NONCONFIDENTIAL
Nos. 2012-1548, 2012-1549

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

APPLE INC. AND NeXT SOFTWARE, INC. (formerly known as NeXT Computer, Inc.),

Plaintiffs-Appellants,

— v. —

MOTOROLA, INC. (now known as Motorola Solutions, Inc.) AND MOTOROLA MOBILITY, INC.,

Defendants-Cross-Appellants.

Appeals from the United States District Court for the Northern District of Illinois, Case No. 11-CV-8540, Judge Richard A. Posner

OPENING BRIEF AND ADDENDUM OF PLAINTIFFS-APPELLANTS APPLE INC. AND NEXT SOFTWARE, INC.

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CERTIFICATE OF INTEREST

Counsel for appellants certify the following:

1. We represent APPLE INC. and NEXT SOFTWARE, INC.

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented: Not applicable.

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented: None. Apple Inc. has no parent corporation. According to Apple's Proxy Statement filed with the United States Securities and Exchange Commission in January 2012, there are no beneficial owners that hold more than 10% of Apple's outstanding common stock. NeXT Software, Inc. is a wholly owned subsidiary of Apple Inc.

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Material has been deleted from pages 8, 10-13, 41, 42, 49, 50, 56, 57, 62, 63, 65-68 and 70 of the nonconfidential Brief of Plaintiffs-Appellants Apple Inc. and NeXT Software, Inc. This material is deemed confidential information pursuant to the Protective Orders entered January 28, 2011 and February 1, 2012. The material omitted from these pages contains confidential deposition and hearing testimony, confidential business information, confidential patent application information, and confidential licensing information.

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TABLE OF ABBREVIATIONS

A_____	Cited page(s) of the Joint Appendix
Apple	Apple Inc. and NeXT Software, Inc.
ITC	United States International Trade Commission
Motorola	Motorola Mobility, Inc.
’263 patent	U.S. Patent No. 6,343,263, Real-Time Signal Processing System for Serially Transmitted Data
’647 patent	U.S. Patent No. 5,946,647, System and Method for Performing an Action on a Structure in Computer-Generated Data
’949 patent	U.S. Patent No. 7,479,949, Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics

STATEMENT OF RELATED CASES

In October 2010, Apple filed a complaint in the Western District of Wisconsin alleging that Motorola is infringing numerous Apple patents including (as relevant here) the ’949, ’263, and ’647 patents. Motorola filed counterclaims alleging that Apple infringes several Motorola patents. In December 2011, the case was transferred to the Northern District of Illinois, A4056-57, and assigned to Hon. Richard A. Posner of the Seventh Circuit, sitting by designation, A4058. No appeal from this proceeding was previously before the Court or any other appellate court.

In October 2010, Motorola filed a proposed complaint with the ITC alleging that Apple infringed different Motorola patents. The Court is currently considering Motorola’s appeal of the ITC’s determination in that investigation. *Motorola Mobility LLC v. ITC*, No. 12-1666 (Fed. Cir. filed Sept. 19, 2012). Later that month, Apple filed a proposed complaint with the ITC alleging that Motorola infringed different Apple patents. The Court is currently considering Apple’s appeal of the ITC’s determination in that investigation. *Apple Inc. v. ITC*, No. 12-1338 (Fed. Cir. filed Apr. 19, 2012).

The Court also was considering Apple's appeal of an ITC decision involving infringement by HTC Corp. of the '647 and '263 patents at issue here, *Apple Inc. v. ITC*, No. 2012-1125 (Fed. Cir. filed Dec. 29, 2011), and HTC's appeal from that same decision regarding the '647 patent, *HTC Corp. v. ITC*, No. 2012-1226 (Fed. Cir. filed Feb. 24, 2012). A December 2011 ITC exclusion order prohibited HTC from importing devices that infringe the '647 patent. *In re Certain Personal Data and Mobile Commc'ns Devices and Related Software*, Inv. No. 337-TA-710, USITC Pub. No. 4331 (Dec. 19, 2011) (Final). Also related to that case was *Apple Inc. v. HTC Corp.*, No. 1:10-cv-00166-GMS (D. Del. filed Mar. 2, 2010), which was stayed pending completion of the proceedings arising from the ITC. In November 2012, Apple and HTC dismissed all current lawsuits pursuant to a global settlement. Accordingly, this Court dismissed the consolidated appeals. *HTC Corp. v. ITC*, No. 12-1226, Dkt. No. 43 (Fed. Cir. Nov. 15, 2012); *Apple Inc. v. ITC*, No. 12-1125, Dkt. No. 48 (Fed. Cir. Nov. 15, 2012).

The '647 patent also is at issue in *Apple Inc. v. Samsung Electronics Co., Ltd.*, No. 5:12-cv-00630-LHK (N.D. Cal. filed Feb. 8, 2012). This Court recently considered Samsung's appeal of the district court's grant of a preliminary injunction, but that appeal was limited to a single patent not at issue here. *Apple Inc. v. Samsung Elecs. Co.*, No. 12-1507 (Fed. Cir. filed Jul. 6, 2012).

Apple has filed a complaint against Samsung in the ITC that involves the '949 patent. *In re Elec. Digital Media Devices*, Inv. No. 337-TA-796 (U.S.I.T.C. filed July 5, 2011). The ITC has not issued a final determination. Apple had also asserted the '263 patent against Nokia in the District of Delaware, but all claims and counterclaims were dismissed when the parties settled. *Nokia Corp. v. Apple Inc.*, No. 1:09-cv-00791-GMS (D. Del. filed Oct. 22, 2009).

INTRODUCTION

These appeals represent an important front in Apple's efforts to stop other consumer electronics companies from appropriating its smartphone innovations. Apple and Motorola have asserted patent claims against each other. The district court dismissed all claims. Apple and Motorola both appeal from those dismissals.

Apple's appeal concerns three Apple patents disclosing inventions embodied in the operating software that runs the iPhone and iPad. Each is a popular feature that makes these devices easy to use. Just as the Mac's user-friendly graphical interface revolutionized the computer desktop, the ease of using and programming both the iPhone and the iPad has fueled the meteoric rise of the most successful slate of consumer products of this generation.

The first innovation is about how you tell the iPhone or iPad what to do. When you touch or swipe on the touchscreen, the device knows what you mean even if your movement is imprecise. The second innovation has fueled the rapid proliferation of applications—"apps," in the vernacular—by making it easier for developers to make apps that stream audio and video in real time. The third advance is the so-called "structure-detection" feature that recognizes patterns of characters such as phone numbers or email addresses and offers convenient options to act upon each (e.g., call the number, text it, or store it in contacts).

Inventions like these propelled the iPhone's meteoric rise. But as a hardware company, Motorola could not compete effectively with Apple's operating software. So it launched a two-pronged attack—appropriate and litigate. First, Motorola built its devices around Google's Android operating system. Android incorporates the very features that made Apple's devices so popular, including Apple's touchscreen gesture recognition, real-time streaming system, and structure-detection system. Next, Motorola initiated several actions against Apple.

Apple responded with patent claims against Motorola in several actions, including this one. But there were key differences. Unlike Apple, Motorola pressed patents on trivial features. Among them were patents that Motorola insisted Apple must be infringing because they were incorporated in industry wireless communication standards. But Motorola had pledged to license all so-called "standard essential patents" to anyone for "fair, reasonable and nondiscriminatory"

("FRAND") rates. The district court correctly rejected Motorola's tactic, as our next brief (third brief on appeal) will demonstrate.

But the district court erred in dismissing some of Apple's claims. The district court failed to follow this Court's teaching on what claims qualify as "means-plus-function" claims within the meaning of 35 U.S.C. § 112 ¶ 6. And it misconstrued two key terms of the structure-detection patent. The district court's general damages rubric was unobjectionable, and it applied that rubric correctly to Motorola (for reasons we will explain in the next brief). But it incorrectly applied the principles to Apple (for reasons we explain below).

