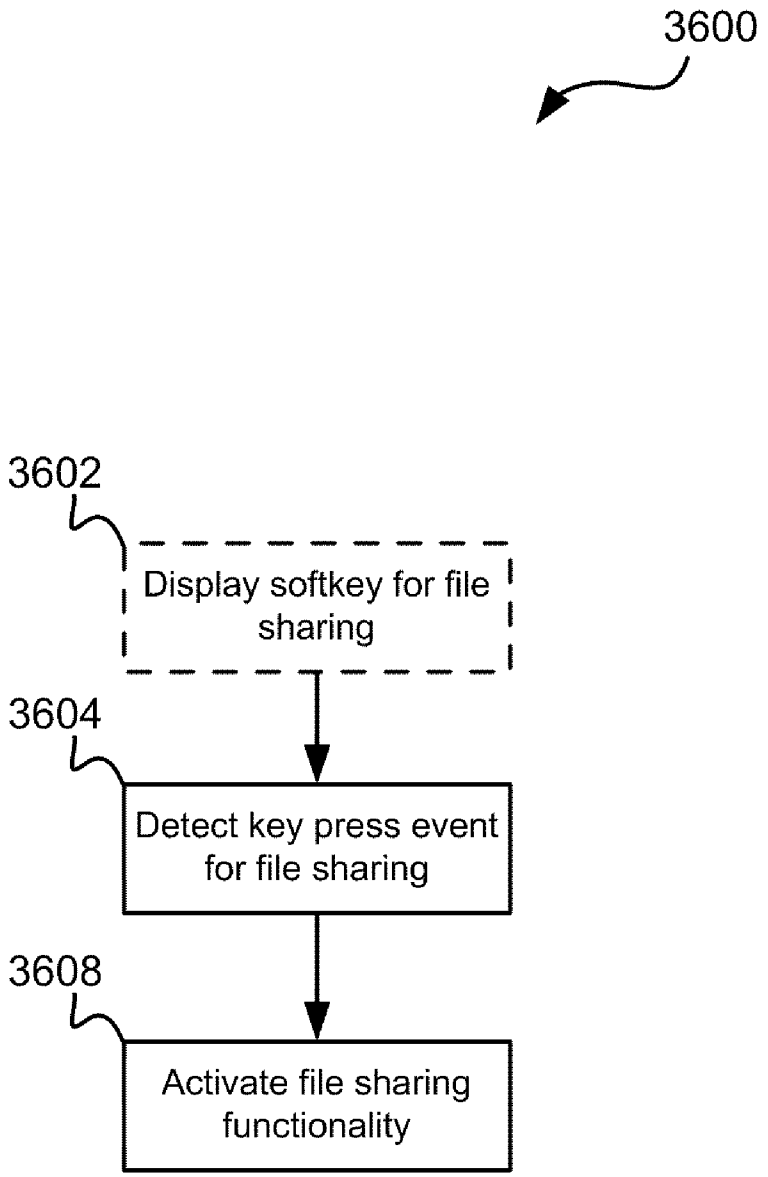

3600
3602
Display softkey for file sharing
3604
Detect key press event for file sharing
3608
Activate file sharing functionality

FIG. 33

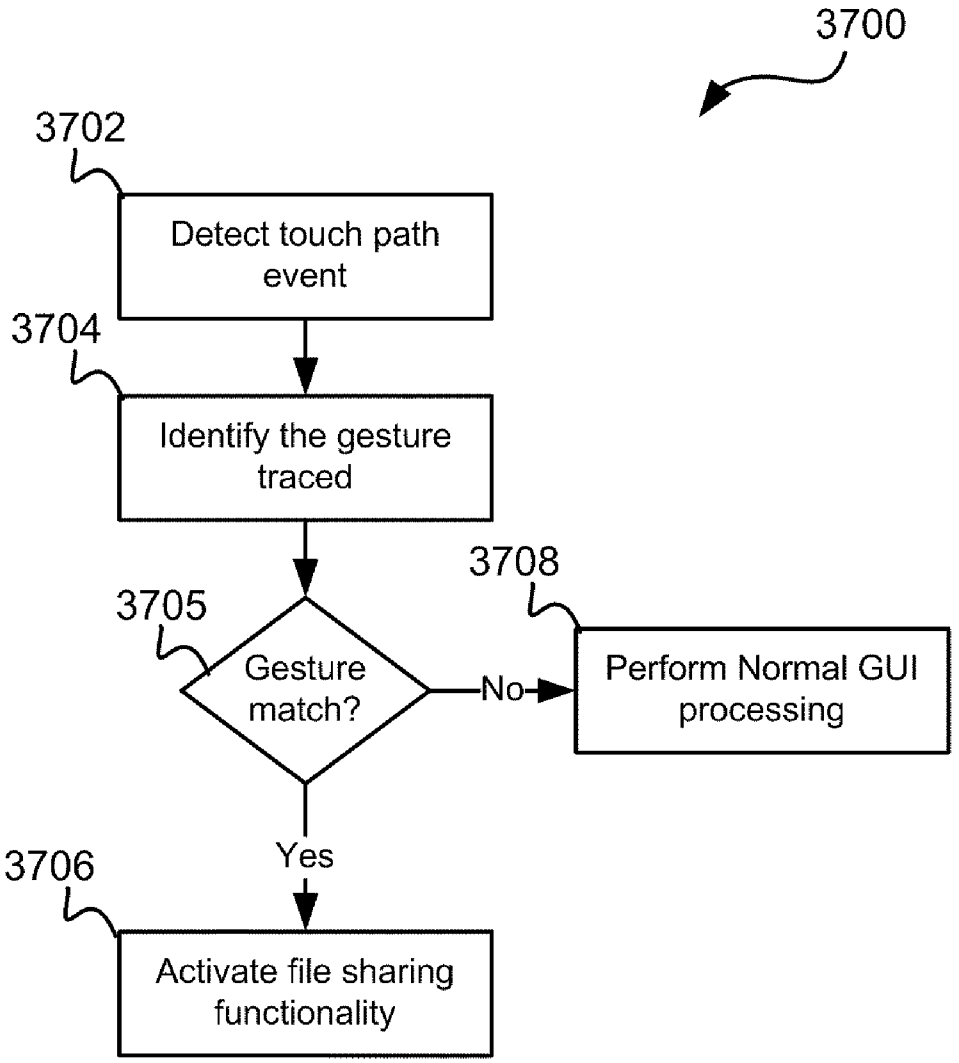

3700
3702
Detect touch path event
3704
Identify the gesture traced
3705
Gesture match?
No
3708
Perform Normal GUI processing
Yes
3706
Activate file sharing functionality

FIG. 34

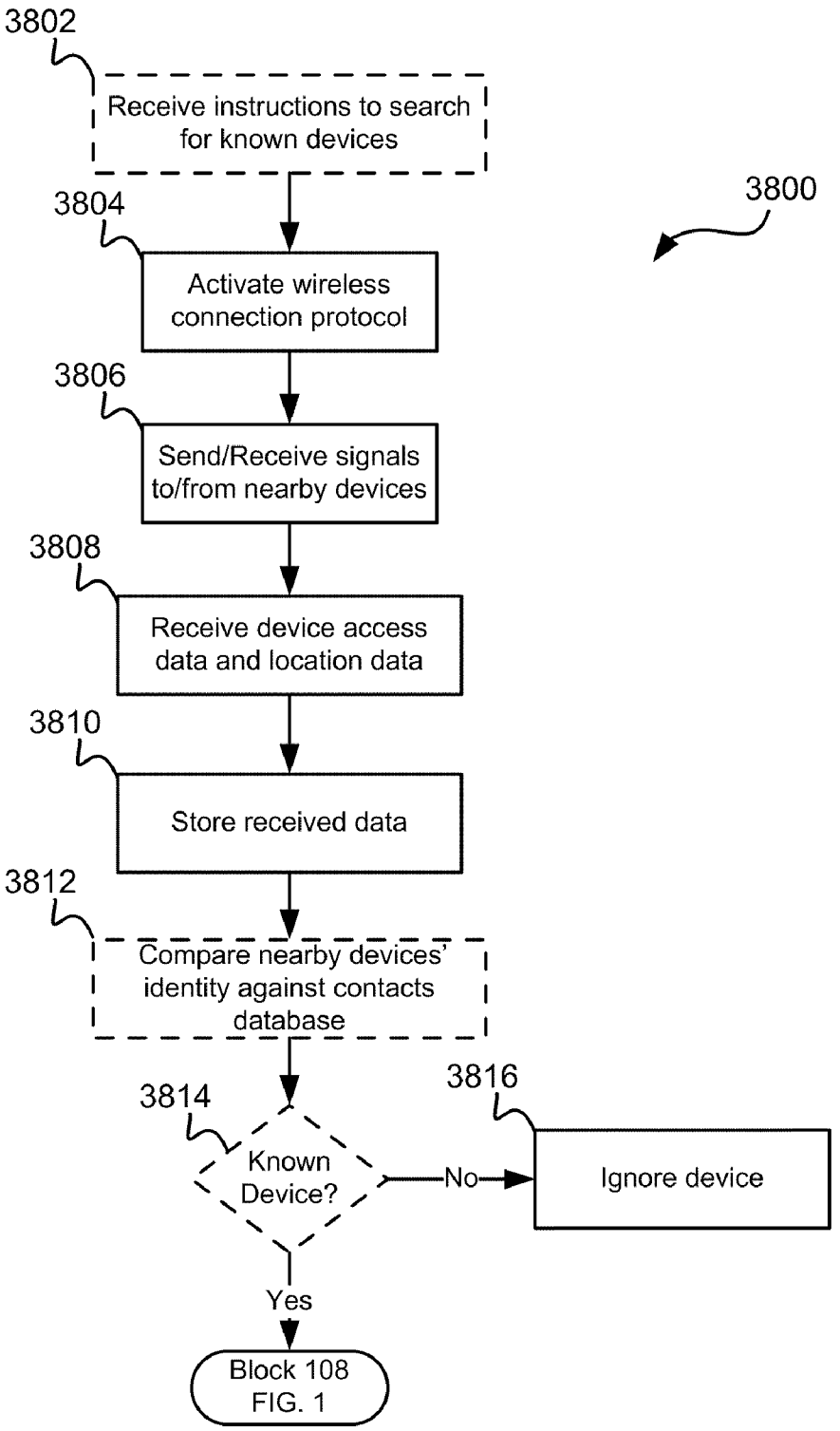

3802
Receive instructions to search for known devices
3800
3804
Activate wireless connection protocol
3806
Send/Receive signals to/from nearby devices
3808
Receive device access data and location data
3810
Store received data
3812
Compare nearby devices' identity against contacts database
3814
Known Device?
No
3816
Ignore device
Yes
Block 108 FIG. 1

FIG. 35

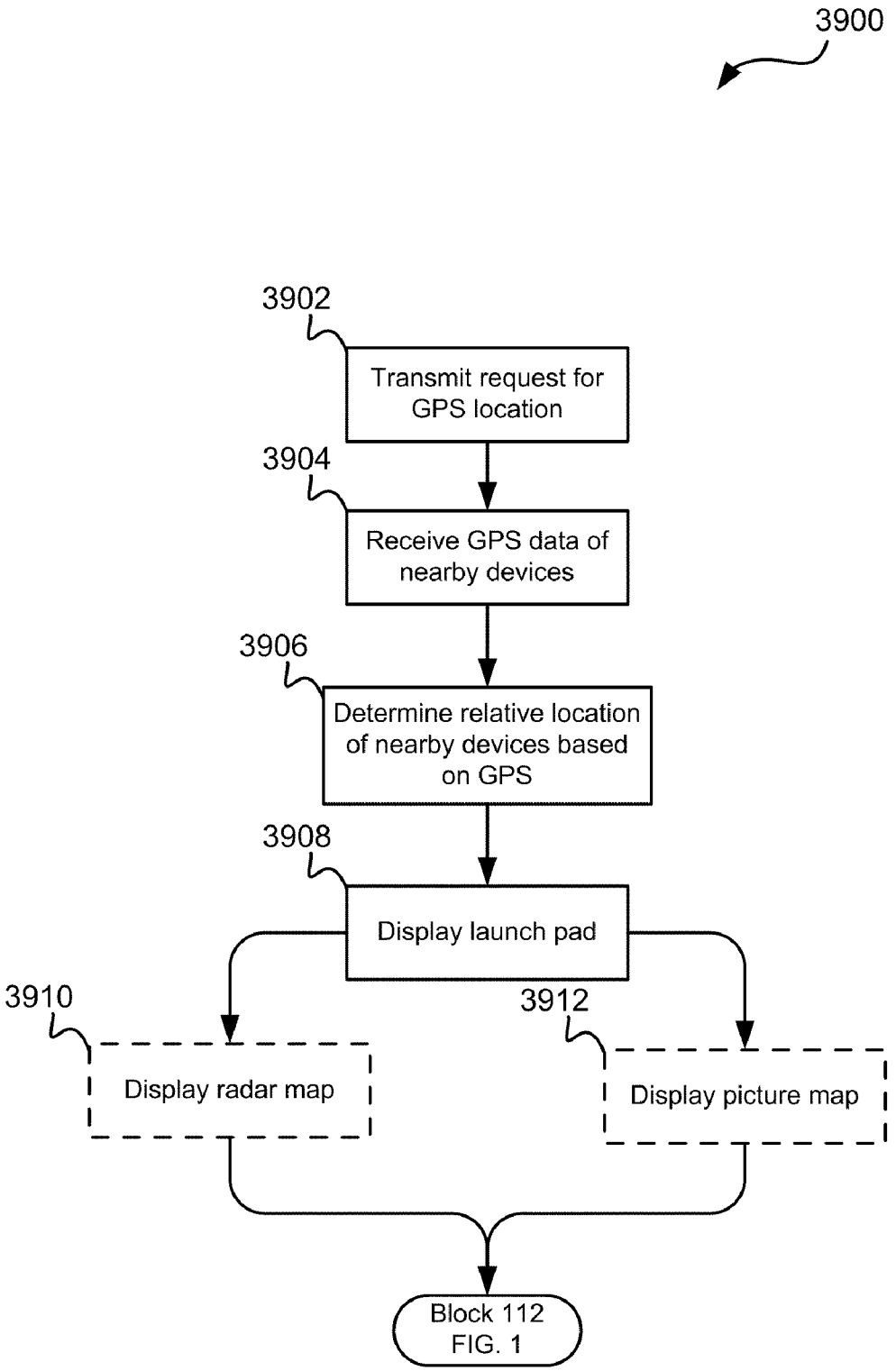

3900
3902
Transmit request for GPS location
3904
Receive GPS data of nearby devices
3906
Determine relative location of nearby devices based on GPS
3908
Display launch pad
3910
Display radar map
3912
Display picture map
Block 112
FIG. 1

FIG. 36

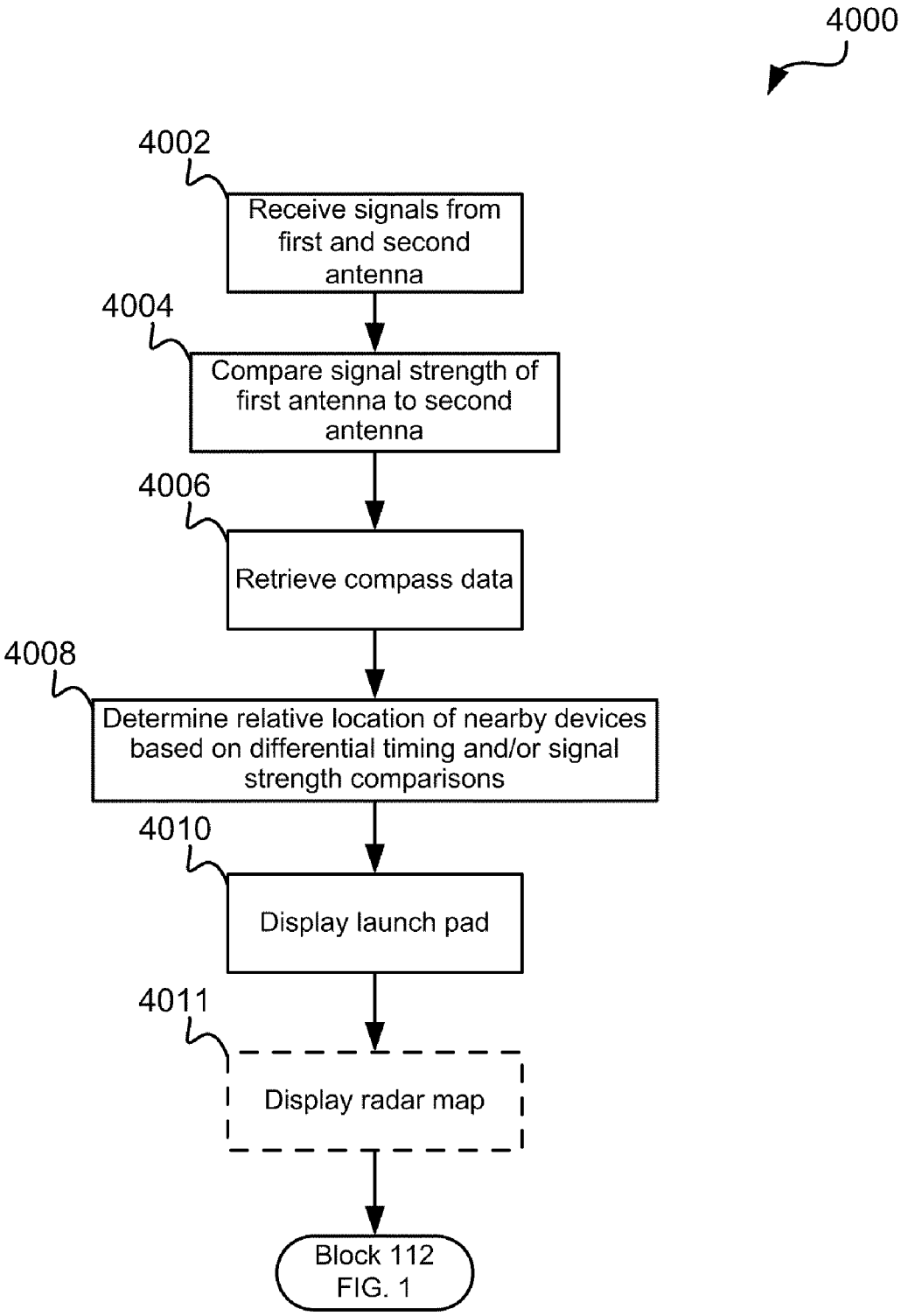

4000
4002
Receive signals from first and second antenna
4004
Compare signal strength of first antenna to second antenna
4006
Retrieve compass data
4008
Determine relative location of nearby devices based on differential timing and/or signal strength comparisons
4010
Display launch pad
4011
Display radar map
Block 112 FIG. 1