The district court's most far-reaching error was to deny Apple injunctive relief as a matter of law. Apple seeks an injunction to stop infringement by an ardent competitor. Apple had a general policy against licensing its central technology. It had proof that it is losing market share and goodwill because of the ongoing infringement. None of its asserted patents are standard-essential. Nevertheless, the district court ruled that there was not even a triable issue as to whether Apple would be able to satisfy the standards for injunctive relief. Sustaining this new legal rule would drastically curtail the patentee's ability to seek an injunction against infringement.

JURISDICTIONAL STATEMENT

The district court had jurisdiction under 28 U.S.C. §§ 1331 and 1338(a) and entered final judgment on June 22, 2012. This timely appeal was filed on July 20, 2012. 28 U.S.C. § 2107(a). The Court has jurisdiction under 28 U.S.C. § 1295(a)(1).

STATEMENT OF THE ISSUES

1. The drafters of claim 1 of the '949 patent did not use the phrase "means" or "means for" nor in any other way indicate an intention to invoke the provisions of 35 U.S.C. § 112 ¶ 6. Did the district court err in applying the means-plus-function statute to limit the claim?

2. In a separate action, the ITC adopted Apple's construction of two claim terms ("analyzer server" and "linking actions to detected structures") used in the '647 patent. In this case, the district court rejected Apple's constructions. Did the district court misconstrue the two terms by improperly limiting the claim to a single embodiment and imposing limitations that are unsupported by the patent itself?

3. Did the district court err in excluding a damages expert who for the ’949 patent relied on a sufficiently comparable benchmark commercial product, for the ’263 patent relied on technical facts provided by another Apple expert, and for the ’647 patent relied on the length of time an infringing competitor took to design around?

4. Apple, which has a general policy against licensing its patents, presented evidence that Motorola was cutting into Apple’s market share and diverting goodwill. Did the district court err in rejecting Apple’s claim for injunctive relief, concluding, as a matter of law, that no trial was necessary because a “compulsory license with ongoing royalty is likely to be a superior remedy”?

STATEMENT OF THE CASE

On October 29, 2010, Apple filed a complaint in the Western District of Wisconsin, alleging that Motorola’s products infringed three Apple patents. Motorola counterclaimed, alleging infringement of six patents. Apple filed an amended complaint alleging that Motorola’s products infringed 12 additional patents. In December 2011, the case was transferred to the Northern District of Illinois, with Judge Posner, sitting by designation, presiding. The district court construed certain terms of the ’949 patent in three orders, dated: January 16, 2012, A45-47; March 19, 2012, A80-83; and March 29, 2012, A90-95. The district court also construed certain terms of the ’647 patent in its March 19, 2012 order. A76-79. In April 2012, the district court granted Motorola partial summary judgment of noninfringement of the ’949 patent. A96-100. Trial on the ’949, ’263, and ’647 patents (along with one other Apple patent) was scheduled to commence on June 11, 2012. In May 2012, the court struck both sides’ damages experts, A101-22, and then in June 2012 granted both sides summary judgment on the grounds that neither was entitled to relief—either damages or an injunction, A123-60. The court then dismissed the cases. A161.

STATEMENT OF FACTS

Apple Develops “Heuristics” To Translate Imprecise User Touches (The ’949 Patent)

One of the challenges in designing and implementing a touchscreen device is that fingers do not work like scroll buttons or trackballs. As the ’949 patent explains, “user gestures may be imprecise.” A489, col. 2:20-22. Particularly on the small screen of a handheld device, “a particular gesture may only roughly correspond to a desired command.” *Id.* To overcome the challenge, Apple’s ’949 patent teaches how "to translate imprecise finger gestures into actions desired by the user" by using "heuristics," which is engineer-speak for rules applied to data (here, various finger gestures) to assist in drawing inferences (here, the user's desired actions) from that data. A543, col. 109:50-51; *see* A45. The '949 patent teaches several heuristics that work together to provide many of the touchscreen features that consumers have come to expect in modern smartphones and tablets: finger swipes or flicks to scroll vertically, horizontally, or diagonally, to select a next item (e.g., the next photo in an album), and so forth. *See infra* at 20-22. A touchscreen that cannot effectively distinguish among these commands will be DOA in the marketplace.

Apple first described these heuristics in a provisional patent application filed in September 2006, just four months before the iPhone's debut. A194. Apple CEO Steve Jobs was the first named inventor. This one application, which describes numerous inventions and features that are now ubiquitous in smartphones, has yielded an impressive 14 patents, including the '949 patent. A489, col. 1:8-45.

Apple Spurs The App Explosion With Its Innovation In Streaming Audio And Video (The ’263 Patent)

The iPhone would hardly have set the world on fire if it just made phone calls (however seamlessly). Apple’s devices (and later Android devices) flew off the shelves in large part because modern users love their apps. A30,395. Apps, written mainly by independent software developers, make the electronic devices infinitely adaptable to each user’s interests. A14,898. As Motorola enviously observed, Apple fostered a [redacted] A30,276.

Apple’s ’263 patent describes one of the inventions that nurtured that [redacted] A29,231, 29,615. [redacted] A29,231. [redacted] A29,309. These apps do not work unless the device can [redacted] A29,150.

Apple’s engineers figured out a way to rapidly process streams of different types of data. A29,140. The ’263 patent describes an invention that “enables any arbitrary type of data, such as voice, facsimile, multimedia and the like, which is transmitted over any type of communication network, to be handled" by a single "real-time engine." A185-86, col. 2:66-3:6. Apple's signal processing system knows (a) how to determine what type of video code is being received and (b) how to match up that video code to a part of the device (called the "digital signal processor" or "DSP") that rapidly processes the code. A185, col. 1:45-46. The claimed signal processing system "sets up data paths and issues service requests" to the "real-time data processing engine." A185, col. 2:58-63.

The invention yields several benefits. For one thing, streaming consumes less memory. *See* A29,153. More importantly, the invention makes life simpler for the app programmer. Under Apple's system, the app programmer does not need to write all the programming that is necessary to process a particular type of streaming data, say video. When the programmer wants the app to use video, she simply includes a reference to the appropriate video processing code in the Apple system. Same for audio, and so on. Similarly, without this invention, the programmer would have to write pages of code to make sure that the different processor in each kind of device (whether an iPhone,

iPhone 3GS, iPhone 4, or iPhone 5) was capable of translating the relevant signal, allowing users to view the video. A29,631-33 [redacted]; *see* A29,153 [redacted]. The same goes for each different operating system (such as iOS 4, iOS 5, or iOS 6). The invention ensures that an app, say Netflix, will work on any device or any operating system. All of this encouraged the proliferation of apps and made them less costly.

Apple Develops A Structure-Detection System For Text (The '647 Patent)

Certain types of text—such as telephone numbers, e-mail addresses, and dates—have an intrinsic pattern or "structure." [redacted] A26,420-23. [redacted] A26,424-28, one of the inventors enthused, [redacted]

Confidential Material Omitted

[redacted] A26,429-30 [redacted].

Thus, for example, as the ’647 patent explains, a device using this system can recognize a phone number in a text message and provide the user with the option of calling the number or storing the number in the phone’s address book. A166 (Fig. 4). Alternatively, if the device detects an e-mail address, the system presents the user with different options, such as sending an e-mail or storing the address for future use. *Id.*

Motorola Copies Apple’s Heuristic, Real-Time Signal Processing, And Structure-Detection Inventions

When Apple introduced the iPhone, consumers lost interest in Motorola’s RAZR line of handsets. *Why the RAZR is Killing Motorola*, Mobile Gazette (May 16, 2007), *available at* http://www.mobilegazette.com/why-the-razr-is-killing-motorola-07x05x16.htm. “‘Motorola [is] in an awful mess,’” pronounced an industry analyst that year. *Id.* (citation omitted). Within two years, commentators were writing Motorola’s obituary: Motorola was “stuck heavily in [a] handset death spiral.” Matt Richtel, *Motorola Scrambles to Restore Its Lost Cellphone Glory*, N.Y. Times, May 1, 2009, at B1.