FIG. 37

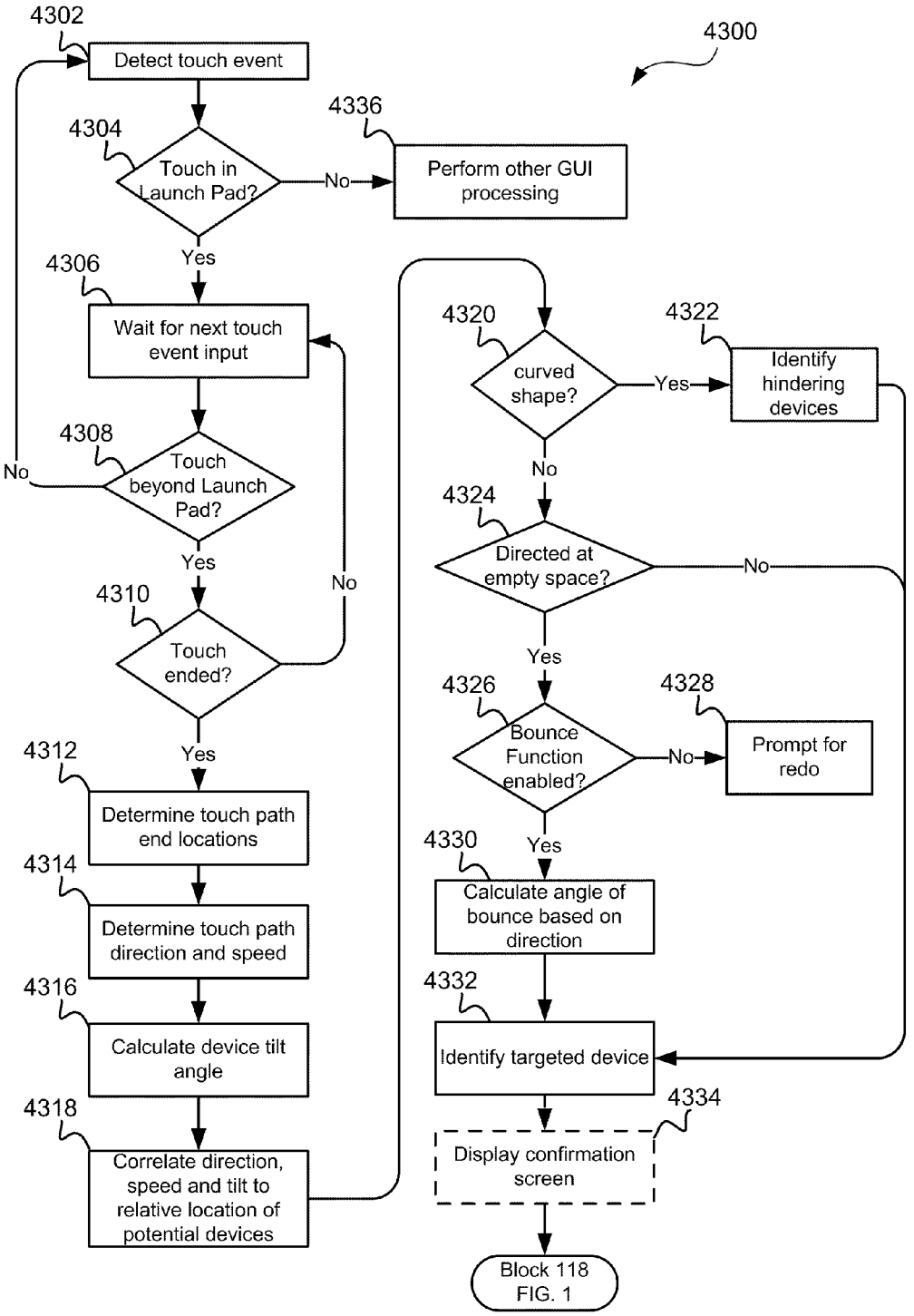

4300
4302
Detect touch event
4304
Touch in Launch Pad?
No
4336
Perform other GUI processing
Yes
4306
Wait for next touch event input
4308
Touch beyond Launch Pad?
No
Yes
4310
Touch ended?
No
Yes
4312
Determine touch path end locations
4314
Determine touch path direction and speed
4316
Calculate device tilt angle
4318
Correlate direction, speed and tilt to relative location of potential devices
4320
curved shape?
Yes
4322
Identify hindering devices
No
4324
Directed at empty space?
No
Yes
4326
Bounce Function enabled?
No
4328
Prompt for redo
Yes
4330
Calculate angle of bounce based on direction
4332
Identify targeted device
4334
Display confirmation screen
Block 118 FIG. 1

FIG. 38

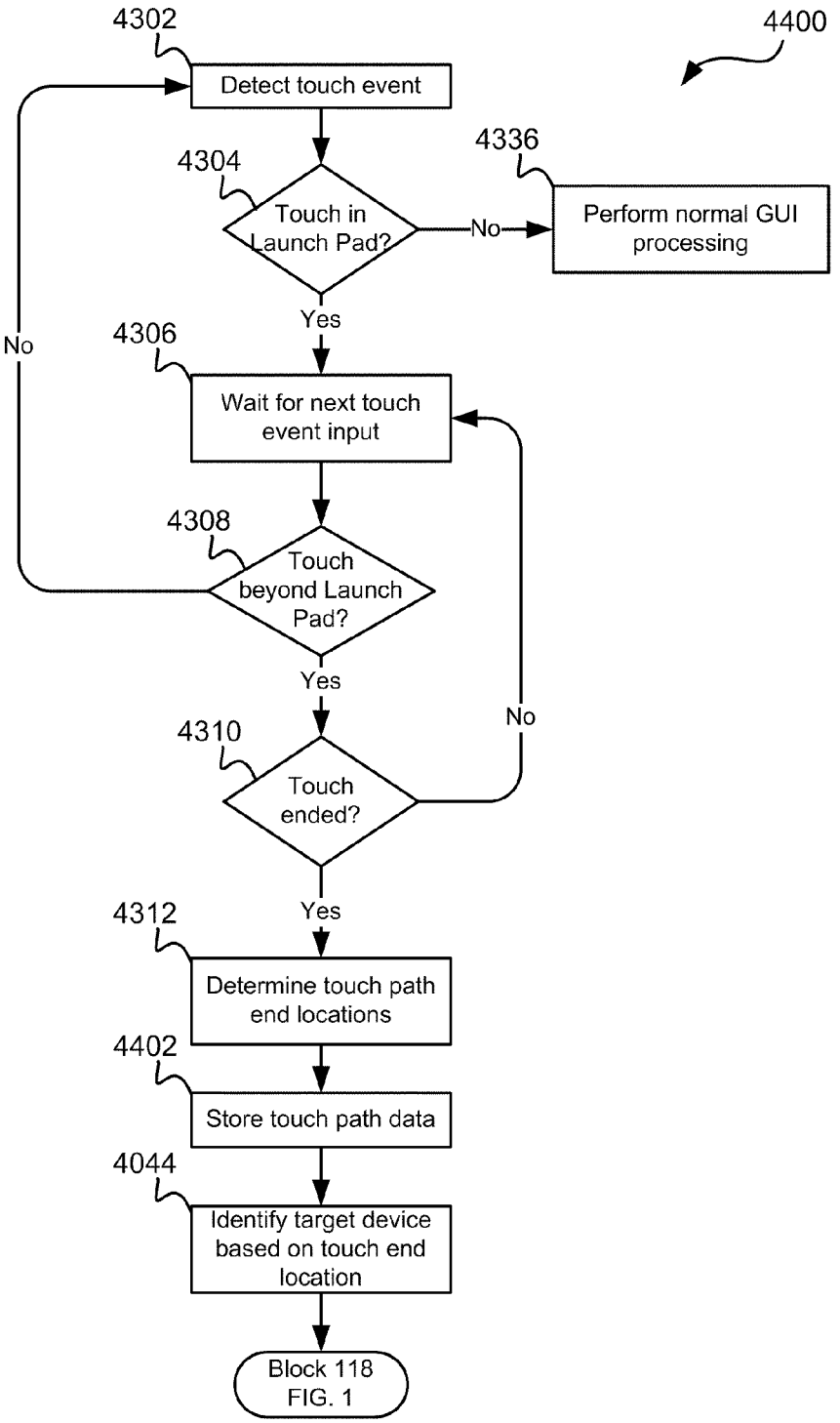

4400
4302
Detect touch event
4304
Touch in Launch Pad?
No
4336
Perform normal GUI processing
Yes
No
4306
Wait for next touch event input
4308
Touch beyond Launch Pad?
Yes
No
4310
Touch ended?
Yes
4312
Determine touch path end locations
4402
Store touch path data
4044
Identify target device based on touch end location
Block 118 FIG. 1

FIG. 39

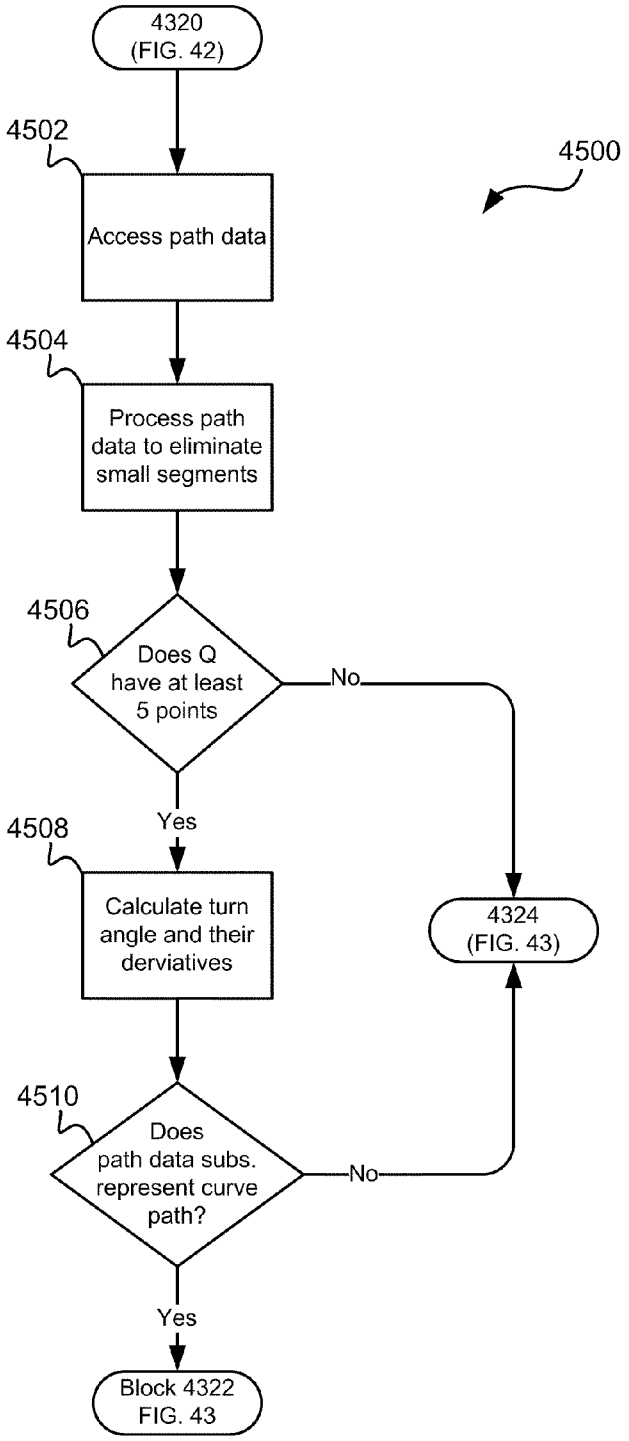

4320
(FIG. 42)
4500
4502
Access path data
4504
Process path data to eliminate small segments
4506
Does Q have at least 5 points
No
Yes
4508
Calculate turn angle and their derviatives
4324
(FIG. 43)
4510
Does path data subs. represent curve path?
No
Yes
Block 4322
FIG. 43

FIG. 40

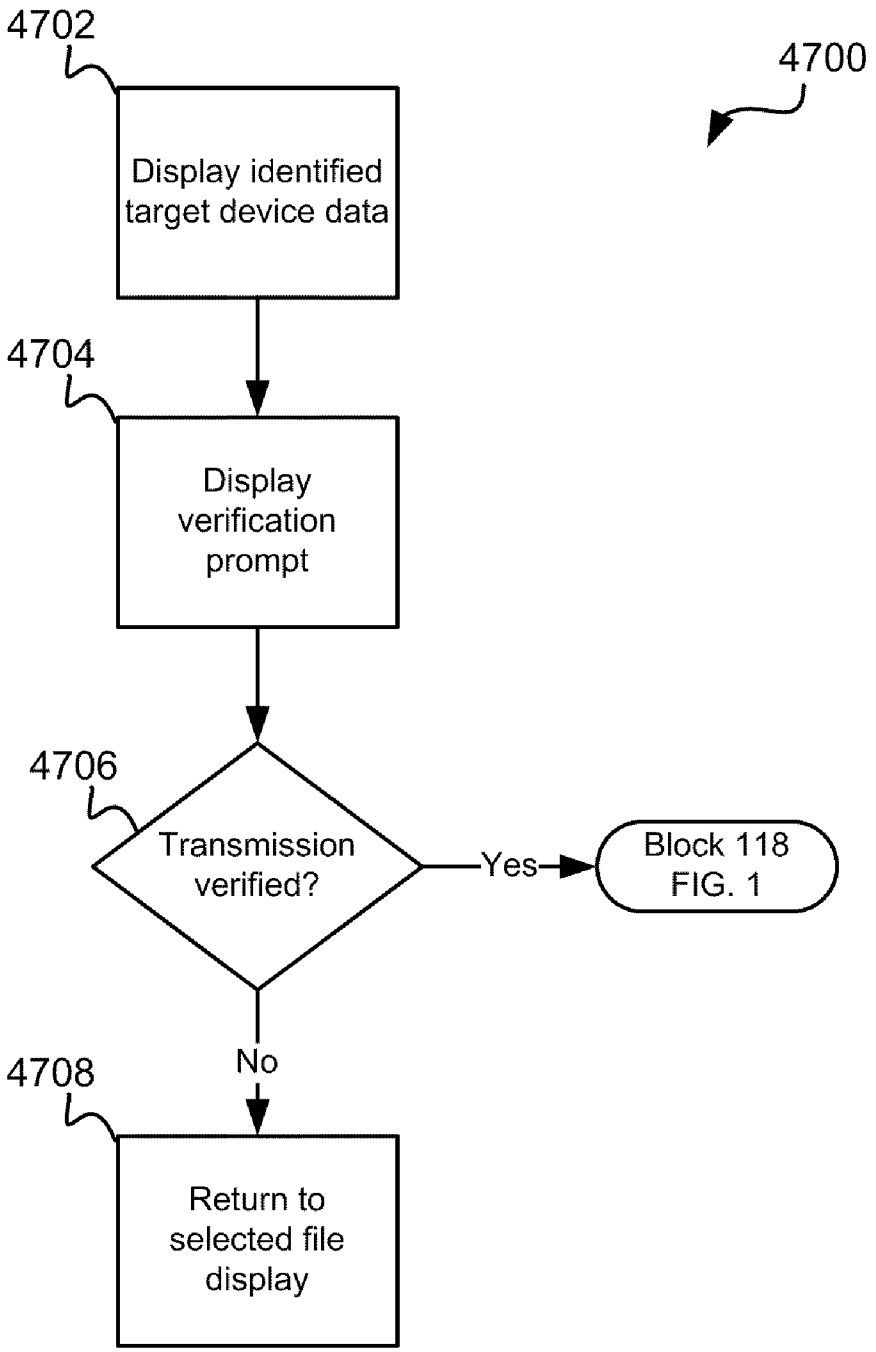

4700
4702
Display identified target device data
4704
Display verification prompt
4706
Transmission verified?
Yes
Block 118 FIG. 1
No
4708
Return to selected file display

FIG. 41

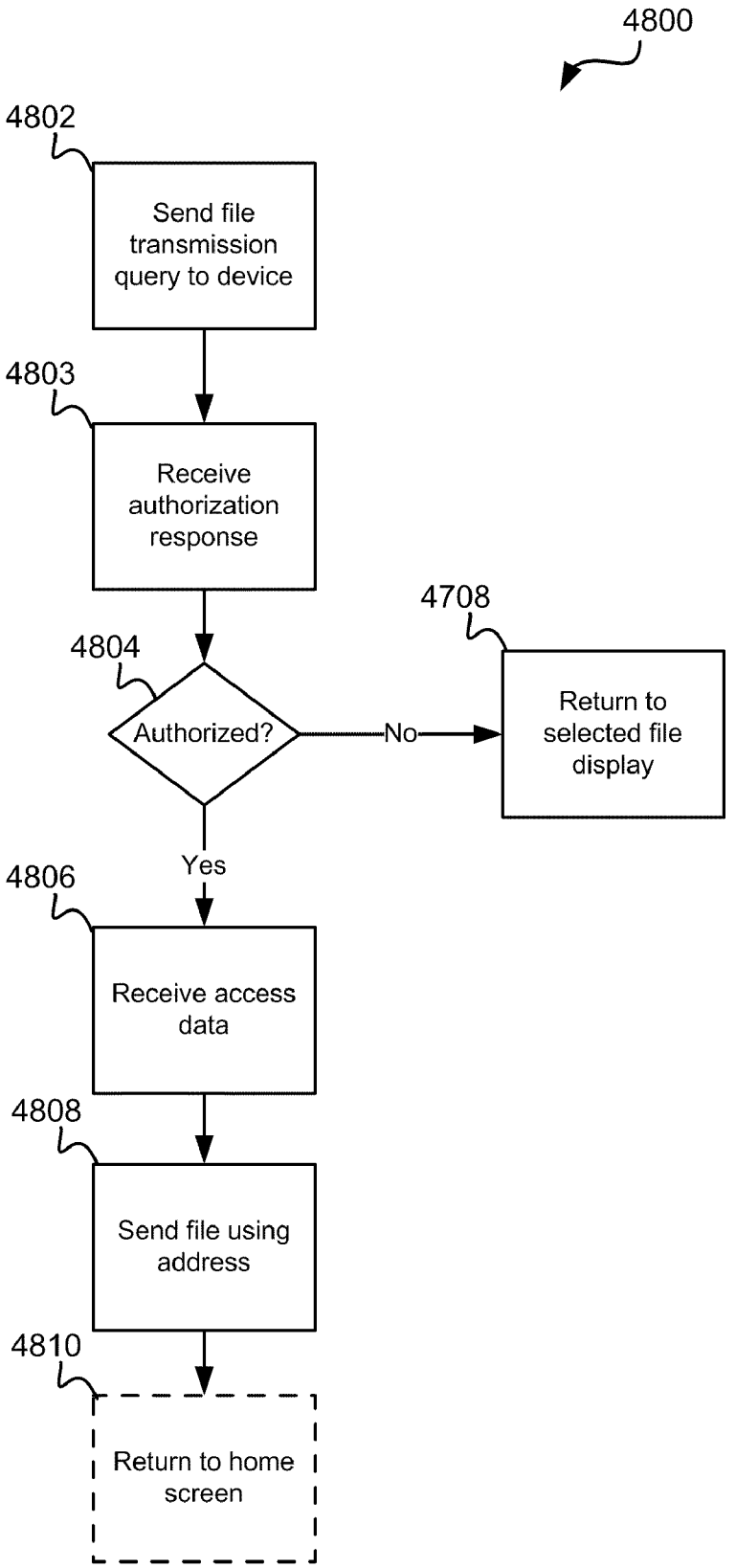

4800
4802
Send file transmission query to device
4803
Receive authorization response
4804
Authorized?
No
4708
Return to selected file display
Yes
4806
Receive access data
4808
Send file using address
4810
Return to home screen

FIG. 42

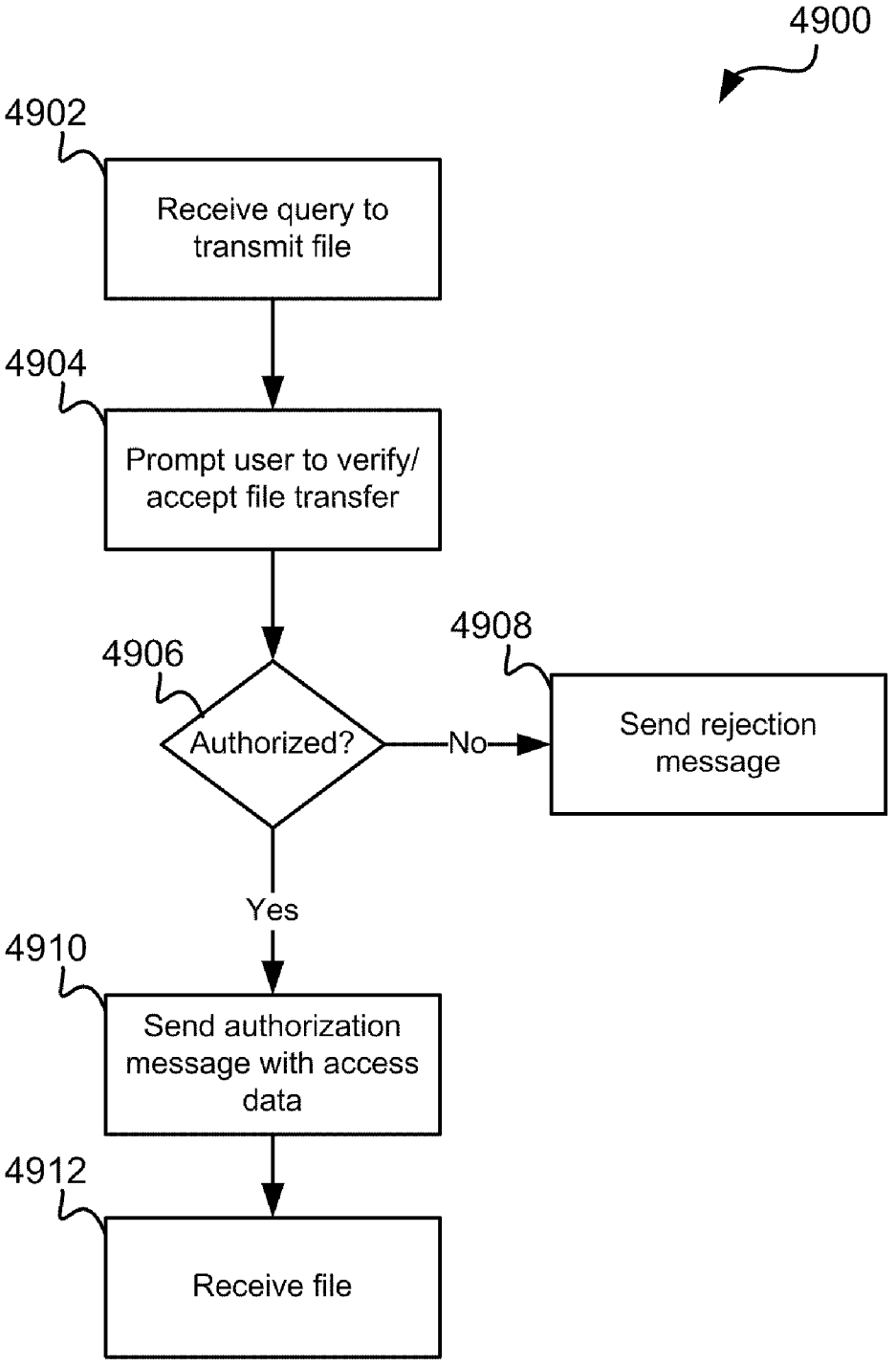

4900
4902
Receive query to transmit file
4904
Prompt user to verify/ accept file transfer
4906
Authorized?
No
4908
Send rejection message
Yes
4910
Send authorization message with access data
4912
Receive file