Motorola was [redacted] to make a phone that could compete with the iPhone. A29,611; *see* A29,591. Motorola executives called for an [redacted] A29,095-96; *see* A29,613, 30,276. The [redacted] Motorola devised was an iPhone knockoff. A29,463. The knockoff was built on Google's Android software platform. A21,949, 21,962. In an effort to mimic Apple's ease of use, Motorola's Android-based devices included Apple's heuristic, real-time processing, and structure linking inventions.

Within a year of introducing its first Android-based device, [redacted] A22,001. It is indisputable that Motorola's smartphones have cut into Apple's market share. A29,089.

Apple Sues To Halt Motorola's Copying But The District Court Dismisses All Claims On Summary Judgment

Apple never agreed that Motorola could use the inventions disclosed in the three patents at issue here. Apple spends millions of dollars in research and development to invent hardware and software for *its own* products. Apple has a general policy of not licensing its inventions to anyone else. A30,705-06; *see* A30,700. [redacted]

Confidential Material Omitted

[redacted] *See, e.g.*, A30,483-504, 30,506-36.

After Motorola sued Apple in several jurisdictions, Apple filed this case. *See supra* at 5-6. The district court issued a series of rulings that had the ultimate effect, just days before trial, of dismissing all the claims on both sides before any trial. We address each ruling, as relevant to Apple's patents, more fully in the argument below (reserving discussion of Motorola's patents for the cross-appeal). In brief:

Claim construction and partial summary judgment of noninfringement on one patent. The district court granted Motorola partial summary judgment of noninfringement on just one of the three patents involved in this appeal—the '949 patent—based on its construction of the "next item heuristic" term. A96-100. As to Apple's claims that Motorola's products infringe the '263 real-time signal processing patent, the court issued a favorable claim construction on Apple's key term ("realtime API"). A67-68. As to the '647 patent, the district court adopted Motorola's proposed constructions of two key terms—a construction that ended up being relevant to the district court's subsequent dismissal of Apple's claim for injunctive relief.

Dismissal of all damages claims. To prove the monetary damages it suffered as a result of Motorola's infringement, Apple offered the expert testimony of Brian Napper. The district court excluded Mr. Napper's damages testimony as to all three patents. A111-19. On the basis of that ruling, the district court later granted Motorola summary judgment on all of Apple's damages claims. A125-40.

Dismissal of injunctive relief. The district court also held that Apple could not secure injunctive relief. A123, 143. The district court did not dispute Apple's argument that the types of "losses it allegedly suffered or will suffer from the alleged infringement 'defy attempts at valuation.'" A152. But the district court found that even if Apple had proven lost market share and customer goodwill, "an injunction would not avert such losses, because of the ease of designing around the patent claims at issue." A145.

The court then dismissed Apple's entire case. A160.

SUMMARY OF THE ARGUMENT

I. Claim Construction of the '949 Patent. The revolutionary touchscreen user interface through which a user controls the iPhone depends on the inventions set out in the patent. A large challenge for making an effective touchscreen is translating imprecise user touches into commands that reflect what the user wants the device to do. The ’949 patent teaches “heuristics” that interpret and convert certain user gestures into specific commands.

The district court did not dispute that Motorola’s products use these heuristics as they are described in the patent. But in the district court’s view, the heuristics limitations are to be interpreted pursuant to the “means-plus-function” statute, 35 U.S.C. § 112 ¶6, and, in light of that statute, the court construed the claims to cover only one particular gesture for selecting the next item in a set. Both steps of the court’s analysis are wrong. The means-plus-function statute is not implicated here for a basic reason: The claims do not include the term “means” nor any similar term. And even assuming that the claim 1 terms are construed as means-plus-function terms, the court misconstrued the key term—“next item heuristic”—by limiting it to exclude examples of such heuristics expressly described in the specification.

II. Claim Construction of the ’647 Patent. The district court misconstrued two terms in the ’647 patent’s asserted claims: “analyzer server" and "linking actions to the detected structures." With respect to both terms, the district court ignored two basic claim construction principles: (1) that claims are not limited to the *examples* of the invention set out in the patent and (2) claims that use different words differ in scope. In a proceeding against HTC, the ITC agreed with Apple's constructions at both the trial and Commission levels.

III. Damages. As this Court has stated, to serve its "gatekeeping" function under Rule 702 of the Federal Rules of Evidence, a district court must ask whether proffered expert evidence exceeds a "minimum standard" of relevance and reliability. *i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 855-56 (Fed. Cir. 2010), *aff'd on other grounds*, 131 S. Ct. 2238 (2011). In this case, the district court concluded that the benchmark Apple's expert used to estimate damages for Motorola's alleged infringement of the '949 (gesture heuristics) patent was not a proper measure of the value of the covered inventions. But the court's reasoning expressly relied on the improper '949 claim construction. Moreover, the appropriateness of the benchmarks used by Mr. Napper to approximate damages was not for the district court to decide. That is the jury's job.

The district court's sole rationale for excluding Mr. Napper's damages testimony on Apple's '263 real-time signal processing patent is that he consulted an Apple technical expert about design-around options. But the payment of an expert by an interested party merely raises a question of credibility for the jury.

Mr. Napper properly based one of his estimates regarding the '647 patent on the actual experience of a smartphone manufacturer, HTC, which took four months to design around the same patent. The actual experience of a comparable competitor in a similar position is perhaps the best evidence one could realistically expect.

IV. Injunctive Relief. The rule the district court applied would lead to the end of injunctions for patent infringement. Apple presented evidence that it has a general policy of not licensing these patents. Its business model famously depends on distinctive products that stand apart from the masses. And Apple presented ample evidence that Motorola's copying of its patented inventions has caused it to suffer concrete market harms. The district court should, at the very least, have granted Apple a trial on its reasonable request for an injunction to halt this harm.

STANDARD OF REVIEW

Claim construction, including whether a claim term is treated as a "means-plus-function" limitation governed by 35 U.S.C. § 112 ¶ 6, is reviewed de novo. *Inventio AG v. ThyssenKrupp Elevator Americas Corp.*, 649 F.3d 1350, 1356 (Fed. Cir. 2011); *see also In re Aoyama*, 656 F.3d 1293, 1296 (Fed. Cir. 2011).

"[A] court of appeals is to apply an abuse-of-discretion standard when it 'review[s] a trial court's decision to admit or exclude expert testimony.'" *Kumho Tire Co., Ltd. v. Carmichael*, 526 U.S. 137, 152 (1999) (citation omitted). Ultimately, "[t]his court reviews the district court's damages decision for 'an erroneous conclusion of law, clearly erroneous factual findings, or a clear error of judgment amounting to an abuse of discretion.'" *Grain Processing Corp. v. American Maize-Products Co.*, 185 F.3d 1341, 1349 (Fed. Cir. 1999) (citation omitted).

This court "review[s] a district court's decision on summary judgment *de novo*, reapplying the same standard applied by the district court." *Hologic, Inc. v. SenoRx, Inc.*, 639 F.3d 1329, 1334 (Fed. Cir. 2011).