FIG. 43

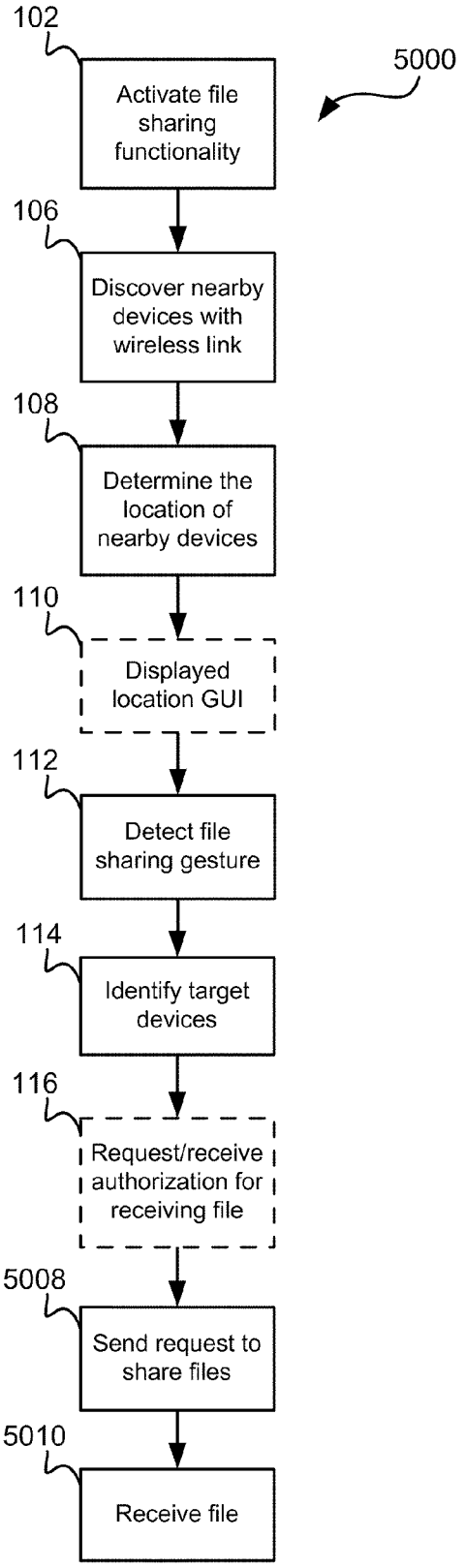

102
Activate file sharing functionality
5000
106
Discover nearby devices with wireless link
108
Determine the location of nearby devices
110
Displayed location GUI
112
Detect file sharing gesture
114
Identify target devices
116
Request/receive authorization for receiving file
5008
Send request to share files
5010
Receive file

FIG. 44

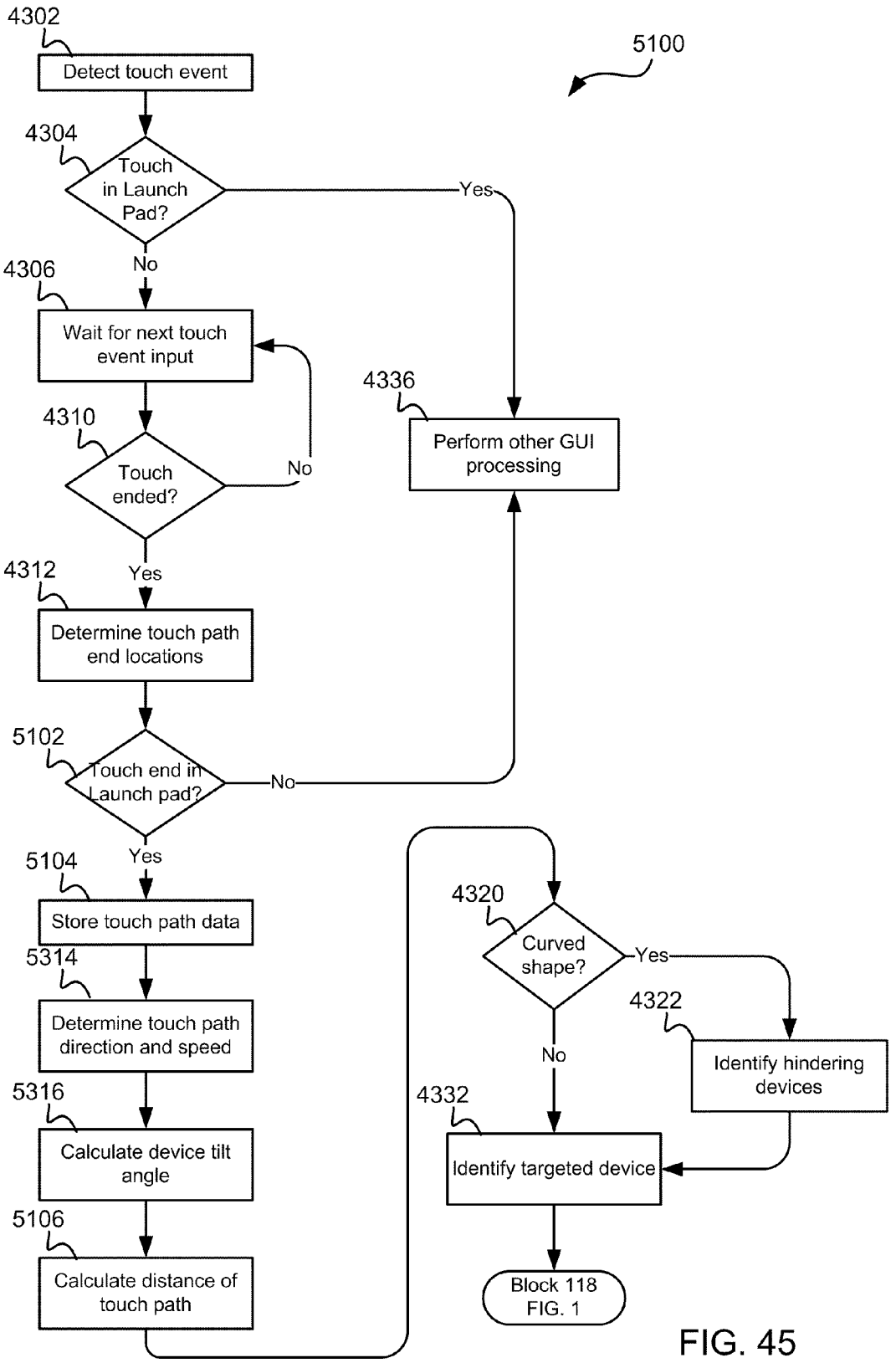

4302
Detect touch event
5100
4304
Touch in Launch Pad?
Yes
No
4306
Wait for next touch event input
4336
Perform other GUI processing
4310
Touch ended?
No
Yes
4312
Determine touch path end locations
5102
Touch end in Launch pad?
No
Yes
5104
Store touch path data
5314
Determine touch path direction and speed
5316
Calculate device tilt angle
5106
Calculate distance of touch path
4320
Curved shape?
Yes
No
4322
Identify hindering devices
4332
Identify targeted device
Block 118 FIG. 1

FIG. 45

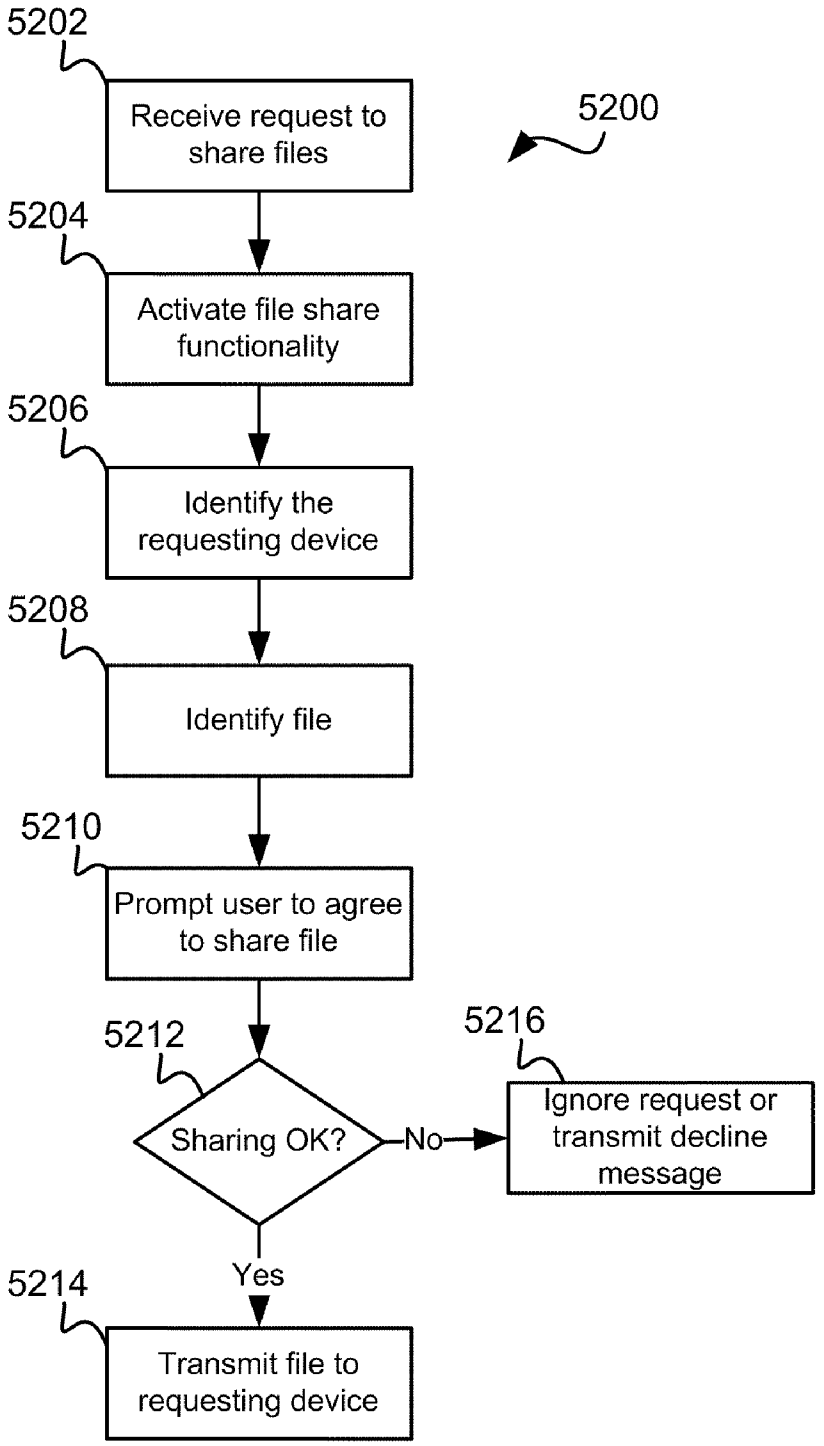

5202
Receive request to share files
5200
5204
Activate file share functionality
5206
Identify the requesting device
5208
Identify file
5210
Prompt user to agree to share file
5212
Sharing OK?
No
5216
Ignore request or transmit decline message
Yes
5214
Transmit file to requesting device

FIG. 46

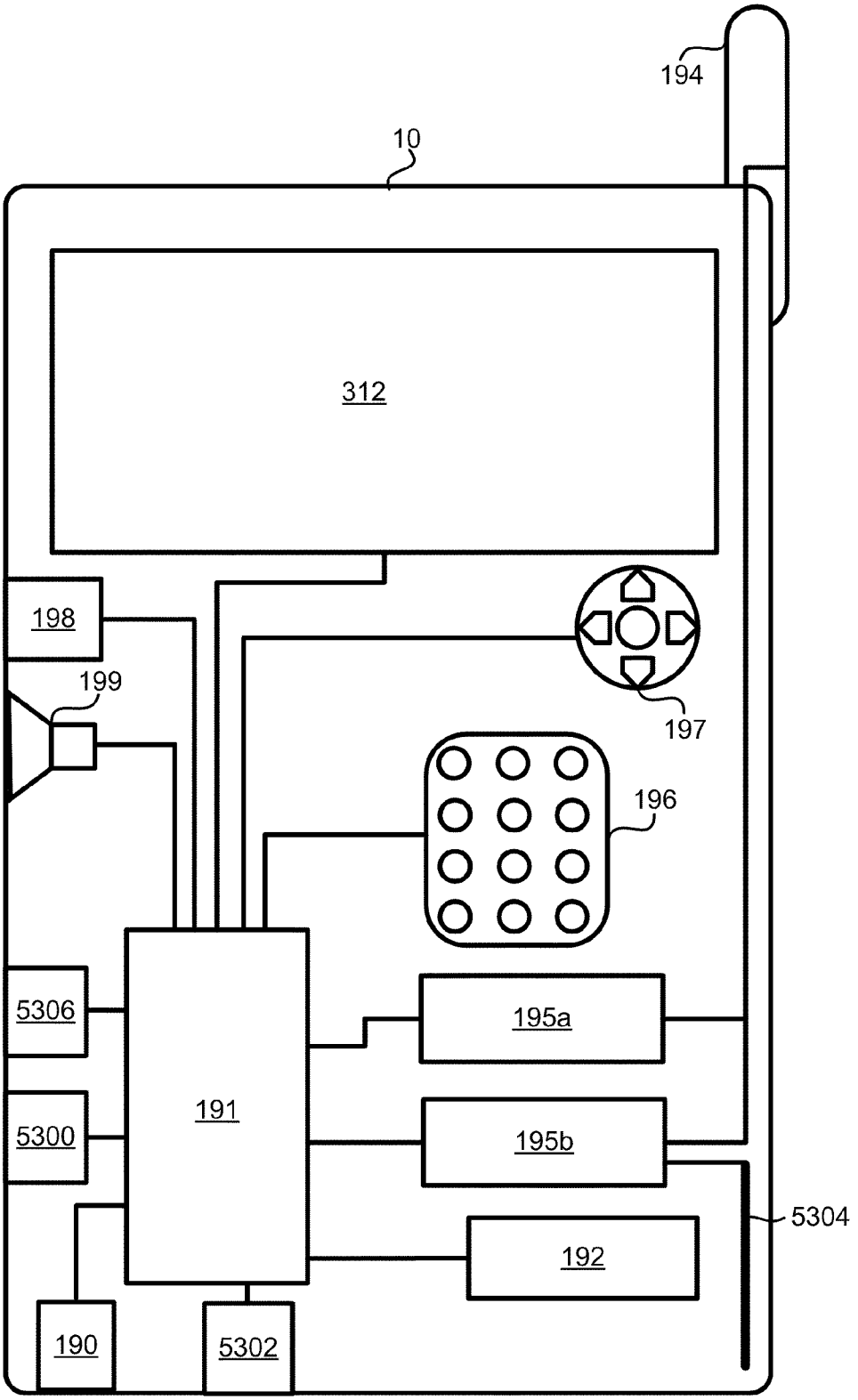

194
10
312
198
199
197
196
5306
195a
191
5300
195b
5304
192
190
5302

FIG. 47

USER INTERFACE GESTURES AND METHODS FOR PROVIDING FILE SHARING FUNCTIONALITY

RELATED APPLICATIONS

[0001] This application claims the benefit of priority to U.S. Provisional Patent Application No. 61/248,249 filed Oct. 2, 2009 entitled "User Interface Methods Providing File Sharing Functionality," the entire contents of which are hereby incorporated by reference. This application cross-references and fully incorporates by reference concurrently filed U.S. application Ser. No. _____ (Attorney Docket No. 091723U2), entitled "Device Movement User Interface Gestures for File Sharing Functionality."

FIELD OF THE INVENTION

[0002] The present invention relates generally to computer user interface systems and more particularly to a gesture based user interface for activating a file sharing function.

BACKGROUND

[0003] Personal electronic devices (e.g. cell phones, PDAs, laptops, gaming devices, etc.) provide users with increasing functionality and data storage. In addition to serving as personal organizers, personal electronic devices serve to store documents, photographs, videos, and music, and serve as portals to the Internet and electronic mail. These devices allow users to communicate with other users and share stored files, such as documents, pictures or videos with other mobile device users. Today, mobile devices allow users to share files by employing different methods such as emailing, texting (e.g., SMS), multimedia messaging service (MMS), and near field communication (NFC). However, these file sharing methods are limiting, cumbersome, and time consuming. Drafting and sending an email requires a large amount of typing. The sender must know and enter an email address before sending a message. To send SMS or MMS messages, senders must know the recipient phone number. To use the internet for uploading or downloading files, the users must know a URL and visit a website. To use NFC, the senders and recipients of files must be in very close proximity.

SUMMARY

[0004] The various aspects include methods for sharing files among computing devices, including activating a file sharing functionality, discovering nearby computing devices, establishing a wireless link with the discovered computing devices, determining locations of the discovered nearby computing devices, detecting a file sharing gesture, identifying a targeted computing device based on the detected file sharing gesture, and transmitting a file sharing message to the targeted computing device. The wireless link may be established using a wireless technology selected from Bluetooth®, ZigBee®, Near Field Communication (NFC), wide-area-wireless IEEE 802.11 (WiFi), infrared (IrDA), and ultrasound. In an aspect, determining locations of the discovered nearby computing devices may include receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices via the established wireless link, and transmitting the file sharing message to the targeted computing device may be accomplished using a wireless technology different from the wireless technology used to establish the wireless link. In an aspect, determining locations of the discovered nearby computing device may include determining a difference in arrival times of signals received from the discovered nearby computing devices using a first and second antennae, and using triangulation calculations based on the determined difference in arrival times of signals to determine a direction to each of the discovered nearby computing devices. In a further aspect, determining locations of the nearby discovered computing device may include receiving location coordinates provided by GPS receivers in each of the discovered nearby computing devices, and comparing the received location coordinates to location coordinates from a GPS receiver. In a further aspect, detecting a file sharing gesture may include detecting one of a flick gesture and a hand gesture. In a further aspect, identifying the targeted computing device may include determining a shape of the detected file sharing gesture, determining a direction and speed of the detected file sharing gesture, calculating a location where an object would land based on the determined shape, direction and speed of the detected file sharing gesture, and comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land. In a further aspect, identifying the targeted computing device may include determining a tilt angle of the computing device, determining a direction and speed of the detected file sharing gesture, calculating a location where an object would land based on the determined tilt angle, direction and speed of the detected file sharing gesture, and comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

[0005] In a further aspect, transmitting a file sharing message may include transmitting a selected file to the targeted computing device, and the method may further include transmitting a request to transmit the file to the targeted computing device, and receiving a response from the targeted computing device including access data specifying an address to which the file should be transmitted, in which transmitting the file to the targeted computing device may include determining a wireless communication link over which the file should be transmitted based upon the address specified in the received access data, and transmitting the file to the address via the determined wireless communication link. In a further aspect, the request to transmit the file to the target computing device may be accomplished using the established wireless link, and the determined wireless communication link used to transmit the file uses a wireless technology that is different than the established wireless link technology. In a further aspect, transmitting a file sharing message may include transmitting a selected file to the targeted computing device, and the method may further include displaying a prompt for a user verification of the targeted computing device, and determining whether a user input indicates user verification of the targeted computing device, in which transmitting the file to the targeted computing device may be accomplished if the user input indicates user verification of the targeted computing device. In a further aspect, displaying a prompt for a user verification the targeted computing device may include receiving a user identifier from discovered computing devices via the established wireless link, using the received user identifier to obtain an image from a contact database, and displaying an obtained image as the prompt for the user verification of the targeted computing device.