ARGUMENT

I. THE DISTRICT COURT ERRONEOUSLY LIMITED THE CLAIMS OF THE '949 PATENT BY MISAPPREHENDING MEANS-PLUS-FUNCTION RULES

Claim 1 of the '949 patent refers to a "next item heuristic," a rule to translate a gesture into a direction to flip to the next item in a series (e.g., the next photo in an album of electronic photos).[1] By its plain language, that term covers *any* "heuristic" that interprets a gesture on a touchscreen to cause the device to display the "next item" in a set. *See infra* Point I.A. Nevertheless, the district court limited the term to heuristics that use "a user's finger tap on the right side of the device's touch screen" as an input. A93-94. The court erroneously held that this "next item heuristic" term, and all other "heuristics" terms in the asserted claims, were written in "means-plus-function" form within the meaning of 35 U.S.C. § 112 ¶ 6. *See infra* Point I.B. The court then compounded the error by excluding from the claim's scope one of the "next item" heuristics described in the specification. *See infra* Point I.C. Because the court's summary judgment ruling—excusing four apps

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[1] The other asserted claims (claims 2, 9, and 10) depend on claim 1. They are therefore not addressed separately.

from infringement, A97—depended on the erroneous claim construction of the "next item heuristic" limitation, it must be reversed.

A. The "Next Item" Term Covers Any Rule That Translates A Gesture Into The Next Item Command

Claim 1 is reproduced at the beginning of the Addendum to this brief with 12 distinct claim limitations enumerated in brackets. The main focus of this appeal is on three distinct heuristics (limitations [10]-[12]). A549-50, col. 122:37-123:2. The first two heuristics—the "vertical screen scrolling" and "two-dimensional screen translation" heuristics—work in tandem to determine whether the screen should scroll vertically or diagonally "based on an angle of initial movement of a finger contact." A549, col. 122:52-65. Figure 39C (reproduced immediately below in slightly simplified form) is an example of how a touchscreen device (e.g., an iPhone) uses the first two heuristics. The concept is to discern whether the initial touch movement is "substantially vertical." A45. The iPhone does so by determining whether the angle of initial movement is or "is not within a predetermined angle (e.g., 27º) of being perfectly vertical." A520, col. 64:21-29. If the angle is smaller than that "predetermined angle" (as indicated at 3937) the first heuristic directs the iPhone to read the movement as a direction to scroll vertically. *Id.*, col. 64:21-24. But if the angle is larger (like the one indicated at 3939), the second heuristic reads the movement as a direction to move diagonally. *Id.*, col. 64:29-33.

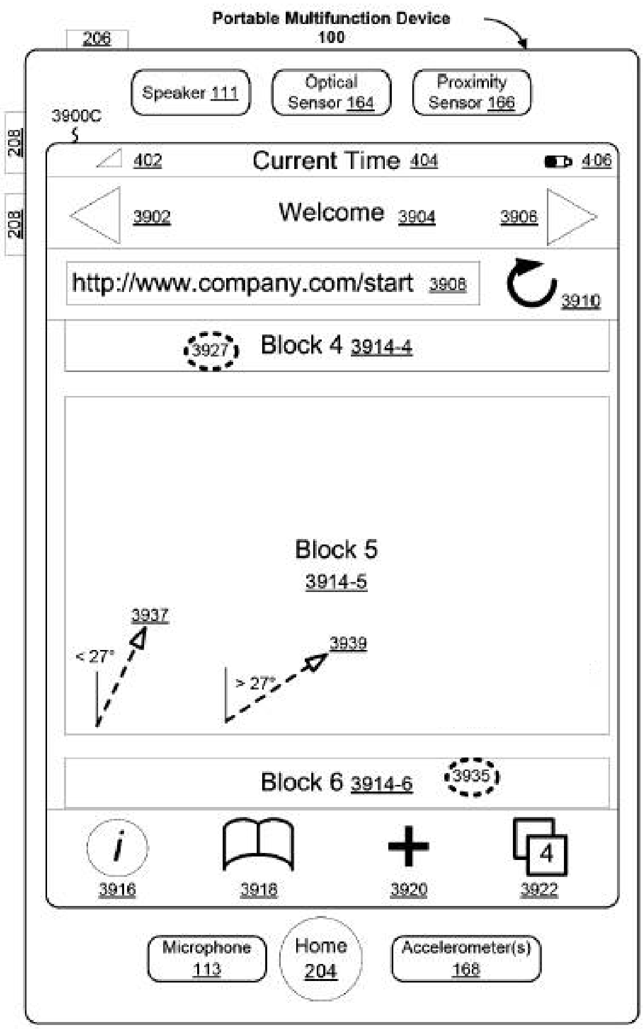

Figure 39C

The third heuristic in claim 1 is the "next item heuristic." Limitation [12] calls for:

> a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a

> respective item in a set of items to displaying a next item in the set of items.

A549-50, col. 122:66-123:2. This heuristic determines that a finger contact means "displaying a next item in the set of items." A550, col. 123:2. The specification emphasizes that optimally the iPhone would "offer[] multiple ways to perform th[at] same task," "whichever way [is] simpler and more intuitive for the user." A505, col. 34:17-21. The specification notes that one could be a simple finger tap on the right side of the screen (labeled 1620 in Figure 16A, reproduced below, also in simplified form). A505, col. 34:12-14. It mentions another that could be a "right to left swipe [labeled] 1616." A505, col. 34:17-19.

The plain language of the claim is satisfied so long as the accused device has any sort of "next item heuristic." The claim does not specify whether the "finger contact[]" should be in the form of a horizontal swipe, a tap, a swoosh, or anything else.

B. The Claims Are Not Means-Plus-Function Claims Because They Neither Recite A "Means" Nor Exhibit Exceptional Characteristics That Override The Drafters' Choice

The district court introduced an extra limitation because it misunderstood the means-plus-function statute, which directs as follows:

> An element in a claim for a combination ***may be expressed*** as a ***means*** or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

35 U.S.C. § 112 ¶ 6 (emphasis added). This provision grants the patentee a drafting option to economize on claim language. The drafter may choose to state what function an element of the invention performs rather than larding the claim with words describing how it accomplishes that function. Only when the drafter makes that conscious choice may a court read expansively worded claims as limited to the structure described in the specification. *See, e.g.*, *Inventio AG v. ThyssenKrupp Elevators Am. Corp.*, 649 F.3d 1350, 1356-57 (Fed. Cir. 2011).

The statute gives drafters clear direction on how to invite means-plus-function treatment: "[T]he use of the word 'means' is central to the analysis, as the terms 'means' and 'means for' have become closely associated with means-plus-function claiming." *Id.* at 1356. Accordingly, means-plus-function principles are subject to strict presumptions: If the patentee uses the word "means," then means-plus-function treatment presumptively applies. *Id.* If not, there is a "strong" presumption—"not readily overcome"—that they did not intend to invite means-plus-function treatment. *Lighting World, Inc. v. Birchwood Lighting, Inc.,* 382 F.3d 1354, 1358 (Fed. Cir. 2004).

The "strong" presumption against means-plus-function treatment applies here. Apple chose *not* to use the phrase "means" or "means for" in any of the '949 patent's asserted claims. A549-50, col. 122:37-123:2.

Only "seldom" have "unusual" circumstances led this Court to conclude that the presumption has been overcome. *Lighting World,* 382 F.3d at 1362. The district court held that this was one of those unusual circumstances, "[b]ecause the claims describe functions without describing the structure necessary to perform the functions." A83. An ITC Administrative Law Judge, examining this very same claim, found the opposite. *See* Order No. 16 at 13, *In re Certain Elec. Digital Media Devices and Components Thereof*, Inv. No. 337-TA-796, 2012 WL 754088 (U.S.I.T.C. Mar. 6, 2012).