[0006] In another aspect, the method may further include displaying a launch pad on a touchscreen user interface, in which detecting a file sharing gesture may be accomplished by comparing a touch event start point or an end point to the displayed launch pad.

[0007] In another aspect, the method may further include displaying a radar map image including graphical indicators for the determined relative locations of the discovered nearby computing devices. In a further aspect, transmitting a file sharing message comprises transmitting a message requesting the targeted computing device to transmit a file. In another aspect, the method may further include transmitting access data to the targeted computing device in which the access data includes an address to which the requested file should be transmitted.

[0008] In another aspect the method may further include determining whether the detected file sharing gesture includes a curved path, and identifying the targeted computing device may include selecting a computing device positioned behind another computing device relative. In another aspect, the method may further include determining whether the detected file sharing gesture is directed away from other computing devices, and calculating an indirect path based on the direction of the file sharing gesture and an edge of the computing device display, in which identifying the targeted computing device may be based upon the calculated indirect path and the determined locations of the discovered nearby computing devices.

[0009] Another aspect is a mobile device that includes a processor, a display coupled to the processor, a touch sensitive surface coupled to the processor, a memory coupled to the processor, and at least one wireless transceiver coupled to the processor, in which the processor is configured with processor-executable instructions to perform operations of the various aspect methods.

[0010] Another aspect is a mobile device that includes means for accomplishing the functions involved in the operations of the various aspect methods.

[0011] Another aspect is a computer program product including a computer-readable medium storing computer-executable instructions including at least one instruction for accomplishing the processes of involved in the various aspect methods.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The accompanying drawings, which are incorporated herein and constitute part of this specification, illustrate exemplary aspects of the invention. Together with the general description given above and the detailed description given below, the drawings serve to explain features of the invention.

[0013] FIG. **1** is a process flow diagram of an aspect method for implementing file sharing functionality based on user gestures.

[0014] FIG. **2**A is a communication network component diagram suitable for use with the various aspects.

[0015] FIG. **2**B is a message flow diagram illustrating communications between components of the network of FIG. **2**A.

[0016] FIG. **3** is a frontal view of a portable computing device illustrating activation of file sharing functionality by touch according to an aspect.

[0017] FIGS. **4**A-**4**D are frontal views of a portable computing device illustrating activation of file sharing functionality by employing function keys according to an aspect.

[0018] FIGS. **5**A-**5**B are frontal views of a portable computing device illustrating activation of file sharing functionality by employing soft keys according to an aspect.

[0019] FIGS. **6**A-**6**B are frontal views of a portable computing device illustrating activation of file sharing functionality using gestures according to an aspect.

[0020] FIG. **7** is a frontal view of a portable computing device illustrating a display including multiple launch pads according to an aspect.

[0021] FIG. **8** is a frontal view of a portable computing device illustrating a display including a radar map according to an aspect.

[0022] FIG. **9** is a frontal view of a portable computing device illustrating transmitting files using flick gestures according to an aspect.

[0023] FIG. **10** is a frontal view of a portable computing device illustrating transmitting files using a hand flick gesture according to an aspect.

[0024] FIG. **11** is a frontal view of a portable computing device illustrating transmitting files based on direction and speed of flick gestures according to an aspect.

[0025] FIG. **12** is a frontal view of a portable computing device illustrating a curved shape gesture for transmitting files according to an aspect.

[0026] FIG. **13** is a frontal view of a portable computing device illustrating transmitting files to a targeted device based on the flick gesture parameters and the tilt angle according to an aspect.

[0027] FIG. **14** is a frontal view of a portable computing device illustrating transmitting files using bounce gestures according to an aspect.

[0028] FIG. **15** is a frontal view of a portable computing device illustrating transmitting files based on the direction in which the computing device is pointing and the flick gesture according to an aspect.

[0029] FIGS. **16**A-**16**B are frontal views of a portable computing device illustrating transmitting files by dragging-and-dropping action according to an aspect.

[0030] FIG. **17** is a frontal view of a portable computing device illustrating transmitting files based on displayed profile pictures according to an aspect.

[0031] FIG. **18** is a frontal view of a portable computing device illustrating transmitting files using drag-and-drop action in a radar map display according to an aspect.

[0032] FIGS. **19**-**20** are frontal views of a portable computing device illustrating verifying transmission of files according to an aspect.

[0033] FIG. **21**A-**21**B are frontal views of a portable computing device illustrating activating file requesting functionality and requesting file transmissions according to an aspect.

[0034] FIG. **22** is a frontal view of a portable computing device illustrating requesting a file transfer using flick gestures according to an aspect.

[0035] FIG. **23** is a frontal view of a portable computing device illustrating requesting a file transfer by pointing the computing device and using flick gestures according to an aspect.

[0036] FIG. **24** is a frontal view of a portable computing device illustrating requesting a file transfer by pointing the computing device and dragging-and-dropping a predetermined request parameter into a launch pad according to an aspect.

[0037] FIG. **25** is a frontal view of a portable computing device illustrating identifying a targeted device for requesting file transfers using profile pictures according to an aspect.

[0038] FIG. **26** is a frontal view of a portable computing device illustrating requesting a file transfer using dragging-and-dropping identified device icons into the launch pad in a radar map display according to an aspect.

[0039] FIG. **27** is a frontal view of a portable computing device illustrating requesting a file transfer using flick gestures according to an aspect.

[0040] FIG. **28** is a frontal view of a portable computing device illustrating requesting a file transfer using a hand gestures according to an aspect.

[0041] FIGS. **29-30** are frontal views of a portable computing device illustrating methods for verifying the identity of targeted devices according to an aspect.

[0042] FIG. **31** is a system block diagram of a computing device suitable for use with the various aspects.

[0043] FIG. **32** is a process flow diagram of an aspect method for activating the file sharing functionality using a touch on a touch surface.

[0044] FIG. **33** is a process flow diagram of an aspect method for activating the file sharing functionality using function keys and soft keys.

[0045] FIG. **34** is a process flow diagram of an aspect method for activating the file sharing functionality using a touch gesture.

[0046] FIG. **35** is a process flow diagram of an aspect method for discovering nearby devices.

[0047] FIG. **36** is a process flow diagram of an aspect method for requesting location data from and displaying the relative location of the nearby devices with respect to the computing device.

[0048] FIG. **37** is a process flow diagram of an aspect method for determining locations of nearby devices using signal triangulation.

[0049] FIG. **38** is a process flow diagram of an aspect method for initiating transmitting files based on touch gestures.

[0050] FIG. **39** is a process flow diagram of an aspect method for initiating transmitting files based on drag-and-drop touch gestures.

[0051] FIG. **40** is a process flow diagram of an aspect method for determining whether a traced touch gesture is ellipsoidal.

[0052] FIG. **41** is a process flow diagram of an aspect method for verifying identities of nearby devices.

[0053] FIG. **42** is a process flow diagram of an aspect method for obtaining user authorization of file transmissions.

[0054] FIG. **43** is a process flow diagram of an aspect method for obtaining user authorization to receive file transmissions.

[0055] FIG. **44** is a process flow diagram of an aspect method for implementing a file request functionality.

[0056] FIG. **45** is a process flow diagram of an aspect method for requesting file transmissions using a touch gesture.

[0057] FIG. **46** is a process flow diagram of an aspect method for transmitting files in response to a file sharing request.

[0058] FIG. **47** is a component block diagram of an example portable computing device suitable for use with the various aspects.

DETAILED DESCRIPTION

[0059] The various aspects will be described in detail with reference to the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts. References made to particular examples and implementations are for illustrative purposes and are not intended to limit the scope of the invention or the claims.

[0060] The word "exemplary" is used herein to mean "serving as an example, instance, or illustration." Any implementation described herein as "exemplary" is not necessarily to be construed as preferred or advantageous over other implementations.

[0061] The term "flick gesture" is used herein to mean a linear or curved touch gesture that is traced in one direction on a touchscreen user interface.

[0062] As used herein, a "touchscreen" is a touch sensing input device or a touch sensitive input device with an associated image display. As used herein, a "touchpad" is a touch sensing input device without an associated image display. A touchpad can be implemented on any surface of an electronic device outside the image display area. Touchscreens and touchpads are generically referred to herein as a "touch surface." Touch surfaces may be integral parts of an electronic device, such as a touchscreen display, or may be a separate module, such as a touchpad, that can be coupled to the electronic device by a wired or wireless data link. The terms touchscreen, touchpad and touch surface may be used interchangeably hereinafter.

[0063] As used herein, the terms "personal electronic device," "computing device," and "portable computing device" refer to any one or all of cellular telephones, personal data assistants (PDA's), palm-top computers, notebook computers, personal computers, wireless electronic mail receivers, cellular telephone receivers (e.g., the Blackberry® and Treo® devices), multimedia Internet enabled cellular telephones (e.g., the Blackberry Storm®), and similar electronic devices which include a programmable processor, memory, a transceiver for communicating with a network (e.g., a wireless network), and a connected or integral touch surface or other pointing device (e.g., a computer mouse). In an example aspect used to illustrate various aspects of the present invention, the electronic device is a cellular telephone including an integral touchscreen display. However, this aspect is present merely as one example implementation of the various aspects, and as such is not intended to exclude other possible implementations of the subject matter recited in the claims.

[0064] As used herein a "touch event" refers to a detected user input on a touch surface which may include information regarding location or relative location of the touch. For example, on a touchscreen or touchpad user interface device, a touch event refers to the detection of a user touching the device and may include information regarding the location on the device being touched.

[0065] As used herein the term "path" refers to a sequence of touch event locations that trace a path within a graphical user interface (GUI) display during a touch event. Also, as used herein the term "path event" refers to a detected user input on a touch surface, which traces a path during a touch event. A path event may include information regarding the

locations or relative locations (e.g., within a GUI display) of the touch events which constitute the traced path.

[0066] With the advances in electronic technologies, computing devices are increasingly used to store and share personal data. Pictures, movies, emails, URLs, applications, contacts, and text messages are examples of data that users store and share with other computing devices. A variety of available file sharing methods are currently available which allow users to share files via a variety of wired and wireless communication networks. For example, emails are delivered in Internet Protocol (IP) datagrams via wired and wireless (e.g., WiFi and cellular data networks) to email addresses; Short Messaging Service (SMS) and Multimedia Messaging Service (MMS) messages are delivered via cellular telephone networks to device phone numbers; downloaded files and webpages from websites accessed at an IP address are delivered via wired and wireless networks; data can be exchanged between two computing devices via short range Bluetooth wireless communication links; and data can be communicated over very short distances using Near Field Communication (NFC) technologies.

[0067] Despite the variety of communication links available to transfer information among computing devices, current user interface systems require users to enter information that has no perceptual connection with the physical world, such as email addresses, telephone numbers or IP addresses. Those more intuitive interfaces, such as allowing users to share files by tracing a finger gesture on the touchscreen of a computing device as provided on the Bump and Move file sharing applications for the Apple iPhone®, require that all communicating devices be within the same network and require a server and internet connection to help pair sender and receiver. In sum, known methods for sharing files among computing devices are either not intuitive, or are limited to particular networks.

[0068] The methods and systems of the various aspects allow users to be cognitively and physically involved with communicating data (i.e., sharing files) by linking the file transfer functionality to gestures that have intuitive meaning. In the natural world, delivery of objects occurs when cognitive intention and physical effort combine to allow carrying of an object from one person to another. In the various aspects, the processes of transmitting files are tied to user physical actions which mimic actions that would be implemented if the files of nearby computing devices were physical objects. Computing devices may gather information about the presence and relative location of other nearby computing devices. Such presence data may include the location parameters (e.g., GPS coordinates) and access data (e.g., telephone number or email address) of nearby computing devices. Similar to how one might send a piece of paper to another by flicking it to the other person with a rapid finger movement, the various aspects allow users to select a file, determine the physical location of the targeted computing devices, and transmit the file to other computing devices using an intuitive physical action such as a flick gesture. Similarly, the various aspects may allow a computing device to request transmission of files from another computing device by using a self-directed stroke gesture.

[0069] The file sharing functionality of the various aspects may be implemented on any type of touch surface. In a particularly useful application, the touch surface is a touchscreen that is touched by a finger; since touchscreens are generally superimposed on a display image, it enables users to interact with the display image with the touch of a finger. In such applications, the user interacts with an image by touching the touchscreen with a finger and tracing a gesture, thus the user's finger activating the touchscreen serves as the pointing device. Touchscreen touch events acquisition (i.e., detection of a finger touch on a touchscreen) and processing are well known, such as is disclosed in U.S. Pat. No. 6,323,846, the entire contents of all of which are hereby incorporated by reference.

[0070] FIG. **1** illustrates a process flow diagram of a method **100** for implementing file sharing functionality in response to intuitive user gestures according to the various aspects. In method **100**, a computing device may be configured to enable device users to share files with another computing device by activating a file sharing functionality at block **102**. This file sharing functionality may be an application or operating system function that includes a set of processes implemented in processor-executable instructions on the computing device, which provides a user interface for file sharing, detects and interprets user gestures, determines the file to be shared and the destination, negotiates the file transfer with the receiving device, and transmits the file via an appropriate and available communication network. This functionality includes the processes of the aspects described herein, as well as well known processes, such as the implementation of appropriate date communication protocols. For ease of reference, an application or operating system function that enables or encompasses such processes is referred to herein as the file sharing functionality. At block **102** the computing device may activate the file sharing functionality, either automatically or in response to a specific user input. For example, the file sharing functionality may be activated automatically when a file is accessed by a user, thereby enabling the user to share the accessed file if desired. As another example, a user may manually activate the file sharing functionality by pressing a button or by entering a particular touch gesture, as described in more details below with reference to FIGS. **3-6**.

[0071] In method **100** at block **104**, the computing device implementing the file sharing functionality may enable the user to identify a file to be shared with another computing device. For example, the user interface may present a menu, list, or thumbnail display of files from which the user can select a file by, for example, touching it on a touchscreen display. Any known method of selecting a file may be used.

[0072] In method **100** at block **106**, activation of the file sharing functionality may prompt the computing device to discover nearby computing devices using a wireless communication link by using, for example, Bluetooth® or ZigBee® wireless communication technologies. Depending on the type of wireless communication technology used to establish a wireless communication link with nearby computing devices, the computing device may discover other computing devices located at relatively close distances. For example, a computing device configured with a Bluetooth® transceiver may be configured to discover the presence of like-equipped computing devices located within about 100 meters, depending on the Bluetooth power class employed. Bluetooth® is a standard communications protocol primarily designed for low power consumption, short range (power-class-dependent: 1 meter, 10 meters, 100 meters) communications between devices equipped with low-cost transceiver microchips. Bluetooth® makes it possible for these devices to communicate with each other when they are within range. As

is well known, the Bluetooth® communication protocol, like other short range wireless communication protocols (e.g., the ZigBee® and NFC protocols), provides for automatic device discovery and link establishment signaling. This automatic link establishment capability includes a set of transmissions at a predefined frequency and with a predefined format that are recognized by receiving devices, prompting the receiving devices to reply with signals that enable the two devices to commence wireless link establishment handshaking communications to establish a wireless communication link between them. The various aspects leverage such automatic device discovery and wireless communication link establishment capabilities to enable a computing device to locate other nearby computing devices. Since the computing devices use radio frequency (RF) communications to discover each other, the two computing devices do not have to be in line of sight of to enable file transfers between them.

[0073] As part of discovering nearby computing devices, at block **108** the computing device may receive the locations of the nearby computing devices using different methods. In one aspect, the computing device may determine the location of nearby computing devices in block **108** by receiving precise latitude and longitude coordinates of the nearby computing devices from Global Positioning System (GPS) receivers within the computing devices. In another aspect, the computing device may determine the relative location of the nearby computing devices at block **108** by using signal strength and time-of-arrival information from received RF signals and triangulation calculations, as described more fully below with reference to FIG. **40**.

[0074] Optionally, at block **110**, the computing device may map the locations of nearby computing devices and display the map in a display GUI once the relative locations of nearby computing devices are determined. The mapped locations of nearby computing devices may be displayed relative to the position of the computing device, such as in a radar map type display showing locations of nearby computing devices with graphical indicators (e.g., dots). An example of such a radar map display is shown in FIG. **8**, which is described more fully below. The display GUI may also include other graphics for guiding the user while utilizing the file sharing functionality. For example, a "launch pad" graphic may be presented to provide an area in which the user can trace different gestures for sharing files.

[0075] Once the file sharing functionality is activated and the locations of nearby computing devices are determined, at block **112** the computing device may determine whether a user wishes to share the selected file with another computing device by detecting a file transfer gesture. As described more fully herein, the computing device may be configured to detect and recognize a file transfer gesture based upon user touches on a touchscreen or touch surface of the computing device.

[0076] According to the various aspects, different file transfer gestures may be employed to initiate the transmission of files between computing devices. Such gestures may include finger gestures and hand gestures. Finger gestures may include gestures that are traced on the device's touchscreen display. Hand gestures may include opening all fingers on the touchscreen like petals of a flower to send files all nearby computing devices or closing fingers together to receive files from all nearby computing devices. Each of these file transfer gestures may be used to initiate transmission of data between computing devices as described in more details below with reference to FIGS. **3-30**. For example, to share a file with another device, a user may use a flick gesture in the direction of another device to provide the computer device with the information it requires to identify the intended recipient of the file and initiate the transmission of the selected file to the intended computing device.

[0077] At block **114** the computing device may identify targeted particular nearby computing device to which the user intends to send the selected file based upon information regarding the file transfer gesture, such as its direction, distance, speed, etc., the orientation of computing device, such as its compass heading and tilt angle, and the relative location of nearby computing devices.

[0078] A computing device may be equipped with different sensors that can provide information that the device processor can use to calculate a trajectory or direction to identify the nearby computing devices that are to receive the selected file. For example, the computing device may include a compass to determine the orientation of the computing device with respect to the direction of a gesture. As another example, the computing device may include a set of accelerometers that can provide gravity vector data, which the processor can use to determine the tilt angle of the computing device.

[0079] Optionally, at block **116** the computing device may be configured to prompt a user to confirm or authorize sharing the selected file with the targeted computing device. Also at block **116** the computing device may receive a message from the targeted recipient computing device, indicating whether the device will accept the file. Providing a verification and/or authorization process enables a user to confirm that the intended recipient's computing device has been selected, and enables intended recipients to decide whether to accept a file. Such measures may prevent transmission of files to the wrong computing device, and give recipient users control over the files that are transmitted to their computing devices. Instead of transmitting an authorization message, a targeted computing device may simply provide the requesting computing device with communication access data, such as Bluetooth identification, email address, or telephone number which can be used to complete the file transfer.

[0080] On the receiver side, authorization to receive a file may be enabled in a variety of ways. For example, a user may configure their computing device to always accept file transmissions from nearby computing devices. In another example, when a computing device receives a request to receive a file, the device processor may generate a prompt that alerts the device's user of the pending file transfer request and, optionally, the identity of the user sending the file and file name or type. An intended recipient user may then press a key or virtual key on the GUI to either accept or decline transfer of the file. In a further example, a user may set an authorization state that automatically accepts file sharing with certain known computing devices, such as those in a contact database, and requires user input to authorize file transfers from unknown computing devices. Such file transfer acceptance criteria may be defined in custom settings based on their preferences.