As the ALJ understood, this exception is inapplicable unless the claim is "essentially … devoid of anything that can be construed as structure." *Flo Healthcare Solutions, LLC v. Kappos*, 697 F.3d 1367, 1374 (Fed. Cir. 2012). There are times, for example, when a patentee uses what might be called a "means substitute," a "generic term[]"—such as "'mechanism,' … 'element,' and 'device'"—that is so expansive that it "do[es] not connote sufficiently definite structure." *MIT v. Abacus Software*, 462 F.3d 1344, 1354 (Fed. Cir. 2006). Or sometimes the drafter uses a so-called "nonce word"—a meaningless "verbal construct," coined for the occasion, "that is not recognized as the name of structure and is simply a substitute for the term 'means for.'" *Lighting World*, 382 F.3d at 1360.

Both of those devices were in play in *MIT*, the case on which the district court relied most heavily. There this Court found the term "colorant selection *mechanism*" to invoke means-plus-function treatment. There, however, unlike here, the patentee used the term "mechanism" and the term "means" interchangeably throughout the specification. *MIT*, 462 F.3d at 1354. Moreover, the key claim language "colorant selection" had no common dictionary definition and no generally understood meaning in the art. *Id.* It was the classic nonce word—an empty vessel that could mean anything and therefore limited nothing.

But claim 1 is not centered on a nonce word. As the district court recognized, "heuristic" has a definite meaning to those skilled in the art. A45-46; *see* A3925, 6226, 6092, col. 9:4-12 (Motorola patent claiming "heuristics" alongside "data" and "information" in a list of things stored in memory).

Moreover, the district court erroneously considered the heuristics limitations in isolation, rather than reading them, as required, through the lens of all the other limitations that precede them. *See Inventio*, 649 F.3d at 1356; *Apex Inc. v. Raritan Computer, Inc.*, 325 F.3d 1364, 1372 (Fed. Cir. 2003). The rest of claim 1 limits each "heuristic" to one that is part of a "computing device," which is subject to nine limitations. It must work through the interplay of a [1] "touchscreen," [2] "processors," [3] "memory," and [4] "programs." A549, col. 122:37-44. The programs, in turn, must satisfy at least five limitations ([5]-[9]). The programs must be [5] "stored in the memory" [6] be "configured to be executed by the one or more processors"; and must [7] "include … instructions for detecting one or more finger contacts with the touchscreen display"; [8] "instructions for applying … heuristics to the … finger contacts to determine a command for the device"; and

[9] "instructions for processing the command." A549-50, col. 122:41-123:2.

The district court did not question that this level of structure would be more than enough in the context of any other technology. Rather, it devised a special rule unique to software claims: Claims involving "a means for performing a *computer-implemented function*," the court held, are not sufficiently definite unless they "disclose the algorithm, or 'step-by-step process,'" for performing that function. A46 (quoting *Aristocrat Techs. Australia Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1332-33 (Fed. Cir. 2008)) (emphasis added).

This Court has rejected any such software-specific rule. Just last year, this Court considered a claim bearing an uncanny resemblance to claim 1: It covered a "computing unit … for at least one of evaluating the destination call reports and association of destination floors with recognized ones of the identification codes, and for the output of at least one destination signal." *Inventio*, 649 F.3d at 1353. The claim did not "disclose the algorithm, or 'step-by-step process,'" for performing that function. A46. Nevertheless, this Court found § 112 ¶ 6 inapplicable. *Inventio*, 649 F.3d at 1359-60. The Court reasoned that the specification described the "computing unit" as including a processor and memory, and explained that the "computing unit" stored and executed a program. *Id.* at 1354, 1359-60. The disputed claim language further defined the computer program's operation. *Id.* at 1353, 1359. Viewing the patent as a whole, this Court held that the claim language was not "so structurally devoid that we should rewrite [it] in means-plus-function format." *Id.* at 1360.

This Court reached the same conclusion with respect to a claim limitation reciting a "control unit for controlling the communication unit." *LG Elecs., Inc. v. Bizcom Elecs., Inc.*, 453 F.3d 1364, 1372 (Fed. Cir. 2006). That claim limitation, too, did not "disclose the algorithm, or 'step-by-step process,'" for performing that function. A46. But it did not matter. This Court held that the claim did not invoke means-plus-function treatment. The reason was that there—just like here—the claim also referred to "a central processing unit and a partitioned memory system." *LG,* 453 F.3d at 1372. That was sufficient structure for performing the claimed function. *Id.*

If the accused infringers in *Inventio* and *LG* had "not rebutted the presumption" against means-plus-function treatment, then Motorola cannot do it here, where the claim itself (and not just the specification) provides even more structure than in either case. *Inventio,* 649 F.3d at 1360. The claim certainly is not "devoid of anything that can be construed as structure" for performing the heuristics limitations. *Flo Healthcare Solutions,* 697 F.3d at 1374.

The case the district court quoted, *Aristocrat Technologies*, does nothing to override this authority. That case involved a claim that was indisputably in means-plus-function format: It recited the term "control *means*." 521 F.3d at 1330 (emphasis added). Moreover, this Court's decision addressed only whether sufficient "structure, material or acts" was disclosed *in the specification* to save the claim from being invalid as indefinite. *Id.* at 1333.

The district court seemed to labor under the mistaken belief that a means-plus-function analysis was necessary to prevent the '949 patent from covering features "inherent" in "all touch-screen computers." A83. But it is improper to invoke the means-plus-function rule just to narrow claims that a court considers too broad. Rather, as this Court has held, patentees must live with the legal consequences of the claims they write—for better or worse—including with the consequences of choosing not to draft claims in means-plus-function format. *Lighting World*, 382 F.3d at 1361-62.

C. The Specification Describes A "Next Item Heuristic" That Covers Horizontal Swipes

Even if it was proper for the district court to apply the means-plus-function provision, the district court erred in limiting the "next item heuristic" to apply only to a tap on the touchscreen's right edge and not to a horizontal swipe. The consequence of redrafting the claim in means-plus-function format is that "such claim shall be construed to cover the corresponding structure, material, or acts described in the specification." 35 U.S.C. § 112 ¶ 6. That means that the "claim encompasses *all structure* in the specification corresponding to that element and equivalent structure." *Micro Chem., Inc. v. Great Plains Chem. Co., Inc.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999) (emphasis added).

The specification repeatedly describes a heuristic that interprets a horizontal swipe as a command to flip to the next item. A222 (Fig. 12A); A229 (Fig. 16A); A230 (Fig. 16B); A254 (Fig. 24A); A258 (Fig. 24E); A399 (Fig. 43CC); A503, col. 30:53-67; A505, col.34:12-21; A509, col. 41:5-14, 32-34, 52-57; A529, col. 82:58-62; A543, col. 109:63-110:5; A545, col. 113:49-54. The specification also describes a heuristic that interprets taps as a next item command. *See* A222 (Fig. 12A); A229 (Fig. 16A, icons 1618, 1620); A230 (Fig. 16B); A503, col. 30:53-67; A505, col. 34:12-21; A543, col. 109:63-110:5; A545, col. 113:49-54. As noted above, the patent emphasizes the value of giving users the option to choose "whichever way [is] simpler and more intuitive for the user." A503, col. 30:63-67; A505, col. 34:17-21. Accordingly, the corresponding "structure" for the "next item heuristic" must include heuristics that use either a horizontal swipe or a tap as an input. *See, e.g.*, *Micro Chem.*, 194 F.3d at 1258.

The district court's rationale for holding otherwise was flawed. The court began with the premise that "[a]ccording to heuristics [1] and [2], a horizontal finger swipe should be interpreted as a command to shift the screen horizontally." A93. From that premise, the court concluded that a horizontal finger swipe cannot also be a command to move to the next item, because "the same user finger movement" cannot be "understood to communicate two separate commands." *Id.* Both the premise and the conclusion are wrong.

The premise is wrong. Claim 1 says nothing about how the device interprets a "horizontal finger swipe." Heuristic [1] covers a near-vertical swipe and heuristic [2] covers a "two-dimensional" (diagonal) swipe. A549, col. 122:59-65. So there is nothing in claim 1 that prevents the next item heuristic from being a horizontal swipe. (The district court appears to have confused claim 1 with dependent claim 10, which does cover a situation where a horizontal swipe may lead to a "one-dimensional horizontal screen scrolling command." A550, col. 124:3-4.)

As to the conclusion, the district court misunderstood the invention. The patent does not describe a device where "the same user finger movement is understood to communicate two separate commands" *at the same time*. A93. Rather, it describes the possibility that the same gesture can signify two different commands, *in different contexts*. Take, for example, a photo display application. If the full image is displayed, then the user can "initiate viewing of the previous image by making a swipe gesture 1616 from left to right on the image." A505, col. 34:9-11. If, however, the user has zoomed in—so that "just a portion of [the] image … is displayed"—then the same horizontal swipe will move the image "in accordance with the direction of the drag or swipe gesture," A506, col. 35:19-24, rather than moving on to the next item. Similarly, the same horizontal swipe may be interpreted as a next-item command when viewing a photo album, A229 (Fig. 16A, 1616); A254 (Fig. 24A, 2416); A543, col. 109:62-110:6, but as a horizontal scroll command when viewing a webpage, A349 (Fig. 39G, 3951); A543, col. 110:31-34. The district court overlooked the principle that in order for a product to infringe claim 1, it merely has to have *some* applications that satisfy all the claim limitations. The claim does not require that the device infringe every time it is used.

II. THE DISTRICT COURT ERRONEOUSLY CONSTRUED TWO TERMS IN THE ’647 PATENT

The district court here and the ITC in a separate proceeding have issued conflicting constructions of the key terms “analyzer server” and “linking” in independent claim 1 of the ’647 patent. In a proceeding against HTC, the ITC agreed with Apple’s constructions. HTC, which appealed other aspects, did not appeal the claim constructions. (The case has since settled.) *See supra* at xv. The district court rejected Apple’s constructions here. The district court erred by improperly limiting both terms to *examples* of the invention and not the invention itself. As with the ’949 patent, these constructions reduced a valuable invention to a trivial one. A145-46.

A. The District Court Erred When Construing The "Analyzer Server" Term

Apple's construction of "analyzer server" was "a program routine(s) that receives data, uses patterns to detect structures in the data, and links actions to the detected structure." A6523. The ITC adopted a virtually identical construction. *In re Certain Personal Data & Mobile Commc'ns Devices & Related Software ("Personal Data")*, Inv. No. 337-TA-710, USITC Pub. No. 4331, Initial Determination at 28-29 (Dec. 19, 2011) (Final), *available at* http://www.usitc.gov/publications/337/Pub4331_337-TA-710.pdf.

As the district court correctly noted, "[t]he 'analyzer server' performs the core functions of the '647 system, namely structure detection and linking." A77. Apple's construction embodies these concepts. It almost exactly matches how the "Summary of the Invention" describes the "analyzer server": "The analyzer server receives data from a document having recognizable structures, and uses patterns to detect the structures." A173, col. 2:28-30.

In contrast, the specification does not support the district court's conclusion that the analyzer server must be "separate from a client." The district court cited Figure 1, which depicts the "program" (which contains the analyzer server) in a separate "box" from the "application" (i.e., client). A77. It reasoned that "[h]ad the patent intended the analyzer server to be integrated into the application, rather than separate, the program box would logically appear inside the application box in Figure 1." *Id.* But Figure 1 just illustrates a preferred *embodiment*, A174, col. 3:19-51, which does not limit the claims, absent clear evidence that the patentee so intended. *E.g., Thorner v. Sony Comp. Entm't Am. LLC*, 669 F.3d 1362, 1366 (Fed. Cir. 2012).

In fact, the patentee intended the opposite. Independent claim 1 is broader than its dependent claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314-15 (Fed. Cir. 2005) (en banc). Dependent claims 3 and 10 specify that a separate application provides the data to the analyzer server. A176. The dependent claims also require an application programming interface ("API"), which Figure 2 depicts as part of Figure 1's "program." A176; A164, 174, col. 3:1. Claim 1, in contrast, does not recite either a separate application or an API, and thus should not be limited in light of Figure 1. There is no evidence that the patentee intended claim 1 to have the same scope as claims 3 and 10.

B. The District Court Erred When Construing "Linking Actions To The Detected Structure"

Claim 1 contains the limitation of "linking actions to the detected structures." A176, col. 7:9-24, 50-51. The specification explains that the "linked actions" are *associated with* particular structures (patterns):

> [A] system is needed that identifies structures, *associates candidate actions to the structures*, enables selection of an action and automatically performs the selected action on the structure.

A173, col. 1:66-2:2 (Background of Invention) (emphasis added); *see also id.*, col. 2:4-9, 17-20. Accordingly, Apple proposed construing this term as "associating detected structures to computer subroutines that cause the CPU to perform a sequence of operations on the particular structures to which they are associated." A6530. That, again, is virtually identical to the ITC's construction. *Personal Data*, USITC Pub. No. 4331, Initial Determination at 127; Commission Op. at 25, *available at* http://www.usitc.gov/publications/337/ Pub4331_337-TA-710.pdf.

The district court, however, construed this term to mean "creating a *specified connection* between each detected structure and at least one computer subroutine that causes the CPU to perform a sequence of operations on that detected structure." A78-79 (emphasis added). The district court's construction was erroneous in two respects.

First, the district court added a "specified connection" requirement. The district court relied on the specification's discussion of "pointers": "Motorola's explanation of pointers … convinces me that such linking constitutes a 'specified connection.'" A78. But "pointers" are not claimed. A176. And the '647 patent discusses pointers only as an example in describing the preferred embodiment. A174, col. 3:65-68. The specification does not "make[] clear that the invention requires" pointers. *Howmedica Osteonics Corp. v. Wright Med. Tech., Inc.*, 540 F.3d 1337, 1345 (Fed. Cir. 2008). As with "analyzer server," the district court erred in limiting claim 1 to a particular embodiment.

Second, the district court ruled that the "linking" term only requires linking "at least one" action to each structure. A78-79. The asserted claim expressly requires "linking" *multiple* "action***s*** to the detected structure***s***." A176, col. 7:15-16 (emphasis added). In contrast, unasserted claims 13-24 recite "linking *at least one action* to the detected structure." A176-77 (emphasis added). The patentee chose to define claim 1's scope differently from claims 13-24. *See Innova/Pure*

Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1119 (Fed. Cir. 2004). The district court erred in rewriting claim 1 using the language of claims 13-24.

III. THE DISTRICT COURT ERRONEOUSLY CONCLUDED THAT APPLE COULD NOT ESTABLISH DAMAGES FOR MOTOROLA'S INFRINGEMENT OF THE THREE PATENTS

Rule 702 is a balancing act. The rule provides that a person "qualified as an expert by knowledge, skill, experience, training, or education" can provide opinion testimony if, among other things, the "testimony is the product of reliable principles and methods" and "the expert has reliably applied the principles and methods to the facts of the case." Fed. R. Evid. 702. On the one hand, the district court has an important "gatekeeping" function to serve: It is responsible for ensuring that the proffered expert testimony exceeds a "minimum standard" of relevance and reliability. *i4i Ltd. P'ship v. Microsoft Corp.*, 598 F.3d 831, 855-56 (Fed. Cir. 2010), *aff'd on other grounds*, 131 S. Ct. 2238 (2011). On the other hand, the Supreme Court has cautioned courts against being "overly pessimistic about the capabilities of the jury and of the adversary system," emphasizing that "[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence." *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 596 (1993). Thus, "disputes about the degree of relevance or accuracy," beyond the "minimum threshold" of reliability, "may go to the testimony's weight, but not its admissibility." *i4i*, 598 F.3d at 852.