[0081] As part of discovering nearby computing devices at block **106** or receiving authorization to transmit files at block **116**, the recipient computing device may provide access data that the transmitting computing device uses to accomplish a file transmission. Such access data may include an address of the recipient computer device, such as a telephone number (for SMS or MMS messages), email address, or IP address

that the transmitting computing device can use to address the file for transmission. The access data may also identify a preferred communication method and communication network to be used for transmitting the file. For example, the receiving device may identify that the file may be transmitted via a direct communication link, such as an NFC, Bluetooth or WiFi direct communication link. Alternatively, the receiving device may identify that the file may be transmitted via an indirect communication network, such as a cellular data communication link or WiFi communication link to a server (e.g., an e-mail server). Additionally as part of the discovery and/or authorization processes (blocks **106** and/or **116**) the transmitting and intended recipient computing devices may negotiate a mutually acceptable communication network to use for the file transfer.

[0082] Once the intended recipient computing device is identified, and transfer of the file is verified and/or authorized, at block **118** the computing device may transmit the selected file to the targeted device using identified access data and communication network.

[0083] As shown in the communication network diagram of FIG. **2**A, a communication network **200** may include computing devices **10***a*-**10***c* that are configured communicate with one another using a short range wireless communication link **11**, such as a Bluetooth® wireless communication link. The computing devices **10***a*-**10***c* can also communicate with a cellular communication network **14** via wireless communication links **12** between the devices and a cellular base station **13**. Such a cellular communication network **14** may be a cellular telephone network, or a WiFi hotspot network coupled to the Internet **16**. Depending on the type of files, the short range wireless communication link **11** available, and the access data provided, the computing devices **10***a*-**10***c* may share files directly from one device to the other, through device-to-device wireless links (e.g., Bluetooth® or NFC communication link), and/or indirectly, such as via a cellular system (SMS or MMS) or via a wireless link to the Internet (e.g., via a webpage or an email server **18**). For example, the computing devices **10***a*-**10***c* which can establish Bluetooth® links with one another may exchange access data and files directly using a Bluetooth® communication link. As another example, computing devices **10***a*-**10***c* may exchange access data via Bluetooth® links, and when access data specifies a telephone number for transmitting a file, the computing devices **10***a*-**10***c* may transmit a selected file as an SMS or MMS message transmitted via a cellular telephone access point **12** to a cellular network **14**. The cellular network relays the SMS/MMS message to the recipient device via the cellular access point **12**. When access data exchanged between computing devices **10***a*-**10***c* includes an email address, a transmitting computing device **10***a* may transmit a selected file via email by transmitting the email to an email server **18** via the cellular access point **12** to the cellular network **14**, which relays the email message via the Internet **16**. The email server **18** may receive the email, identify the intended recipient, and deliver it to the intended computing device **10***b* or **10***c* via the Internet **16** to the cellular network **14** which transmits it via the cellular access point **12**.

[0084] While the foregoing examples described transmitting files via a cellular telephone network, messages may similarly be transmitted via another type of wireless communication network, such as a WiFi, WiMax or MiFi network. Further, the computing devices **10***a*-**10***c* may be configured to select among a number of alternative wireless networks (e.g., cellular, WiFi and MiFi) based upon a variety of factors, including signal strength, reliability, cost, and access rights. Further, files transmitted by one computing device **10***a* via one wireless network may be received the recipient computing device **10***b* via a different wireless network. For example, a transmitting computing device **10***a* may transmit a selected file to a recipient device e-mail address via cellular telephone data communication link, but the recipient computing device may receive the e-mail from its e-mail server via a local WiFi wireless hotspot coupled to the Internet. The methods by which messages are routed through external networks and the Internet are well known, and thus not described further herein.

[0085] The various aspects are also not limited to radio frequency wireless communications, as the communication among mobile devices may be accomplished via visible or infrared light or ultrasound. For example, the messages employed in the various aspects may be transmitted via infrared data links using well known technologies, such as the infrared transceivers included in some mobile device models. As another example, the messages employed in the various aspects may be transmitted via visible light, such as a small projector on one mobile device (e.g. a "pico projector") that may be aimed at a camera on a second mobile device to exchange images. As a further example, future mobile devices that may be equipped with ultrasound emitters and receivers may be configured to use ultrasound to communicate data across short distances in a manner similar to radio frequency communications.

[0086] Representative communications that occur between different components of the communication network described above with reference to FIG. **2**A are illustrated in FIG. **2**B. A computing device **10***a* that has its file transfer functionality activated may discover nearby computing device **10***a* by sending a device discovery signal, message **20**. The other computing device **10***b*, upon receiving the device discovery signal, may transmit a response message **22**. The device discovery and response signals may include device identifying information about the computing devices **10***a*, **10***b* to enable the devices to negotiate a communication link, messages **23**. The device discovery, response, and handshaking message formats will be defined by the particular communication protocol used for the device-to-device communications (e.g., Bluetooth®). As part of the response or handshaking messages **22** or **23**, the replying computing device **10***b* may provide information about the device, such as its access data, its location (e.g., in the form of GPS coordinates) and, optionally, information about its owner such as a name or picture of the owner. Based on a detected gesture, the sending computing device **10***a* may determine that the user desires to share a particular file with a targeted computing device **10***b*. To accomplish a file transmission, the sending computing device **10***a* may send a query, message **24**, to the targeted computing device **10***b* requesting permission to transmit the file and access data for use in sending the file. Based on the preferences of its owner and in response to the query message **24** received from the transmitting computing device **10***a*, the targeted computing device **10***b* may respond by transmitting the requested access data, message **26**.

[0087] If the access data sent to the transmitting computing device **10***a* specifies that the file should be transmitted via the established device-to-device communication link (e.g., a

Bluetooth® link), the transmitting computing device **10***a* may directly transmit the file to the targeted computing device **10***b* in message **28**.

[0088] If the access data sent to the transmitting computing device **10***a* specifies a telephone number, the transmitting computing device **10***a* may compose an SMS or MMS message including the file, and transmit the message via the cellular network **14** wireless access point **12**, message **30**. The cellular network **14** relays the SMS/MMS message to the targeted computing device **10***b* using the telephone number, message **32**.

[0089] If the access data provided to the transmitting computing device **10***a* is an e-mail address, the transmitting computing device **10***a* may compose and send an e-mail message via the cellular network **14** wireless access point **12** (or other type of wireless network), message **34**. The cellular network **14** may relay the e-mail message to an addressed e-mail server **18** via the Internet **16**, message **36**. The e-mail server **18** may store the e-mail message and, when accessed, relay the e-mail message to the cellular network **14**, which provides service to the targeted computing device **10***b* via the Internet **16**, message **38**. The cellular network **14** relays the e-mail message to the targeted computing device **10***b* via a wireless access point **12**, message **40**. If the access data includes an IP address, the computing device **10***a* may access the server with that IP address via the cellular network **14**, and the Internet **16** to upload the file in a manner very similar to how an e-mail message is sent to an e-mail server. The targeted computing device **10***b* may access the server at the same IP address via the cellular network **14** and the Internet **16**, and download the file in a manner very similar to how an e-mail message is received from the e-mail server.

[0090] FIGS. **3**-**6** illustrate different methods that may be implemented on a computing device **10** to enable a user to activate the file sharing functionality. As illustrated in FIG. **3**, a computing device **10** may be configured to enable a user to activate the file sharing functionality by touching the touchscreen **308**. A user may open a file, such as drawings by Leonardo da Vinci, and touch the touchscreen **308** using a finger **306** to activate the file sharing functionality. The user may be required to touch the touchscreen **308** for a set period of time and/or at a specific location to activate the file sharing functionality. For example, the user may be required to touch the touchscreen **308** and hold the touch for at least 5 seconds before the file sharing function is activated. As a further example, the file sharing functionality may be activated by voice command, such as "share this file," similar to how other mobile device functions can be activated by speaking a particular command. Alternatively, the user may be required to touch a specific location on the touchscreen **308**, such as the center of the screen, to activate the file sharing function. In a further aspect, a certain amount of pressure applied to the touchscreen display may activate the file sharing functionality. As illustrated, activation of the file sharing functionality may be identified by the display of a GUI graphical indicator or icon, such as a launch pad **304**.

[0091] FIGS. **4**A-**4**D illustrate activation of the file sharing functionality using a function key **402** on the computing device **10**. As illustrated in FIG. **4**A, a user may use a finger **306** to press a function key **402** associated with activating the file sharing functionality. The function key **402** may be specifically designated for activating the file sharing functionality, or may be designed for multiple functions. If other functions are associated with the function key **402**, a GUI menu **404** may be presented to allow the user to select a particular desired function, as illustrated in FIG. **4**B. As illustrated in FIG. **4**C, the user may choose the file sharing functionality by touching the word "Share" as it appears on the menu **404** using a finger **306**. As illustrated in FIG. **4**D, activation of the file sharing functionality may be identified by the display of a launch pad **304**.

[0092] FIGS. **5**A-**5**B illustrate activation of the file sharing functionality using soft keys **502** on the computing device **10**. As shown in FIG. **5**A, a user may touch a soft key **502** with a finger **306** to activate the file sharing functionality. As shown in FIG. **5**B, the computing device **10** may inform the user about the activation of the file sharing functionality by displaying a launch pad **304**.

[0093] FIGS. **6**A-**6**B illustrate activation of the file sharing functionality using a gesture traced on the touchscreen **308** of the computing device **10**. As shown in FIG. **6**A, a user may use a finger **306** to trace a closed elliptical shape **602**, such as a circle, on the touchscreen **308**. Tracing a circle is merely an example of a gesture that may be used to activate the file sharing functionality, and other gestures may be used. The computing device **10** may be configured to detect and identify the gesture as one for activating the file sharing functionality. As shown in FIG. **6**B, the computing device **10** may inform the user about the activation of the file sharing functionality by displaying a launch pad **304**.

[0094] The foregoing examples are not intended to limit the scope of the various aspects, and other activation mechanisms may be used.

[0095] In an aspect illustrated in FIG. **7**, once the file sharing functionality is activated, more than one launch pad **304** may be displayed to indicate the activation of the file sharing functionality, and to allow the user to share files with other computing devices **10** in different ways. For example, a first launch pad **304***a*, shown in this figure with dashed borders, may be displayed to enable the user to transmit files to other computing devices **10**. A second launch pad **304***b*, shown here with solid borders, may also be displayed to enable uses to request and receive files from other computing devices **10**, as described herein.

[0096] In an aspect illustrated in FIG. **8**, a computing device **10** may inform a user that the file sharing functionality is active by displaying a radar map **802**. Such a radar map display **802** may use graphical indicators **804**, such as dots or circles, to show the location of other nearby computing devices which have wireless communication links established with the user's computing device **10**. As described above, the wireless communication links to nearby computing devices and the device location information used to create the radar display **802** may be established and exchanged during the device discovery process commenced by activation of the file sharing functionality. The orientation of the nearby computing devices may be shown relative to the location of the user's computing device **10**. The location of the user's computing device may be indicated on the radar map **802** by the launch pad **304**. As the user moves, the orientation of the dots with respect to the launch pad **304** may change, indicating the changing relative location of the other computing devices with respect to the user's location. The radar map **802** display may be enabled or disabled based on the user's preferences.

[0097] Once the file sharing functionality is activated and a wireless link is established between nearby computing devices, different methods may be employed for sharing files

among the linked computing devices. One method in which files may be shared is by transmitting files to another computing device **10**. A second method in which files may be shared is by transmitting a request from the computing device **10** requesting another computing device to send it files. FIGS. **9-18** illustrate different aspect gestures that may be used to initiate the transmission of files to other computing devices. FIGS. **21-28** illustrate different aspect gestures that may be used to cause a computing device **10** to request files from other computing devices.

[0098] As illustrated in FIG. **9**, a user's computing device **10***a* may be near other computing devices **10***b*-**10***d*. In a typical social situation, other computing devices **10***b*-**10***c* may be located around a user's computing device **10***a*. As part of establishing wireless links to the other computing devices, the computing device **10***a* may be configured to determine the location of each of the other computing devices **10***b*-**10***d*. For example, computing device **10***a* may determine the presence of computing devices **10***b* and **10***c* in front of it, and that of a computing device **10***d* behind it. The computing device **10***a* may be further configured to detect a user's touch on the touchscreen **308** and to recognize that a touch tracing a gesture towards a receiving computing device **10***c* indicates the user's desire to share the selected file or files with that particular computing device **10***c*. This touch gesture may be in the form of a quick flick of the finger on the touch screen, and accordingly is referred to herein as a flicking gesture." FIG. **9** shows the direction of the flick gesture by a dashed line with an arrow **902** directed towards the computing device **10***c*. Such a dashed line **902** may or may not be displayed on the display **310**, which may be a configurable setting based on user preferences. The computing device **10***a* may be configured to identify the targeted computing device **10***c* based on the flick gesture and initiate transmission of the selected file to that other computing device **10***c*. As discussed above, the transmission of the file may be involve transmitting a file transfer request to the destination computing device **10***c*, receiving access data, and transmitting the file via an available communication network in accordance with the information in the received access data. The processes and communications described above with reference to FIGS. **1-2**B may be accomplished automatically in the background, so it appears to the user that the flick gesture causes the selected file to quickly appear on the destination computing device **10***c*. In this manner, the sharing of the file is accomplished in a simple intuitive motion.

[0099] Should also be appreciated that the flick gesture may be applied to any surface that can detect the gesture. For example, mobile devices that have a touch sensitive surface on a case, such as the backside of a single sided device or the top side of a clamshell device may accept the gestures on any surface capable of receiving a file. For example, a clamshell mobile device with a touch sensitive exterior may enable users to transfer files by performing the flick gesture on the top surface of the device without viewing or touching a display. As another example, a mobile device with a touch sensitive back surface may accept a flick gesture applied to the back case while the user views the radar screen user interface on the display. The

[0100] In an aspect shown in FIG. **10**, the transmitting computing device **10***a* may be configured to simultaneously transmit one or more files to all or a subset of the nearby computing devices **10***b*, **10***c*, **10***d* which are wirelessly linked to the transmitting computing device **10***a*. The transmitting computing device **10***a* may be configured to recognize an opening hand gesture to mean that the selected files may be shared with all or a subset of the discovered nearby computing devices **10***b*-**10***d*. To perform an opening hand gesture, a user may place all fingertips of one hand in the launch pad **304** on the touchscreen **308** and, while continuing to touch the surface, extend the fingers towards the boarders of the touchscreen display as though to open the hand. The path of the hand gesture is shown in FIG. **10** by three dashed lines with arrows **902**, indicating the transmission of selected files to the three receiving computing devices **10***b*-**10***d*. Such dashed lines may or may not be presented on the touchscreen display **308**.

[0101] In an aspect shown in FIG. **11**, the transmitting computing device **10***a* may be configured to transmit messages to a receiving computing device **10***c* based on the orientation and distance of the receiving computing device **10***c* as compared to the transmitting computing device **10***a*. The transmitting computing device **10***a* may be configured to determine the direction of a gesture and calculate the distance that a file would travel if it were a real object based on the speed of the flick gesture across the touchscreen **308**. Based on the direction and calculated travel distance based on the speed of the flick gesture, the processor of the transmitting computing device **10***a* may identify a particular computing device **10***c* to which the user wants to send a file. This aspect may be useful in situations where two nearby computing devices are situated along the same line direction. Without this aspect, the transmitting computing device **10***a* might transmit the file to the first computing device **10***b* along the line of the flick gesture, when the user actually intended the file to go to the second computing device **10***c*. The aspect illustrated in FIG. **10** enables users to select among multiple potential target computing devices along a line of direction by varying the speed of the flick gesture, just as if the user were flicking an real object with a finger. The user's traced gesture is shown in FIG. **9** as a dotted line with an arrow **902** which is shown here only to illustrate the direction of the traced gesture.

[0102] In this aspect, the computing device **10** may be configured to be trainable so that each user can correlate flick gesture speeds with intended travel distances. Over time as the user shares files by executing flick gestures on the touchscreen, the computing device **10** may learn the user's habits and the different path trace speeds to calibrate the device to more accurately identify file sharing devices targeted by a user's flick gestures.

[0103] FIG. **12** illustrates a further aspect gesture which enables users to direct a file transmission to a second computing device **10***c* along a line of direction by tracing a curved flick gesture. In situations where multiple computing devices **10***b*-**10***c* are located along the same general direction relative to the transmitting computing device **10***a*, the transmitting computing device **10***a* may be configured to allow a user to trace a curve gesture on the touchscreen **308** to indicate that a file should be transmitted to a targeted computing device **10***c* by bypassing or going around another computing device **10***b* that is in the way. The path of the curved flick gesture is illustrated in FIG. **12** as a dotted curve line with an arrow **904** which may begin at the launch pad **304** and end at the right hand corner of the touchscreen display **308** of the computing device **10***a*, which is the direction of the intended nearby computing device **10***c*.

[0104] FIG. **13** illustrates a further aspect gesture which enables a computing device user to share a file with an intended recipient computing device **10***c* positioned behind another computing device **10***b* by tilting the transmitting computing device **10***a* upward while performing the flick gesture. This aspect provides an intuitive mechanism for indicating that a more distant computing device should receive the filed by emulating how the user might flick a real object a further distance. This aspect may be useful in situations where multiple computing devices **10***b*-**10***d* are located along the same general direction in relation to the transmitting computing device **10***a*. To enable this aspect, the transmitting computing device **10***a* may be configured with accelerometers that can detect a tilt of the device with respect to the gravity gradient. By determining the tilt of the computing device, and the direction and speed of the flick gesture, the computing device processor can determine the targeted computing device **10***c* based on a calculated travel distance of a real object and bypass intervening computing devices. FIG. **13** illustrates the tilt angle **1302** by showing the computing device **10***a* in relation to its horizontal orientation **10***f* shown in dotted lines. The computing device **10***a* may be configured to determine the tilt angle, and based on the speed and direction of the gesture traced by the user, calculate the travel distance of a real object following a ballistic trajectory **1304** to identify the targeted computing device **10***c*. This aspect provides an intuitive mechanism for indicating that a file should skip over one or more computing device **10***b* to be delivered to a more distant computing device **10***c*.

[0105] FIG. **14** illustrates a further aspect gesture for enabling users to direct the transmission of a file to an intended recipient computing device **10***c* that is blocked by another computing device **10***b* by appearing to bounce the file off of a virtual wall to carom towards the targeted computing device. In a situation where multiple computing devices **10***b*-**10***c* are located along the same general direction in relation to the transmitting computing device **10***a*, the computing device **10***a* may be configured to determined when a flick gesture is directed away from nearby computing devices, and to calculate a bounce angle that an object would follow if it bounced off an edge of the touchscreen display **308** along the direction of the flick gesture. The path of the flick gesture and the rebounding path off the edge of the display are shown by the dotted lines **902** and **903**. The computing device **10***a* may be configured to detect a flick gesture towards one of the sidewalls of the touchscreen display, determine the angle of reflection **1400**, and identify the targeted computing device **10***c* based upon the direction of the reflected path **903**.

[0106] In an aspect shown in FIG. **15**, the transmitting computing device **10***a* may be configured to identify the targeted computing device **10***b*, which is directly in front of the transmitting computing device. In this aspect, the transmitting computing device **10***a* may display a radar map **802** including graphical indicators **804** that identify the relative location of nearby computing devices **10***b*-**10***j*, which are wirelessly linked to the computing device **10***a*. As the user moves the computing device **10***a* to point it at the targeted computing device **10***b*, the computing device **10***a* may be configured to detect the change in its orientation (e.g., via a compass sensor), and to adjust positions of the graphical indicators **804** to reflect the relative locations of the nearby computing devices **10***b*-**10***j*. The computing device **10***a* may be configured to detect a touch of a finger **306** in the touchscreen **308** launch pad **304**, and to identify the computing device **10***b* that is located in front of the transmitting computing device **10***a*. For instance, the transmitting computing device **10***a* may be configured to receive data from an electronic compass sensor to determine the direction to which the computing device **10***a* is pointing and identify the targeted computing device **10***b*. The computing device **10***a* may further be configured to detect a flick gesture towards the targeted computing device **10***b* and interpret this gesture to begin the process of transmitting the file to the identified computing device **10***b*.