These appeals present an object lesson on the yin and the yang of Rule 702. The parties made two different expert presentations. On one side of the divide was Motorola's expert, Carla Mulhern. As we will explain in the next brief, her testimony did not meet the minimum threshold of reliability. A119-21.

This brief will focus on Apple's damages expert, who was on the other side of the divide. The district court did not question Mr. Napper's qualifications as an expert in valuing intellectual property for purposes of estimating damages. And the court did not question Mr. Napper's methodology of following this Court's framework of imagining "a hypothetical negotiation and [applying the] *Georgia-Pacific* factors for estimating a reasonable royalty." *i4i*, 598 F.3d at 854 (embracing *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116

(S.D.N.Y. 1970)); *see* A134-36. The district court excluded his testimony for reasons that went to the weight of the evidence and credibility—thereby invading the jury's province.

As relevant to this appeal, the district court identified different flaws relating to each of the patents. We address each in turn, and demonstrate why Apple's damages claims should be reinstated.

A. Apple's Expert Used A "Sufficiently Comparable" Benchmark To Estimate Apple's Damages From Motorola's Infringement Of The '949 Patent

For the '949 patent, the district court did not question that Mr. Napper employed a widely accepted method of estimating damages: looking to the value of benchmark commercial products that use comparable technology. *See, e.g., i4i,* 598 F.3d at 853, 856. Mr. Napper chose Apple's Magic Trackpad as a benchmark. The district court correctly described the comparison: "Whereas a mouse operates by the user's moving it on a mouse pad and pushing its buttons to move the cursor on the computer screen and select items with it, a track pad operates by the user's moving his finger on the pad and then clicking; it is that movement that moves the cursor on the computer screen." A112. The district court also acknowledged why the Magic Trackpad was a suitable benchmark: "The fact that some consumers will pay more for Magic Trackpad than for a mouse—$69.99, according to Napper's report, versus $49.99 for Apple's mouse—suggests that some consumers indeed value gestural as opposed to mouse-driven control of the cursor to the desktop." *Id.*

Packaged together, the '949 patent claims create a set of complementary functions collectively similar to the portion of Trackpad's functionality on which Mr. Napper based his estimate. Claim 1, alone, covers heuristics for vertical movement (including near-vertical gestures), diagonal movement, and moving to the next item. *See supra* at 20-22. Beyond that, claim 2 adds a heuristic for translating content within a frame, claim 9 adds a prior item heuristic, and claim 10 adds horizontal movement (including near-horizontal gestures). *See* A81-82, 368-70 (Figs. 42A-42C), 549-50. Each one of these heuristics is critical to the ability to navigate images and series of images.

Mr. Napper did not just attribute the $20 price difference between the mouse and the trackpad to the '949 patent gestures. Rather, [redacted]

[redacted] For example, [redacted]

A22,035-37. [redacted]

A22,038. [redacted] A22,036-37.

Despite this detailed explanation, the district court excluded Mr. Napper's testimony. The court's reasoning depended almost entirely on its repeated observation that "[a]t this point in the litigation the dispositive element of the '949 patent is the use of a tap on the right-hand side of the screen to switch to the next page." A112; *see also* A113, 116. If this Court rejects that erroneous construction (as argued in

Point I), it must reverse the district court's exclusion of Mr. Napper's testimony as well.[2]

At one point, the district court seemed to suggest otherwise. Isolating a single gesture heuristic, the court opined: "The fact that many consumers will pay more for a Magic Trackpad … tells one nothing about what they will pay to avoid occasionally swiping unsuccessfully because their swiping finger wasn't actually vertical to the screen." A115. But the '949 patent is not limited to a single gesture, and certainly not just to an improvement on a single gesture. *See supra* at 20-22.

Moreover, Mr. Napper's testimony did not have to rest on a flawless foundation, just a minimally reliable one, with an analysis "sufficiently related to the disputed issue." *i4i*, 598 F.3d 855-56. Since the analysis exceeded that minimal standard, the propriety of Mr. Napper's benchmark was not for the district court to decide. The Magic

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[2] If this Court accepts the district court's construction, then Apple does not challenge the balance of the court's damages rulings regarding the '949 patent. Accordingly, we do not address aspects of the district court's rulings relevant only if its claim construction is upheld. *See, e.g.*, A114 (criticizing Mr. Napper for not considering the alternatives of "dropp[ing] the tap heuristic from your Kindle application or … drop[ping] the application and tell [Motorola's] consumers that if they want it they can download it without charge").

Trackpad is "sufficiently comparable" to the functionality covered by the '949 patent to allow the jury to decide whether to accept his damages estimates; it is certainly not "radically different" from the covered technology, or at all "doubtful" that the Trackpad is "in any way similar." *Lucent Techs., Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1327-29 (Fed. Cir. 2009); *see ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1333 (Fed. Cir. 2012) ("the degree of comparability of the … license agreements … [is a] factual issue[] best addressed by cross examination and not by exclusion."); *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1316 (Fed. Cir. 2011); *i4i,* 598 F.3d at 854 (challenges to expert's use of benchmark because it had "additional features besides" the patented invention "go to the weight, not admissibility, of [the expert's] opinion") (citing *Daubert*, 509 U.S. at 593).

B. Apple's Damages Expert Permissibly Relied On Apple's Technical Expert To Identify Design-Around Alternatives To The '263 Patent

The district court offered a single basis for excluding Mr. Napper's damages testimony on Apple's '263 real-time signal processing patent: The expert "obtained the essential information, namely the identity of the chip that would avoid infringement, from an agent of the party rather than from a disinterested source." A116. That agent was "Nathaniel Polish, Apple's principal technical expert." *Id.* Notably, neither Motorola nor its own hired damages expert, Mr. Wagner, questioned the admissibility of Mr. Napper's testimony on the ground that he relied on a technical expert hired by Apple. *See* A20,863-66, 23,976-78.

The district court did not dispute the basic rule that Mr. Napper, as an expert, was allowed to rely on any "facts or data in the case that the expert has been made aware of," even if they would not be admissible on their own, so long as "experts in the particular field would reasonably rely on those kinds of facts or data." Fed. R. Evid. 703. Damages experts routinely rely on information supplied by technical experts—particularly with regard to the alternatives available to avoid infringement. *See* Ronan Arad et al., *Patent Infringement Damages* 21, *in* Litigation Services Handbook: The Role of the Financial Services Expert (Roman L. Weil, et al. eds., 5th ed. 2012).

The district court faulted Mr. Napper for *whom* he chose to rely upon. The district court found it improper for Mr. Napper to rely on a technical expert who, like Mr. Napper, himself, was hired by Apple. A116. This Court, however, has held that "a witness's pecuniary interest in the outcome of a case goes to the probative weight of testimony, not its admissibility." *Ethicon, Inc. v. U.S. Surgical Corp.*, 135 F.3d 1456, 1465 (Fed. Cir. 1998). *Accord Cruz-Vasquez v. Mennonite Gen. Hosp.*, 613 F.3d 54, 59 (1st Cir. 2010) ("[C]onsiderations such as an expert witness's pecuniary interest in the outcome of a case, or his status as an expert witness only for one side of an issue … go to the probative weight of testimony, not its admissibility."); *Tagatz v. Marquette Univ.*, 861 F.2d 1040, 1042 (7th Cir. 1988) (Posner, J.) ("hired experts, who generally are highly compensated—and by the party on whose behalf they are testifying—are not notably disinterested," but "[t]he trier of fact should be able to discount for" any such "conflict of interest"); *see also* A117.