[0107] In a further aspect illustrated in FIGS. **16**A and **16**B, the transmitting computing device **10***a* may be configured to allow a user to transfer files to a targeted computing device **10***b* by a drag-and-drop gesture. In this aspect, the transmitting computing device **10***a* may be configured to display a radar map **802**, graphical indicators **804** and a launch pad **304** as shown in FIG. **16**A. The transmitting computing device **10***a* may be configured to detect the touch of a user's finger **306** on the launch pad **304** of the touchscreen display. As illustrated in FIG. **16**B, the user may trace a drag gesture by tracing a path from the launch pad **304** to the graphical indicator **804** corresponding to the intended recipient computing device **10***c*. Once the finger **306** touches the graphical indicator **804** corresponding to a targeted computing device **10***c*, the computing device **10***a* may detect the discontinuation of the touch (i.e., the drop gesture), identify the targeted computing device **10***b* based on the location of the finger **306** touch release and interpret this gesture to begin the process of transmitting the file to that computing device **10***c*. Since the radar map display illustrates the location of nearby computing devices that the user can also see in reality, this aspect provides an easy to use and intuitive GUI gesture for transmitting a file to a particular computing device in a crowded room.

[0108] A further aspect is shown in FIG. **17**, in which the transmitting computing device **10***a* is configured to identify the other computing devices **10** by showing a profile picture **1700** of its owner instead of displaying the location of the device. The owner pictures **1700** may be obtained from contact information in the computing device **10***a* contact database, or may be provided to the transmitting computing device **10***a* during the device discovery and link establishment process. If a nearby computing device is not included in the contact database and does not provide a profile picture of its owner, the transmitting computing device **10***a* may be configured to use a default picture **1700**. To fit within the display area of the device, the computing device **10***a* may be configured to scroll the pictures and allow the user to brows through the pictures using standard scroll and browse gestures. The user may then select a particular computing device to receive a file by touching the picture of the device owner using a finger **306**. Using this input, the transmitting computing device **10***a* may determine the target computing device and begin the process of transmitting files to the targeted computing device.

[0109] In an aspect shown in FIG. **18**, the transmitting computing device **10***a* may be configured to display a radar map **802**, and identify the location and presence of other computing devices **10***b*-**10***g* by displaying graphical indicators **804**. The graphical indicators may include dots or owner pictures **1700**. Pictures may be displayed on the locations of computing devices for which the owner's picture is contained in the contact database or that have communicated owner profile photos to the transmitting computing device **10***a*. In

this aspect, the user may identify the computing device to which he wishes to transmit a file by touching or tracing a path to the picture or dot of the destination device. For example, the computing device **10***a* may be configured to detect a traced touch gesture starting from the launch pad **304** and ending at the graphical indicator **804** designating another computing device **10***b*, and interpret this gesture to begin the process of transmitting a file to the computing device **10***b*.

[0110] In an aspect shown in FIGS. **19-20**, the transmitting computing device **10** may be configured to prompt the user to verify transmission of files to a particular computing device before the transmission is begun. Once the targeted computing device **10** is identified based on the user's gestures and location of the other computing devices **10** as described above, the transmitting computing device **10** may generate a display prompting the user to verify the identity of the targeted computing device **10**. In an exemplary aspect illustrated in FIG. **19**, the transmitting computing device **10** may be configured to present an identity of the owner of the targeted computing device. The identity of the owner may be a name or photo, and the information may be obtained from the transmitting computing device's contact database, or from the targeted computing device, such as during the handshaking process or as part of the transmitted access data. For example, if the identity of the targeted computing device owner is known, a question pane **2100** may be presented on the display **310** prompting the user to indicate whether the file should be transmitted to the identified person. The user may select "Yes" to verify the transmission file, and "No" to repeat the process of identifying a targeted computing device **10**.

[0111] In another aspect shown in FIG. **20**, the transmitting computing device **10** may be configured to display a radar map **802** in which the identified targeted computing device **10** is identified with a graphical indicator **804**, such as a star, in conjunction with a prompt requesting the user to verify the file transmission. The verification prompt may display a question pane **2200** to prompt the user to verify the transmission of a selected file to the indicated computing device. The user may touch the touchscreen **308** with a finger **306** to indicate that the file should be transmitted or to prevent transmission so a different computing device can be selected.

[0112] In an aspect illustrated in FIGS. **21**A-**21**B, a computing device **10** may be configured to enable a user to activate a file request functionality by which the user can request files transmissions from other computing devices. The file request functionality may be activated by a variety of methods. In an aspect illustrated in FIG. **21**A, the requesting computing device **10** may be configured to activate the file request functionality in response to the press of a function key **402**. Alternatively, the file request functionality may be activated in response to the press of a soft key **502** or a particular touch to a touchscreen **308** (not shown). In an aspect, once the file request functionality is activated, the requesting computing device **10** may be configured to display to the user a list of requests that the user may desire to communicate to another computing device **10**. For example, the request list may include a request for pictures, phone number, name, or an invitation to share a drink as illustrated in FIG. **21**A. Other request types may be created and customized based on user preferences. As illustrated in FIG. **21**B, the requesting computing device **10** may be configured to detect a user's selection of the request type and, in response, transmit the request to a targeted computing device **10**. The request can be directed to a specific device because the computing device **10** may have established wireless communication links with nearby computing devices, as described above with reference to FIGS. **1-2**B. The requesting computing device **10** may be configured to allow a user to designate another computing device to which the user desires to send the request using gesture methods similar to those described above with reference to FIGS. **9-18**.

[0113] In an aspect shown in FIG. **22**, the requesting computing device **10***a* may be configured to display a launch pad **304** when a file requesting functionality is activated. The requesting computing device **10***a* may be further configured to detect a touch gesture on the touchscreen **308**, identify a targeted computing device **10***b* based upon the nature of the touch gesture, transmit a request for a file from the targeted computing device **10***b*, and receive the requested file.

[0114] To identify a targeted computing device **10***b*, the requesting computing device **10***a* may be configured to detect a flick gesture that begins in the launch pad **304** and moves away from the targeted computing device **10***b* (i.e., along a direction away from the location of the target at computing device **10***b*). The dotted line and arrow **902** shows the direction of movement a finger **306** to request a file from the computing device **10***b*. The dotted line and arrow **902** is shown to identify the direction of the finger **306** movement, and may not be part of the display **310**. In alternative aspects, a dotted line and arrow **902** may be presented on the display as a visual cue to enable a user to verify that the flick gesture was properly interpreted by the computing device **10**. The computing device **10***a* detecting such a file request flick gesture may configure and transmit a file request message to the targeted computing device **10***b*. The file request message of the various aspects may include access data so the receiving computing device has the information needed to transmit files to the requesting computing device **10***a*. In response to receiving the file request, the targeted computing device **10***b* may transmit a file **2400** to the requesting computing device **10***a* using the communicated access data and the transmission methods described herein. The requesting computing device **10***a* may receive and display the file. In this manner, the file request flick gesture operates in an intuitive manner, enabling users to download a file without engaging in the complex actions usually involved in initiating a file download.

[0115] In an aspect illustrated in FIG. **23**, the requesting computing device **10***a* may be configured to identify a targeted computing devices **10** based on the direction in which the requesting computing device **10***a* is pointing. For example, the requesting computing device **10***a* may enable a user to point the device towards a targeted computing device **10***b* and trace a self-directed flick gesture from outside the launch pad **304** to the inside of the launch pad **304** to initiate the transmission of a file request message to the target at computing device **10***b*.

[0116] In an aspect shown in FIG. **24**, upon activation of the file requesting functionality, the requesting computing device **10***a* may display a menu pane **2600**, including a list of requests that a user may send to a targeted computing device **10***b*. As described above with reference to FIG. **23**, the requesting computing device **10***a* may be configured to identify a targeted computing device **10***b* based upon the direction in which the device is pointed. The requesting computing device **10***a* may further be configured to enable a user to send a selected type of request a targeted computing device **10***b* by selecting, dragging, and dropping a request from the menu pane **2600** onto the launch pad **304**. The requesting comput-

ing device **10***a* may send the selected request to the targeted computing device **10***b* using the wireless may communication link established during the device discovery processes, and receive and display transmitted files. For example, when a user desires to request a phone number from a targeted computing device **10***b*, the user may activate the request functionality, point his computing device **10***a* at the targeted computing device **10***b*, and drag-and-drop the phone number request message type from the menu pane **2600** into the launch pad **304** using his finger **306** on the touchscreen **308**. In response to this gesture the user's computing device **10***a* may send a request to the targeted computing device **10***b* to receive a phone number. When a response is received the requesting computing device may display the response.

[0117] In an aspect shown in FIG. **25**, the requesting computing devices **10***a* may be configured to establish wireless communication links with nearby computing devices **10***b*-**10***d* and present a display identifying each computing device **10***b*-**10***d* with a profile picture of its owner to enable a user to select a device from which to request a file transfer. As described above, profile pictures **2700** may be obtained from a contacts database or received from other computing devices **10***b*-**10***d* when the wireless communication links are established. To identify a targeted computing device **10** for a file transfer request message, the user of the requesting computing device **10***a* may touch the profile picture **2700** of the targeted computing device **10***b*. In response, the requesting computing device **10***a* may format and transmit a request message to the targeted computing device **10***b* via the established wireless communication link.

[0118] In an aspect shown in FIG. **26**, the requesting computing device **10***a* may be configured to display a radar map **802** including graphical indicators **804** such as dots and profile pictures to enable the user to identify a computing device **10***b*-**10***g* to which a file request message should be transmitted. The user of the requesting computing device **10***a* may identify a targeted computing device **10***b* for the request message by selecting, dragging, and dropping the graphical indicator associated with the targeted computing device **10***b* into the launch pad **304**. Once the targeted computing device **10***b* is selected, the request for file sharing may be sent to it.

[0119] In an aspect shown in FIG. **27**, the requesting computing device **10***a* may be configured to identify and request file sharing from a targeted computing device **10***b* based on the direction of a flick gesture. In this aspect, the touch path of a flick gesture may begin at a location on the touchscreen **308** outside of the launch pad **304** and end in the launch pad **304**. The dotted line and arrow **902** shows the direction in which a finger **306** may trace a flick gesture for requesting a file transfer from the targeted computing device **10***b* in this aspect.

[0120] In an aspect shown in FIG. **28**, the requesting computing device **10***a* may be configured to identify and request file sharing simultaneously from many different targeted computing devices **10***b*-**10***d* by recognizing a closing hand gesture. In this aspect, a user may place all fingers of one hand near the outside borders on the touchscreen **308** and bring the fingers toward the launch pad **304**. The requesting computing device **10***a* may be configured to recognize such a closing hand gesture, and in response transmit a file sharing request to all linked computing devices **10***b*-**10***d*. Upon receiving such a file sharing request, the other computing devices **10***b*-**10***d* may transmit files to the requesting computing device **10***a* according to access data included in the file sharing request.

[0121] The requesting computing devices **10** may be configured to display a prompt to enable the user to verify the identity of the targeted computing devices **10** before a file transfer request message is transmitted. In an aspect shown in FIG. **29**, a requesting computing device **10** may be configured to identify a targeted computing device **10***a* on a radar map **802** display using a graphical indicator **804**, such as the star, and display a decision pane **3200** requesting the user to confirm or reject the device selection. In the illustrated example, two decision soft keys **3200** are displayed to allow the user to verify the action by pressing "Request" soft key, or stop the request, such as to select a different targeted computing device, by pressing the "Don't Request" soft key.

[0122] In an aspect shown in FIG. **30**, when the identity of the owner of the targeted computing device **10** can be ascertained, such as by looking up the device in the user's contact database, the requesting computing device **10***a* may enable the user to verify the request transmission using that identification data. The identity of the owner of a targeted computing device **10** may displayed as a name, picture, telephone number or email address of the owner. For example, if the picture and name of the owner of the targeted computing device is available, such as in the contact database or transmitted by the targeted computing device, the requesting computing device **10***a* may display a verification prompt pane **3300** including the profile picture and the name of the owner of the targeted computing device **10** along with a prompt for the user to verify the transmission of the requests to the targeted computing device **10**. For example, the user may press a "Yes" or "No" soft key to verify the transmission of the request message.

[0123] FIG. **31** illustrates hardware and software components **3400** of a computing device **10** suitable for use with the various aspects. A computing device **10** may be programmed with an application **3408** to provide the file sharing functionality of the various aspects. The application **3408** may communicate with the operating system (OS) **3404** through an application programming interface (API) **3406**. An API **3406** is an interface that defines the ways by which an application program may request services from libraries and or OS **3404**. Alternatively, the file sharing functionality may be implemented in a series of new APIs. The file sharing functionality application **3408** may communicate with users through the device display **310**, touchscreen **308**, and physical keys **402**. For example, users may depress a key **402** or touch the touchscreen **308** to activate the file sharing functionality. Users may also use the touchscreen **308** to trace flick gestures to initiate file sharing communications. Information received through presses of the keys **402** and/or touchscreen **308** may be communicated to the operating system **3404** and via drivers **3402**. Drivers **3402** act like translators between the keys **402** and touchscreen **308**, and the OS **3402**. The information received via the drivers **3402** may be communicated to the application **3408** via an API **3406**. The application **3408** may provide information to the user on the display **310**. The information that may be displayed to the user may include instructions for activating the file sharing functionality, graphical indicators to facilitate the use of the file sharing functionality, the location and identity of other computing devices **10**, and verification questions.

[0124] The file sharing functionality, and the hand and flick gestures described above may be implemented using the methods described below with reference to FIGS. **32**-**46**.

FIGS. **32-34** illustrate different methods for implementing hand and flick gestures for activating the file sharing functionality.

[0125] FIG. **32** illustrates a process flow of an aspect method **3500** for activating the file sharing functionality using touch. In method **3500** at block **3502**, a computing device **10** may be configured to detect a touch on the touchscreen **308**, and to determine the location of the touch event at block **3504**. At determination block **3506**, the computing device may determine whether the touch event is within a designated area, such as in a launch pad **304**. If the touch event is detected in the designated location (i.e., determination block **3506**="Yes"), the computing device **10** may activate the file sharing functionality at block **3510**. If the touch event is not detected in the designated location (i.e., determination block **3506**="No"), the computing device **10** may perform normal graphical user interface (GUI) processing such as panning at block **3508**.

[0126] FIG. **33** illustrates a process flow of an aspect method **3600** for activating the file sharing functionality in response to the press of a function key **402** or soft key **502**. In method **3600** at block **3604**, the computing device **10** may be configured to detect a key **402** press event for activating the file sharing functionality. Optionally, if a soft key is used to activate the file sharing functionality, the computing device **10** may be configured to display the soft key **502** at block **3602**. A soft key **502** press event may also be detected for activating file sharing functionality at block **3602**. At block **3608** the computing device may activate the file sharing functionality.

[0127] FIG. **34** illustrates a process flow diagram of an aspect method **3700** for activating the file sharing functionality using a pre-determined gesture traced on the touchscreen **308**. A computing device **10** may be configured to detect a touch path event at block **3702**, and analyze the traced path of the touch path event at block **3704** to determine whether the touch path event matches a predetermined gesture at determination block **3705**. For example, an elliptical gesture may be designated to activate the file sharing functionality. If the gesture traced by the user matches the predetermined gesture correlated to the file sharing functionality (i.e. determination block **3704**="Yes"), the computing device **10** may activate the file sharing functionality at block **3706**. If the gesture traced by the user does not match a predetermined gesture (i.e. determination block **3704**="No"), the computing device **10** may perform normal GUI processing at block **3708**.

[0128] FIG. **35** illustrates a process flow of an aspect method **3800** for discovering nearby computing devices and establishing wireless communication links with discovered devices. Activation of the file sharing functionality may cause the computing device processor to activate a wireless transceiver (if not already activated) at block **3804**, and to begin sending device discovery signals to and receiving response signals from nearby computing devices at block **3806**, as defined by the wireless communication protocol of the activated transceiver (e.g., Bluetooth®). As discussed above, this exchange of device discovery and response signals allows nearby computing devices **10** to discover one another's presence and establish wireless communication links. As part of establishing the communication links, the computing devices may exchange access data and location data at block **3808**. This exchange of device data may include identification data and photographs. For example, the computing device **10** may receive identifying data such as profile pictures of the owners of nearby computing devices at block **3808**. Access data may include information that may be used by the computing device to communicate with the targeted computing device **10**, such as Bluetooth® identification data, telephone numbers, and e-mail addresses. Alternatively, transmission of access data may depend on the user authorizing a file transfer operation, and thus may not occur before a computing device is authorized to receive files from a transmitting computing device. The process of requesting and granting access authorization between transmitting targeted computing devices is described in more detail below with reference to FIGS. **42-43**. The computing device may store the received data at block **3810**, and use the received data to determine the presence of the nearby computing device **10**.

[0129] Optionally at block **3802**, the computing device **10** may receive user instructions to search only for known nearby computing devices. For example, a computing device **10** may be instructed to search only for devices whose device data match those in the device's contact database. In this aspect, once nearby devices are discovered, the computing device **10** may compare the nearby devices' identity against the contact database at block **3812**, to determine whether the nearby computing device is known at determination block **3814**. If the detected nearby computing device is not known (i.e., determination block **3814**="No"), the computing device **10** may ignore that device at block **3816**. If the detected nearby computing device is known (i.e., determination block **3814**="Yes"), the computing device **10** may determine the location of the nearby device at block **108** in FIG. **1**.

[0130] The location of computing devices **10** may be determined using various methods. For example, Global Positioning System (GPS) coordinate data receivers received from nearby computing devices may be used to determine their location relative to the device's own location. Alternatively or in addition, signal triangulation methods may be used in determining the relative location of the nearby computing devices **10**.

[0131] FIG. **36** illustrates a process flow of an aspect method **3900** for determining location using GPS coordinates. In method **3900** at block **3902** the computing device **10** may send a request for location data from the nearby computing devices **10**, and receive GPS coordinates from nearby computing devices **10** equipped with GPS navigation receivers at block **3904**. The requesting computing device **10** may determine the relative location of nearby devices based on the received GPS data and position information obtained from the device's own GPS receiver at block **3906**. At block **3908**, the computing device may display a launch pad **304** image to indicate to the user that device is ready for receiving user commands for file sharing. The computing device **10** may then detect a file sharing gesture at block **112** in FIG. **1**.

[0132] Optionally, the computing device **10** may employee different GUI displays to show the relative locations of nearby computing devices **10**. For example, the computing device **10** may display a radar map **802** including graphical indicators that show the location of all the nearby computing devices **10** with respect to the location of the computing device **10** at block **3910**. Alternatively, the computing device **10** may display a picture map including pictures of the owners of the nearby computing devices **10** at block **3912**. The computing device **10** may then detect a file sharing gesture at block **112** in FIG. **1**.

[0133] FIG. **37** illustrates a process flow diagram of an aspect method **4000** for determining the relative location of

nearby computing devices **10** using triangulation. Computing devices **10** may include two antennas and a compass to enable determination of the location of nearby devices using triangulation. The computing devices **10** may receive signals on a first and a second antenna at block **4002**, and compare the timing or signal strength of signals received by the two antennas at block **4004**. The computing device **10** may also receive data from the compass sensor at block **4006**, and determine the relative location of nearby devices based on differential timing and/or signal strengths and the compass data at block **4008**. The triangulation analyses that can be used to determine relative locations are well known. Once the location of the nearby computing devices **10** is determined, at block **4010** the computing device **10** may display a launch pad **304** to allow the user to trace file sharing gestures. The computing device **10** may then detect a file sharing gesture at block **112** in FIG. **1**. Optionally, at block **4011** the computing device **10** may display a radar map **802** display, including graphical indicators to show the relative location of the nearby computing devices with respect to the computing device **10**.

[0134] Once file gesture functionality is activated and nearby computing devices are discovered, different gestures may be used command the computing device **10** to share files with nearby computing devices **10**. These gestures may include those that require the user to move the computing device **10**, and those that require the user to trace a shape on the touchscreen **308** of the computing device **10** using a finger **306**.

[0135] FIG. **38** illustrates a process flow of an aspect method **4300** for recognizing and interpreting a flick gesture for initiating a file sharing process. In method **4300** at block **4302**, the computing device **10** may detect a touch event and determine whether the touch is in the launch pad **304** at determination block **4304**. If the touch event is not within the launch pad **304** (i.e., determination block **4304**="No"), the computing device **10** may perform other GUI processing at block **4336**. If the touch is in the launch pad **304** (i.e., determination block **4304**="Yes"), the computing device **10** may wait to detect the next touch event input at block **4306**, and determine whether the touch goes beyond the launch pad **304** area at determination block **4308**. If the touch path event does not go beyond the launch pad **304** area (i.e., determination block **4308**="No"), the computing device **10** may detect a touch event by return to block **4302**.

[0136] If the touch path event goes beyond the launch pad **304** area (i.e., determination block **4308**="Yes"), the computing device **10** may determine whether the touch event has ended at determination block **4310**. If the touch event has not ended (i.e., determination block **4310**="No"), the computing device may wait for next touch event input by returning to block **4306**. If the touch has ended (i.e., determination block **4310**="Yes"), the computing device **10** may determine the touch path event end location at block **4312**, determine the touch path event direction and speed at block **4314**, and calculate the computing device's tilt angle based upon accelerometer sensor data at block **4316**. At block **4318** the computing device process may use the direction and speed of the flick gesture, and the measured tilt angle of the device to calculate a ballistic trajectory, and use that result to correlate the gesture to a particular relative nearby computing devices. To calculate tilt angles, the computing device **10** may include a set of accelerometers that can sense the gravity gradient and provide such measurements to the processor for use in simple geometric calculations. At determination block **4320** the computing device **10** may determine whether the touch path event traces a curved shape. If the traced touch path event is determined to be curved (i.e., determination block **4320**="Yes"), the computing device may identify the intended recipient computing device based on the measured path curvature, direction, speed, and device tilt angle at block **4322**, and the relative locations of other computing device **10** at block **4332**. Once the targeted device is identified, the computing device **10** may initiate the processes to transmit the file to the targeted computing device at block **118** in FIG. **1**. Optionally, at block **4334** the computing device **10** may display a prompt requesting the user to confirm that the correct device has been identified as the targeted computing device at block **4334** before the file is transmitted.

[0137] If the traced touch path event is not curved (i.e., determination block **4320**="No"), the computing device **10** may determine whether the touch path event is directed towards empty space at determination block **4324**. This determination may be based on the relative locations of nearby computing devices **10** as determined by the transmitting computing device **10**. If the traced touch path event is not directed at an empty space (i.e., determination block **4324**="No"), the computing device **10** may identify the targeted device based on the direction and speed of the touch path event, and the tilt angle of the computing device **10** at block **4332**. Once the targeted device is identified, the computing device **10** may transmit the file to the targeted device at block **118** in FIG. **1**. Optionally, at block **4334** the computing device **10** may display a prompt requesting the user to confirm that the correct device has been identified as the targeted computing device at block **4334** before the file is transmitted.

[0138] If the traced touch path event is directed at an empty space (i.e. at determination block **4324**="Yes"), the computing device **10** may determine whether the bounce functionality is enabled at determination block **4326**. If the bounce functionality is not enabled (i.e., determination block **4326**="No"), the computing device **10** may prompt the user to retrace the gesture at block **4328**. If the bounce functionality is enabled (i.e., determination block **4326**="Yes"), the computing device may calculate the angle of the bounce based in the direction of the traced path at block **4330**, and identify the targeted computing device at block **4332**. Once the targeted computing device is identified, the computing device **10** may begin the processes to transmit the file to the targeted device at block **118** in FIG. **1**. Optionally, at block **4334** the computing device **10** may display a prompt requesting the user to confirm that the correct device has been identified as the targeted computing device at block **4334** before the file is transmitted.

[0139] FIG. **39** illustrates a process flow of an aspect method **4400** for implementing drag-and-drop gesture to identify a nearby computing device **10** to which files may be transmitted. In method **4400** at block **4302**, the computing device **10** may detect a touch event and determine whether the touch is within the launch pad **304** at determination block **4304**. If the touch event is not in the launch pad **304** (i.e., determination block **4304**="No"), the computing device **10** may perform other GUI processing at block **4336**. If the touch it is in the launch pad **304** (i.e., determination block **4304**="Yes"), the computing device **10** may wait to detect the next touch event input at block **4306**, and determine whether a touch event goes beyond the launch pad **304** area at determination block **4308**. If the touch path event does not go beyond the launch pad **304** area (i.e., determination block

4308="No"), the computing device **10** may detect a touch event by returning to block **4302**.

[0140] If the touch path event goes beyond the launch pad **304** area (i.e., determination block **4308**="Yes"), the computing device **10** may determine whether the touch event has ended at determination block **4310**. If the touch event has not ended (i.e., determination block **4310**="No"), the computing device may wait for the next touch event by returning to block **4306**. If the touch event has ended (i.e., determination block **4310**="Yes"), the computing device **10** may determine the touch path event end location at block **4312**, store touch path data at block **4402**, and identify the targeted device based on the touch end location at block **4044**. Once the targeted device is identified, the computing device **10** may initiate the processes to transmit the files to the targeted device at block **118** in FIG. **1**.

[0141] FIG. **40** illustrates a process flow diagram of an aspect method **4500** for determining whether a traced path is curved in shape included in block **4320** of FIG. **38**. The computing device processor may access path data stored in memory at block **4502**, and may process the data using known methods to interpolate among small path segments to "smooth" the path at block **4504**. Once the small segments have been smoothed, the processor may determine whether the smoothed path data includes a series of touch locations Q including at least a minimum number of points, such as a minimum of five points, at determination block **4506**. In alternative aspects, the minimum number of stroke point array Q may be 3, 10 or more points. If the series of touch locations Q does not include the minimum number of touch points (i.e., determination block **4506**="No"), the path data processing may continue as if the path is not an ellipsoid-type or is an ambiguous shape, such as with normal GUI processing at block **4324** in FIG. **38**. However, if the series of touch locations Q includes the minimum number of points (i.e., determination block **4506**="Yes"), the processor may calculate the turn angles and the derivatives of the turn angles of the traced path using the path data stored in memory at block **4508**. By using known methods, the processor may then determine whether the path data represents a curve touch path event at determination block **4510**. If the path data does not represent a curved touch path event (i.e., determination block **4510**="No") the path data is assumed not to constitute a curved shape and the processing of the flick gesture may continue at block **4324** in FIG. **38**. If the path data is determined to represent a curved shape (i.e., determination block **4510**="Yes"), the process continues at block **4322** to identify intervening computing devices as described above with reference to FIG. **38**.

[0142] Optionally, the transmitting computing device **10** may be configured to prompt the user to verify the identity of the targeted computing device **10** before beginning the processes for transmitting the file. FIG. **41** illustrates a process flow of an aspect method **4700** for prompting a device user to verify the identity of the targeted computing device **10** before transmitting a file. The computing device **10** may be configured to display identifying information about the targeted computing device at block **4702**, and display a verification prompt at block **4704**. Identifying information may include the location of the targeted computing device in a radar map **802**, a picture profile of the owner of the targeted computing device and the cellular telephone number of the targeted computing device. For example, once a targeted computing device is identified, the computing device may provide the location of that identified device on the radar map **802**. Because the location of nearby computing devices is displayed relative to the transmitting computing device **10**, a user may verify the identity of the targeted computing device by comparing its position on the displayed radar map **802** to the position of the other nearby device users. The computing device **10** may determine whether file transmission is verified by the user based upon an appropriate user input at determination block **4706**. If file transmission is verified by the user (i.e., determination block **4706**="Yes"), the computing device **10** may begin the process of transmitting the file to the targeted computing device at block **118** in FIG. **1**. If file transmission is not verified by the user (i.e., determination block **4706**="No"), computing device **10** may returned to the selected file display at block **4708**.

[0143] FIG. **42** illustrates a process flow of an optional aspect method **4800** for requesting authorization access data on a targeted computing device **10**. In method **4800** at block **4802**, the transmitting computing device **10** may send a file transmission query to the targeted computing device before transmitting a file. The computing device may receive an authorization response from the targeted computing device at block **4803**, and determine whether authorization is granted at determination block **4804**. If authorization is not granted in the response (i.e., determination block **4804**="No"), a computing device **10** may returned to the selected file display at block **4708**. If authorization is granted in the response (i.e., determination block **4804**="Yes"), the computing device **10** may receive access data as part of the response, such as an address or authorization number at block **4806**. At block **4808**, the computing device may use the received access data to transmit the selected files to the targeted computing device. As discussed above, the method used to transmit the selected files may depend on access data received from the targeted computing device. For example, if the access data includes a telephone number, the transmitting computing device **10** may transmit the selected file as SMS or MMS messages. Optionally, once a selected file is transmitted, the transmitting computing device may return to the home screen at block **4810**.

[0144] FIG. **43** illustrates a process flow of an optional aspect method **4900** for authorizing and sending access data to a transmitting computing device **10**. In method **4900** at block **4902**, the targeted computing device may receive a message from the transmitting computing device **10** requesting permission to transmit files to it. At block **4904**, the targeted computing device **10** may generate a display prompting the user to authorize or deny this request. The targeted computing device **10** may receive the user input via a GUI selection and determine whether the user authorized receiving file transmissions at determination block **4906**. If authorization is denied by the user (i.e., determination block **4906**="No"), the targeted computing device **10** may send a rejection message to the transmitting computing device **10** at block **4908**. If authorization is granted (i.e., determination block **4906**="Yes"), the targeted computing device **10** may send an authorization response along with appropriate access data at block **4910**. The targeted computing device **10** may receive the file from the transmitting computing device at block **4912**. In an aspect, the authorization prompt presented to the user may further offer the user choices for how files should be transmitted. For example, a menu prompt may enable the user to choose among receiving the files as an SMS or MMS message, as an attachment to an e-mail message or as a direct file transfer via the established wireless communica-

tion link. The targeted computing device may receive the user's selection and include the appropriate address within the access data transmitted along with the response message. The transmitting computing device then uses the access data to transmit the files using the transmission method selected by the targeted user.

[0145] FIG. **44** illustrates a process flow of an aspect method **5000** for requesting files from targeted computing devices **10**. In method **5000** at block **102**, a computing device **10** may activate the file sharing functionality. Activation of the file sharing functionality may prompt the computing device **10** to discover nearby devices at block **106**, and to determine the location of the nearby computing devices based upon received responses at block **108**. Optionally, at block **110**, once locations of the nearby devices are determined, the computing device **10** may display a radar map **802** indicating the relative locations of discovered nearby computing devices. At block **112** the computing device **10** may detect a file sharing gesture (e.g., a self-directed flick gesture) traced on the touchscreen **308**, as described above with reference to FIG. **1**. At block **114**, the computing device may identify the nearby computing device targeted for a request for files based on the parameters of the detected file sharing gesture and the locations of nearby computing devices. At block **5008**, the requesting computing device may send a message to the targeted computing device requesting files, and receive files from the targeted computing device **10** at block **5010**. Optionally, the computing device may be configured to request and receive authorization for receiving files from the targeted device at block **116** in FIG. **1**.

[0146] FIG. **45** illustrates a process flow of an aspect method **5100** for detecting and identifying file sharing gestures for requesting files when the computing device has the request file sharing functionality activated. In method **5100** at block **4302**, the computing device **10** may detect a touch event, and determine whether the touch is within the launch pad **304** at determination block **4304**. If the touch event is in the launch pad **304** (i.e., determination block **4304**="Yes"), the computing device **10** may perform other GUI processing at block **4336**. Note that this logic is opposite to that presented in the method described above with reference to FIG. **38** which related to a transmit file sharing functionality. If the touch it is not in the launch pad **304** (i.e., determination block **4304**="No"), the computing device **10** may wait to detect the next touch event input at block **4306**, and determine whether the touch is ended at determination block **4310**. If the touch has not ended (i.e., determination block **4310**="No"), the computing device **10** may wait for a next touch event input, returning to block **4306**. If the touch has ended (i.e., determination block **4310**="Yes"), the computing device **10** may determine the touch path event end location at block **4312**, and determine whether the touch ends in the launch pad **304** at determination block **5102**. If the touch does not end in the launch pad **304** (i.e., determination block **5102**="No"), the computing device **10** may perform other GUI processing at block **4336**.

[0147] If the touch event ends in the launch pad **304** (i.e., determination block **5102**="Yes"), the computing device **10** may store the touch path data at block **5104**. The computing device **10** may determine the touch path direction and speed at block **5314**, calculate the device tilt angle at block **5316**, and calculate the length of the touch path based on the direction, speed, and the tilt angle values at block **5106**. The computing device **10** may determine whether the touch path event traces a curve shaped gesture at determination block **4320**. If the traced touch path event trace is a curve shaped gesture (i.e., determination block **4320**="Yes"), the computing device **10** may identify intervening nearby computing devices at block **4322**, and identify the targeted device based on the calculated the distance of the touch path event at block **4332**. At block **118** in FIG. **1**, the computing device may then begin the processes of transmitting the file to targeted device. If the traced touch path event is not a curve shaped gesture (i.e., determination block **4320**="No"), the computing device **10** may identify the targeted device based on the calculated distance of the touch path event at block **4332**, and begin the processes for transmitting the file to the targeted device at block **118** in FIG. **1**.

[0148] FIG. **46** illustrates a process flow of an aspect method **5200** for receiving a request to share files and transmitting a file to the requesting computing device **10**. In method **5200** at block **5202**, the request receiving computing device may receive a request to share files, and in response may activate the file sharing functionality at block **5204**, and identify the requesting device at block **5206**. At block **5208** the request-receiving computing device **10** may identify a file that may be transmitted to the requesting computing device **10**. The file may be identified based on the designations received from the requesting computing device such as a picture, phone number, specific document, another person's contact number, or a response to a question. At block **5210** the request receiving computing device may display a prompt requesting the user to authorize transmitting the identified file to the identified requesting computing device. This prompt may identify the requesting computing device using any of the methods described in the various aspects, including, for example, a radar map, a user name, a user photograph, etc. At determination block **5212**, the request receiving computing device may determine whether the user has agree to file sharing or declined to share the identified file with the identified computing device. If the user has agreed to share the file (i.e., determination block **5212**="Yes"), the request-receiving computing device may begin the process of transmitting the identified file to the requesting computing device **10** at block **5214**. If the user has not agreed to share the file (i.e., determination block **5212**="Yes"), the request receiving computing device may ignore the request or transmit a message declining the request at block **5216**.

[0149] In a further aspect a computing device to which a file is transmitted may be configured to redirect the file to another computing device if it is busy, such as involved in a telephone call or transmitting data. In a further aspect, a network delivering a file to the targeted computing device may be configured to redirect the file to another computing device if the targeted computing device is busy, such as involved in a telephone call or transmitting data.

[0150] The aspects described above may be implemented on any of a variety of portable computing devices **10**. Typically, such portable computing devices **10** will have in common the components illustrated in FIG. **47**. For example, the portable computing devices **10** may include a processor **191** coupled to internal memory **192** and a touch surface input device. The touch surface input device may be any type of touchscreen display **312**, such as a resistive-sensing touchscreen, capacitive-sensing touchscreen, infrared sensing touchscreen, acoustic/piezoelectric sensing touchscreen or the like. The various aspects are not limited to any particular type of touchscreen display **312** or touchpad technology.

Additionally, the portable computing device **10** may have an antenna **194** for sending and receiving electromagnetic radiation that is connected to one or more wireless transceivers **195***a*, **195***b* coupled to the processor **191**. For example, one wireless transceiver **195***a* may be cellular telephone transceiver **195***a* configured to establish a wireless communication link with a cellular telephone and data communication network, and another may be a Bluetooth® transceiver configured to establish wireless communication links with other Bluetooth® enabled computing devices. Portable computing devices **10** which do not include a touchscreen input device **312** typically include a key pad **196** or miniature keyboard and menu selection keys or rocker switches **197** which serve as pointing devices. The processor **191** may further be connected to a wired network interface **198**, such as a universal serial bus (USB) or FireWire® connector socket, for connecting the processor **191** to an external touchpad or touch surfaces or external local area network. The computing device **10** may further include a microphone **199** coupled to the processor **191** to receive voice and commands from the user.

[0151] The computing device **10** may further include other circuit components and sensors to enable the file sharing functionality of the various aspects. An accelerometer sensor assembly **190** may be coupled to the processor **191** to detect acceleration of the computing device. Such an accelerometer sensor assembly **190** may include three accelerometers configured to sense accelerations along three mutually perpendicular directions. A gyroscope sensor **5300** may be coupled to the processor **191** to detect rapid rotational movements of the computing device **10**. An electronic compass sensor **5302** may be coupled to the processor to detect the direction in which the computing device is pointing with respect to the Earth's magnetic field. In an aspect, the computing device **10** may also include a second antenna **5304** coupled to one of the wireless transceivers **195***b* to enable the transceiver **195***b* or processor to compare the timing and/or signal strength of signals received from nearly computing devices to support triangulation calculations. A GPS receiver **5306** may also be coupled to the processor **191** to determine the location of a computing device. In an aspect, the GPS receiver **5306** and the processor **191** may be configured to determine location using enhanced GPS services supported by a cellular telephone network.

[0152] In some implementations, a touch surface can be provided in areas of the computing device **10** outside of the touchscreen display **312**. For example, the keypad **196** can include a touch surface with buried capacitive touch sensors. In other implementations, the keypad **196** may be eliminated so the touchscreen display **312** provides the complete GUI. In yet further implementations, a touch surface may be an external touchpad that can be connected to the computing device **10** by means of a cable to a cable connector **198** or a wireless transceiver **195***b* coupled to the processor **191**.

[0153] The processor **191** may be any programmable microprocessor, microcomputer or multiple processor chip or chips that can be configured by software instructions (applications) to perform a variety of functions, including the functions of the various aspects described above. In some portable computing devices **10**, multiple processors **191** may be provided, such as one processor dedicated to wireless communication functions and one processor dedicated to running other applications. The processor may also be included as part of a communication chipset. Typically, software applications may be stored in the internal memory **195** before they are accessed and loaded into the processor **191**. In some portable computing devices **10**, the processor **191** may include internal memory sufficient to store the application software instructions. For the purposes of this description, the term memory refers to all memory accessible by the processor **191**, including internal memory **195** and memory within the processor **191** itself. Application data files are typically stored in the memory **195**. In many portable computing devices **10**, the memory **195** may be a volatile or nonvolatile memory, such as flash memory, or a mixture of both.

[0154] Those of skill in the art would appreciate that the various illustrative logical blocks, modules, circuits, and algorithm blocks described in connection with the aspects disclosed herein may be implemented as electronic hardware, computer software, or combinations of both. To clearly illustrate this interchangeability of hardware and software, various illustrative components, blocks, modules, circuits, and blocks have been described above generally in terms of their functionality. Whether such functionality is implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans may implement the described functionality in varying ways for each particular application, but such implementation decisions should not be interpreted as causing a departure from the scope of the present invention.

[0155] The order in which the blocks of a process are described and appear in the figures is for example purposes only as the order of some blocks may be changed from that described herein without changing the scope of the present invention and the claims.

[0156] The blocks of a method or algorithm described in connection with the aspects disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in processor readable memory which may be any of RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to a processor such that the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a user terminal or computing device. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal or computing device. Additionally, in some aspects, the blocks and/or actions of a method or algorithm may reside as one or any combination or set of codes and/or instructions on a machine readable medium and/or computer readable medium, which may be incorporated into a computer program product.

[0157] The foregoing description of the various aspects is provided to enable any person skilled in the art to make or use the present invention. Various modifications to these aspects will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other aspects without departing from the scope of the invention. Thus, the present invention is not intended to be limited to the aspects shown herein, and instead the claims should be accorded the widest scope consistent with the principles and novel features disclosed herein.

What is claimed is:

1. A method for sharing files among a mobile device and nearby computing devices, comprising:
activating a file sharing functionality;
discovering nearby computing devices;
establishing a wireless link with the discovered computing devices;
determining locations of the discovered nearby computing devices;
detecting a file sharing gesture on a touch surface of the computing device;
identifying a targeted computing device based on the detected file sharing gesture; and
transmitting a file sharing message to the targeted computing device.

2. The method of claim 1, wherein establishing the wireless link is accomplished using a wireless technology selected from Bluetooth®, ZigBee®, Near Field Communication (NFC), wide-area-wireless IEEE 802.11 (WiFi), infrared (IrDA), and ultrasound.

3. The method of claim 2, wherein:
determining locations of the discovered nearby computing devices comprises receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices via the established wireless link; and
transmitting the file sharing message to the targeted computing device is accomplished using a wireless technology different from the wireless technology used to establish the wireless link.

4. The method of claim 1, wherein determining locations of the discovered nearby computing device comprises:
determining a difference in arrival times of signals received from the discovered nearby computing devices using a first and second antennae; and
using triangulation calculations based on the determined difference in arrival times of signals to determine a direction to each of the discovered nearby computing devices.

5. The method of claim 1, wherein determining locations of the nearby discovered computing device comprises:
receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices; and
comparing the received location coordinates to location coordinates from a GPS receiver within the mobile device.

6. The method of claim 1, wherein detecting a file sharing gesture comprises detecting one of a flick gesture and a hand gesture.

7. The method of claim 1, wherein identifying the targeted computing device comprises:
determining a shape of the detected file sharing gesture;
determining a direction and speed of the detected file sharing gesture;
calculating a location where an object would land based on the determined shape, direction and speed of the detected file sharing gesture; and
comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

8. The method of claim 1, wherein identifying the targeted computing device comprises:
determining a tilt angle of the mobile device;
determining a direction and speed of the detected file sharing gesture;
calculating a location where an object would land based on the determined tilt angle, direction and speed of the detected file sharing gesture; and
comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

9. The method of claim 1, wherein transmitting a file sharing message comprises transmitting a selected file to the targeted computing device, the method further comprising:
transmitting a request to transmit the file to the targeted computing device; and
receiving a response from the targeting computing device including access data specifying an address to which the file should be transmitted,
wherein transmitting the file to the targeted computing device comprises:
determining a wireless communication link over which the file should be transmitted based upon the address specified in the received access data; and
transmitting the file to the address via the determined wireless communication link.

10. The method of claim 9, wherein the request to transmit the file to the target computing device is accomplished using the established wireless link, and the determined wireless communication link used to transmit the file uses a wireless technology that is different than the established wireless link technology.

11. The method of claim 1, wherein transmitting a file sharing message comprises transmitting a selected file to the targeted computing device, the method further comprising:
displaying a prompt for a user verification of the targeted computing device; and
determining whether a user input indicates user verification of the targeted computing device,
wherein transmitting the file to the targeted computing device is accomplished if the user input indicates user verification of the targeted computing device.

12. The method of claim 11, wherein displaying a prompt for a user verification the targeted computing device comprises:
receiving a user identifier from discovered computing devices via the established wireless link;
using the received user identifier to obtain an image from a contact database; and
displaying an obtained image as the prompt for the user verification of the targeted computing device.

13. The method of claim 1, wherein the touch surface is a touchscreen user interface, further comprising:
displaying a launch pad on the touchscreen user interface,
wherein detecting a file sharing gesture comprises comparing one of a touch event start point and an end point to the displayed launch pad.

14. The method of claim 1, further comprising:
displaying a radar map image including graphical indicators for the determined relative locations of the discovered nearby computing devices.

15. The method of claim 1, wherein transmitting a file sharing message comprises transmitting a message requesting the targeted computing device to transmit a file.

16. The method of claim **15**, further comprising:

transmitting access data to the targeted computing device, the access data including an address to which the requested file should be transmitted.

17. The method of claim **1**, further comprising:

determining whether the detected file sharing gesture includes a curved path,

wherein identifying the targeted computing device comprises selecting a computing device positioned behind another computing device relative.

18. The method of claim **1**, further comprising:

determining whether the detected file sharing gesture is directed away from other computing devices; and

calculating an indirect path based on the direction of the file sharing gesture and an edge of the computing device display,

wherein identifying the targeted computing device is based upon the calculated indirect path and the determined locations of the discovered nearby computing devices.

19. A mobile device, comprising:

a processor;

a display coupled to the processor;

a touch sensitive surface coupled to the processor;

a memory coupled to the processor; and

a first wireless transceiver coupled to the processor,

wherein the processor is configured with processor-executable instructions to perform steps operations comprising:

activating a file sharing functionality;

discovering nearby computing devices via the first wireless transceiver;

establishing a wireless link with the discovered computing devices via the first wireless transceiver;

determining locations of the discovered nearby computing devices;

detecting a file sharing gesture on the touch sensitive surface;

identifying a targeted computing device based on the detected file sharing gesture; and

transmitting a file sharing message to the targeted computing device via the first transceiver.

20. The mobile device of claim **19**, wherein the first transceiver is configured to communicate according to a wireless technology selected from Bluetooth®, ZigBee®, Near Field Communication (NFC), wide-area-wireless IEEE 802.11 (WiFi), infrared (IrDA), and ultrasound.

21. The mobile device of claim **20**, wherein the processor is further configured with processor-executable instruction such that:

determining locations of the discovered nearby computing devices is accomplished by receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices via the established wireless link; and

transmitting the file sharing message to the targeted computing device is accomplished using a wireless technology different from the wireless technology used to establish the wireless link.

22. The mobile device of claim **19**, further comprising a first antenna and a second antenna, at least one of which is coupled to the first transceiver,

wherein the processor is further configured with processor-executable instruction such that determining locations of the discovered nearby computing device is accomplished by performing operations comprising:

determining a difference in arrival times of signals received from the discovered nearby computing devices via the first and second antennae; and

using triangulation calculations based on the determined difference in arrival times of signals to determine a direction to each of the discovered nearby computing devices.

23. The mobile device of claim **19**, further comprising a Global Positioning System (GPS) receiver coupled to the processor,

wherein the processor is further configured with processor-executable instruction such that determining locations of the discovered nearby computing device is accomplished by performing operations comprising:

receiving location coordinates provided by GPS receivers in the discovered nearby computing devices; and

comparing the received location coordinates to location coordinates received from the GPS receiver.

24. The mobile device of claim **19**, wherein the processor is further configured with processor-executable instruction such that detecting a file sharing gesture is accomplished by performing operations comprising detecting one of a flick gesture and a hand gesture on the touch sensitive surface.

25. The mobile device of claim **19**, wherein the processor is further configured with processor-executable instruction such that identifying the targeted computing device is accomplished by performing operations comprising:

determining a shape of the detected file sharing gesture;

determining a direction and speed of the detected file sharing gesture;

calculating a location where an object would land based on the determined shape, direction and speed of the detected file sharing gesture; and

comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

26. The mobile device of claim **19**, further comprising an accelerometer coupled to the processor configured to measure a tilt angle of the mobile device,

wherein the processor is further configured with processor-executable instruction such that identifying the targeted computing device is accomplished by performing operations comprising:

determining a tilt angle of the computing device using an input from the accelerometer;

determining a direction and speed of the detected file sharing gesture;

calculating a location where an object would land based on the determined tilt angle, direction and speed of the detected file sharing gesture; and

comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

27. The mobile device of claim **19**, wherein the processor is further configured with processor-executable instruction such that transmitting a file sharing message is accomplished by performing operations comprising:

transmitting, via the first transceiver, a request to transmit a selected file to the targeted computing device;

receiving, via the first transceiver, a response from the targeting computing device including access data specifying an address to which the selected file should be transmitted,

determining a wireless communication link over which the selected file should be transmitted based upon the address specified in the received access data; and

transmitting the selected file to the address via the determined wireless communication link.

28. The mobile device of claim **27**, wherein the processor is configured by processor-executable instructions to transmit the selected file to the target computing device via the first transceiver.

29. The mobile device of claim **27**, further comprising a second transceiver coupled to the processor, wherein the second transceiver is configured to communicate using a wireless communication technology different from that of the first transceiver,

wherein the processor is further configured with processor-executable instruction to transmit the selected file via the second transceiver.

30. The mobile device of claim **19**, wherein:

the processor is further configured with processor-executable instruction such that transmitting a file sharing message is accomplished by performing operations comprising transmitting a selected file to the targeted computing device;

the processor is configured with processor-executable instructions to perform further operations comprising

displaying on the display a prompt for a user verification of the targeted computing device, and

determining whether a user input indicates user verification of the targeted computing device; and

the processor is further configured with processor-executable instruction such that transmitting the file to the targeted computing device is accomplished if the user input indicates user verification of the targeted computing device.

31. The mobile device of claim **30**, wherein the processor is further configured with processor-executable instruction such that displaying a prompt for a user verification the targeted computing device is accomplished by performing operations comprising:

receiving a user identifier from discovered computing devices via the established wireless link via the first transceiver;

using the received user identifier to obtain an image from a contact database stored in the memory; and

displaying on the display the obtained image as the prompt for the user verification of the targeted computing device.

32. The mobile device of claim **19**, wherein:

the display and the touch sensitive surface are a touchscreen display;

the processor is configured with processor-executable instructions to perform further operations comprising displaying a launch pad on the touchscreen display; and

the processor is further configured with processor-executable instruction such that detecting a file sharing gesture comprises comparing one of a touch event start point and an end point to the displayed launch pad.

33. The mobile device of claim **19**, wherein the processor is configured with processor-executable instructions to perform further operations comprising displaying a radar map image on the display including graphical indicators for the determined relative locations of the discovered nearby computing devices.

34. The mobile device of claim **19**, wherein the processor is further configured with processor-executable instruction such that transmitting a file sharing message is accomplished by performing operations comprising transmitting a message requesting the targeted computing device to transmit a file.

35. The mobile device of claim **34**, wherein the processor is configured with processor-executable instructions to perform further operations comprising:

transmitting access data to the targeted computing device, the access data including an address to which the requested file should be transmitted.

36. The mobile device of claim **19**, wherein:

the processor is configured with processor-executable instructions to perform further operations comprising determining whether the detected file sharing gesture includes a curved path; and

the processor is further configured with processor-executable instruction such that identifying the targeted computing device is accomplished by performing operations comprising selecting a computing device positioned behind another computing device relative.

37. The mobile device of claim **19**, wherein the processor is configured with processor-executable instructions to perform further operations comprising:

determining whether the detected file sharing gesture is directed away from other computing devices; and

calculating an indirect path based on the direction of the file sharing gesture and an edge of the computing device display,

wherein the processor is further configured with processor-executable instruction such that identifying the targeted computing device is accomplished based upon the calculated indirect path and the determined locations of the discovered nearby computing devices.

38. A mobile device, comprising:

means for activating a file sharing functionality;

means for discovering nearby computing devices;

means for establishing a wireless link with the discovered computing devices;

means for determining locations of the discovered nearby computing devices;

means for detecting a file sharing gesture;

means for identifying a targeted computing device based on the detected file sharing gesture; and

means for transmitting a file sharing message to the targeted computing device.

39. The mobile device of claim **38**, wherein means for establishing the wireless link uses a wireless technology selected from Bluetooth®, ZigBee®, Near Field Communication (NFC), wide-area-wireless IEEE 802.11 (WiFi), infrared (IrDA), and ultrasound.

40. The mobile device of claim **39**, wherein:

means for determining locations of the discovered nearby computing devices comprises means for receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices via the established wireless link; and

means for transmitting the file sharing message to the targeted computing device comprises means for transmitting the file sharing message using a wireless technology

different from the wireless technology used by the means for establishing the wireless link.

41. The mobile device of claim **38**, wherein means for determining locations of the discovered nearby computing device comprises:

means for determining a difference in arrival times of signals received from the discovered nearby computing devices using a first and second antennae; and

means for using triangulation calculations based on the determined difference in arrival times of signals to determine a direction to each of the discovered nearby computing devices.

42. The mobile device of claim **38**, wherein means for determining locations of the nearby discovered computing device comprises:

means for receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices; and

means for comparing the received location coordinates to location coordinates from a GPS receiver.

43. The mobile device of claim **38**, wherein means for detecting a file sharing gesture comprises means for detecting one of a flick gesture and a hand gesture.

44. The mobile device of claim **38**, wherein means for identifying the targeted computing device comprises:

means for determining a shape of the detected file sharing gesture;

means for determining a direction and speed of the detected file sharing gesture;

means for calculating a location where an object would land based on the determined shape, direction and speed of the detected file sharing gesture; and

means for comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

45. The mobile device of claim **38**, wherein means for identifying the targeted computing device comprises:

means for determining a tilt angle of the computing device;

means for determining a direction and speed of the detected file sharing gesture;

means for calculating a location where an object would land based on the determined tilt angle, direction and speed of the detected file sharing gesture; and

means for comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

46. The mobile device of claim **38**, wherein means for transmitting a file sharing message comprises means for transmitting a selected file to the targeted computing device, the mobile device further comprising:

means for transmitting a request to transmit the file to the targeted computing device; and

means for receiving a response from the targeting computing device including access data specifying an address to which the file should be transmitted,

wherein means for transmitting the file to the targeted computing device comprises:

means for determining a wireless communication link over which the file should be transmitted based upon the address specified in the received access data; and

means for transmitting the file to the address via the determined wireless communication link.

47. The mobile device of claim **46**, wherein means for transmitting a request to transmit the file to the target computing device comprises means for transmitting the request using the established wireless link, and means for transmitting the file via the determined wireless communication link uses a wireless technology that is different than the established wireless link technology.

48. The mobile device of claim **38**, wherein means for transmitting a file sharing message comprises means for transmitting a selected file to the targeted computing device, the mobile device further comprising:

means for displaying a prompt for a user verification of the targeted computing device; and

means for determining whether a user input indicates user verification of the targeted computing device,

wherein means for transmitting the file to the targeted computing device comprises means for transmitting the file to the targeted computing device if the user input indicates user verification of the targeted computing device.

49. The mobile device of claim **48**, wherein means for displaying a prompt for a user verification the targeted computing device comprises:

means for receiving a user identifier from discovered computing devices via the established wireless link;

means for using the received user identifier to obtain an image from a contact database; and

means for displaying an obtained image as the prompt for the user verification of the targeted computing device.

50. The mobile device of claim **38**, wherein means for detecting a file sharing gesture comprises a display and means for detecting touch events on the display, the mobile device further comprising means for displaying a launch pad on the display,

wherein means for detecting a file sharing gesture comprises means for comparing one of a touch event start point and an end point to the displayed launch pad.

51. The mobile device of claim **38**, further comprising:

means for displaying a radar map image including graphical indicators for the determined relative locations of the discovered nearby computing devices.

52. The mobile device of claim **38**, wherein means for transmitting a file sharing message comprises means for transmitting a message requesting the targeted computing device to transmit a file.

53. The mobile device of claim **52**, further comprising:

means for transmitting access data to the targeted computing device, the access data including an address to which the requested file should be transmitted.

54. The mobile device of claim **38**, further comprising:

means for determining whether the detected file sharing gesture includes a curved path,

wherein means for identifying the targeted computing device comprises means for selecting a computing device positioned behind another computing device relative.

55. The mobile device of claim **38**, further comprising:

means for determining whether the detected file sharing gesture is directed away from other computing devices; and

means for calculating an indirect path based on the direction of the file sharing gesture and an edge of the computing device display,

wherein means for identifying the targeted computing device comprises means for identifying the targeted computing device based upon the calculated indirect path and the determined locations of the discovered nearby computing devices.

56. A computer program product, comprising:

a computer-readable medium comprising:

at least one instruction for activating a file sharing functionality;

at least one instruction for discovering nearby computing devices;

at least one instruction for establishing a wireless link with the discovered computing devices;

at least one instruction for determining locations of the discovered nearby computing devices;

at least one instruction for detecting a file sharing gesture on a touch surface of a computing device;

at least one instruction for identifying a targeted computing device based on the detected file sharing gesture; and

at least one instruction for transmitting a file sharing message to the targeted computing device.

57. The computer program product of claim **56**, wherein the at least one instruction for establishing the wireless link includes at least one instruction for using a wireless technology selected from Bluetooth®, ZigBee®, Near Field Communication (NFC), wide-area-wireless IEEE 802.11 (WiFi), infrared (IrDA), and ultrasound.

58. The computer program product of claim **57**, wherein:

the at least one instruction for determining locations of the discovered nearby computing devices comprises at least one instruction for receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices via the established wireless link;

the at least one instruction for transmitting the file sharing message to the targeted computing device includes at least one instruction for using a wireless technology different from the wireless technology used to establish the wireless link.

59. The computer program product of claim **56**, wherein the at least one instruction for determining locations of the discovered nearby computing device comprises:

at least one instruction for determining a difference in arrival times of signals received from the discovered nearby computing devices using a first and second antennae; and

at least one instruction for using triangulation calculations based on the determined difference in arrival times of signals to determine a direction to each of the discovered nearby computing devices.

60. The computer program product of claim **56**, wherein the at least one instruction for determining locations of the nearby discovered computing device comprises:

at least one instruction for receiving location coordinates provided by Global Positioning System (GPS) receivers in each of the discovered nearby computing devices; and

at least one instruction for comparing the received location coordinates to location coordinates from a GPS receiver.

61. The computer program product of claim **56**, wherein the at least one instruction for detecting a file sharing gesture comprises detecting one of a flick gesture and a hand gesture.

62. The computer program product of claim **56**, wherein the at least one instruction for identifying the targeted computing device comprises:

at least one instruction for determining a shape of the detected file sharing gesture;

at least one instruction for determining a direction and speed of the detected file sharing gesture;

at least one instruction for calculating a location where an object would land based on the determined shape, direction and speed of the detected file sharing gesture; and

at least one instruction for comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

63. The computer program product of claim **56**, wherein the at least one instruction for identifying the targeted computing device comprises:

at least one instruction for determining a tilt angle of the computing device;

at least one instruction for determining a direction and speed of the detected file sharing gesture;

at least one instruction for calculating a location where an object would land based on the determined tilt angle, direction and speed of the detected file sharing gesture; and

at least one instruction for comparing the calculated location to the determined locations of the nearby discovered computing devices to identify a computing device closest to the calculated location where an object would land.

64. The computer program product of claim **56**, wherein the at least one instruction for transmitting a file sharing message comprises at least one instruction for transmitting a selected file to the targeted computing device, the computer-readable medium further comprising:

at least one instruction for transmitting a request to transmit the file to the targeted computing device; and

at least one instruction for receiving a response from the targeting computing device including access data specifying an address to which the file should be transmitted,

wherein the at least one instruction for transmitting the file to the targeted computing device comprises:

at least one instruction for determining a wireless communication link over which the file should be transmitted based upon the address specified in the received access data; and

at least one instruction for transmitting the file to the address via the determined wireless communication link.

65. The computer program product of claim **64**, wherein the at least one instruction for transmitting a request to transmit the file to the target computing device includes at least one instruction for using the established wireless link, and at least one instruction for transmitting the file using a wireless technology that is different than the established wireless link technology.

66. The computer program product of claim **56**, wherein the at least one instruction for transmitting a file sharing message comprises at least one instruction for transmitting a selected file to the targeted computing device, the computer-readable medium further comprising:

at least one instruction for displaying a prompt for a user verification of the targeted computing device; and

at least one instruction for determining whether a user input indicates user verification of the targeted computing device,

wherein the at least one instruction for transmitting the file to the targeted computing device includes at least one instruction for transmitting the file if the user input indicates user verification of the targeted computing device.

67. The computer program product of claim **66**, wherein the at least one instruction for displaying a prompt for a user verification the targeted computing device comprises:

at least one instruction for receiving a user identifier from discovered computing devices via the established wireless link;

at least one instruction for using the received user identifier to obtain an image from a contact database; and

at least one instruction for displaying an obtained image as the prompt for the user verification of the targeted computing device.

68. The computer program product of claim **56**, wherein the computer-readable medium further comprises at least one instruction for displaying a launch pad on a touchscreen user interface,

wherein the at least one instruction for detecting a file sharing gesture comprises at least one instruction for comparing one of a touch event start point and end point to the displayed launch pad.

69. The computer program product of claim **56**, wherein the computer-readable medium further comprises:

at least one instruction for displaying a radar map image including graphical indicators for the determined relative locations of the discovered nearby computing devices.

70. The computer program product of claim **56**, wherein the at least one instruction for transmitting a file sharing message comprises at least one instruction for transmitting a message requesting the targeted computing device to transmit a file.

71. The computer program product of claim **70**, further comprising:

at least one instruction for transmitting access data to the targeted computing device, the access data including an address to which the requested file should be transmitted.

72. The computer program product of claim **56**, further comprising:

at least one instruction for determining whether the detected file sharing gesture includes a curved path,

wherein the at least one instruction for identifying the targeted computing device comprises at least one instruction for selecting a computing device positioned behind another computing device relative.

73. The computer program product of claim **56**, wherein the computer-readable medium further comprises:

at least one instruction for determining whether the detected file sharing gesture is directed away from other computing devices; and

at least one instruction for calculating an indirect path based on the direction of the file sharing gesture and an edge of the computing device display,

wherein the at least one instruction for identifying the targeted computing device comprises at least one instruction for identifying the targeted computing device based upon the calculated indirect path and the determined locations of the discovered nearby computing devices.

* * * * *