The analysis does not change just because another layer of expert testimony is added. Claims of possible bias of a source supplying an expert with information to be used in litigation are "not the basis for truncating th[e adversarial] process," but rather should "be tested in the crucible of adversarial proceedings." *United States v. 14.38 Acres of*

Land, 80 F.3d 1074, 1079 (5th Cir. 1996);*see also id.* at 1077 ("As a general rule, questions relating to the bases and sources of an expert's opinion affect the weight to be assigned that opinion rather than its admissibility and should be left for the jury's consideration."); *Walker v. Soo Line R.R. Co.*, 208 F.3d 581, 586 (7th Cir. 2000) (when "a medical expert has relied upon a patient's self-reported history and that history is found to be inaccurate, district courts usually should allow those inaccuracies in that history to be explored through cross-examination").

Notably, the court cited no case—nor any other legal authority—in support of its conclusion that Mr. Napper's testimony could be excluded simply because of who supplied the information about the substitute chip. Instead, the court set out a hypothetical where a Motorola executive asks an engineer what it would cost to design around a feature. The engineer, in turn, asks someone at Apple for the bottom line cost of a design-around. Then the Motorola executive barks, "*Dummkopf!* You're fired." A117.

The court's hypothetical teaches nothing about the reliability of Mr. Napper's testimony. As the district court observed, its job was to determine whether Mr. Napper used "the same approach that he would have been required by the applicable professional standards to use to deal with an identical issue outside the litigation context." A103. So the relevant question should be: If *Apple* hired Mr. Napper outside of the litigation context—perhaps to value its patented technology in advance of a negotiation with Motorola—would it have been reasonable for him to consult with *Apple*'s engineers? Of course, it would. Instead, the district court's hypothetical posited that Mr. Napper was working for *Motorola* "to advise on how at lowest cost Motorola might obtain the functionality of the '263 without infringing that patent." A116. But even accepting that counterfactual premise, there is nothing inherently suspect in an expert consultant using information obtained from a competitor when deciding which product to use in a hypothetical design-around.

Moreover, the scenario the district court envisioned—where Mr. Napper would consult with an "independent" engineering expert—would be virtually impossible in real life. Experts do not work for free, and if Apple paid them for their time then they would be just as "tainted" in the district court's eyes as Dr. Polish.

C. Apple's Expert Permissibly Relied On HTC's Design-Around Efforts To Estimate Apple's Damages From Motorola's Infringement Of The '647 Patent

Mr. Napper offered two alternative estimates for a reasonable royalty for the '647 patent. The district court struck only the more "conservative" one of them in its *Daubert* ruling, A129; *see* A117-19, and we do not appeal that ruling here. But the other estimate we do press on appeal. This estimate survived the district court's *Daubert* ruling—indeed, Motorola did not even challenge it on *Daubert* grounds. A129. But the court nevertheless found the alternative estimate insufficient to overcome summary judgment.

Mr. Napper based this latter estimate on the actual experience of another smartphone manufacturer, HTC. HTC was forced to design around the '647 patent in light of the ITC's above-mentioned exclusion order. *See supra* at xv. That order gave HTC a four-month grace period to design around the patent before the exclusion order would go into effect. A130. Mr. Napper acknowledged that [redacted] A22,041. But he thought it appropriate to use the four-month grace period provided by the ITC as a benchmark for how long it should take to design around the patent. A129-30. Accordingly, Mr. Napper estimated a reasonable royalty based on [redacted] A22,041. The number came to [redacted] *Id.*

The district court accepted the basic premise of Mr. Napper's HTC-related estimate: "An infringer enjoined from using a patented invention has to stop selling the infringing product until it purges the infringement, as by an invent-around," so "[t]he cost (including lost sales) of having to invent around is … one method of estimating the reasonable royalty for a license." A130. Nevertheless, the district court disregarded Mr. Napper's HTC-related opinion as insufficient to defeat summary judgment on damages for two reasons, both erroneous.

First, the district court observed that the ITC's "construction of the patent's claims differs from my construction of the same claims." *Id.* If, however, this Court concludes that the district court erred in construing the '647 patent, then its primary rationale for ignoring Mr. Napper's damages analysis based on HTC's design-around efforts evaporates. In any event, that difference goes only to weight, and credibility, which should be left to the jury. *See O'Leary v. Accretive Health, Inc.*, 657 F.3d 625, 630 (7th Cir. 2011).

Second, the district court dismissed the calculation as an "afterthought" that "occupies only two pages in [his] report and says nothing about HTC the company, or about HTC's cell phones, or about the engineering resources that HTC devoted to modifying its phones in response to the … exclusion order." A130. No one disputes that HTC is a large company and a significant competitor in the smartphone market. A90,546. It is reasonable to assume that HTC devoted significant resources to its design around efforts. As one article cited in Mr. Napper's report noted, if HTC did not come up with an acceptable alternative to the '647 patent's functionality in its smartphones, it would "be at a disadvantage to Apple." Nigam Arora, *Apple Patent Victory Against HTC Doesn't Cripple Google's Android*, Forbes (Dec. 20, 2011), http://www.forbes.com/sites/greatspeculations/2011/12/20/patent-victory-for-apple-against-htc-doesnt-cripple-googles-android/; *see* A22,041. And while HTC claimed at the time the ITC issued its exclusion order that it "ha[d] a work around ready to address patent infringement," Arora, *Apple Patent Victory*, it did not release any new devices it believed to be non-infringing until shortly before the ITC's order went into effect—four months later, A28,940.

As with any benchmark, HTC's experience designing around the '647 patent is not a perfect measure of the royalty amount Motorola would have negotiated. But the actual experience of a competitor in a position similar to Motorola's is perhaps the best evidence one could realistically hope for. Motorola would have been free to explore on cross examination any relevant differences between HTC and Motorola, and their products—an opportunity it notably did not avail itself of during Mr. Napper's deposition. It is up to the jury, not the district court, to decide whether any such differences exist and are significant enough to warrant finding that Apple failed to prove damages on the '647 patent.

In sum, there was, in the district court's words, "enough evidence to justify a trier of fact in finding in favor of [Apple] if [Motorola] present[ed] no contrary evidence." A128.

IV. THE DISTRICT COURT ERRONEOUSLY DENIED APPLE A TRIAL ON ITS CLAIM FOR INJUNCTIVE RELIEF

In addition to excluding Apple's expert as to *past* damages, the district court also dismissed Apple's claim for injunctive relief to prevent *future* harm. It ruled, *as a matter of law*, that Apple had not marshaled enough evidence to create even a genuine dispute that injunctive relief could be justified once it proved that Motorola was infringing valid patents. A157. Instead, the district court held that Apple's only possible remedy was a "compulsory license with ongoing royalty." A148.

Dismissal of the claim for injunctive relief might have been appropriate if Apple routinely licensed its technology and was not competing with Motorola in the marketplace. Denial of injunctive relief is appropriate where the patent owner's frequent licensing indicates "willing[ness] to forgo its patent rights for compensation." *High Tech Med. Instrumentation, Inc. v. New Image Indus., Inc.*, 49 F.3d 1551, 1557 (Fed. Cir. 1995); *see also Edwards Lifesciences AG v. Corevalve, Inc.*, __ F.3d __, 2012 WL 5476839, at *8 (Fed. Cir. Nov. 13, 2012) ("the grant of a royalty-bearing license instead of imposing an injunction" may be justified "where the patentee would experience no competitive injury"). This same principle (along with basic principles set out in *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006)) supports the district court's dismissal of Motorola's claim for injunctive relief. A140-41. In promising to license any standards-essential patent on FRAND terms, Motorola affirmatively committed "to forgo its patent rights for compensation."

But Apple is in a different boat from the non-practicing entity and the FRAND licensor. Apple's "patent portfolio is not a sterile one which sits idle." *Broadcom Corp. v. Qualcomm, Inc.* No. SACV 05-467-JVS, 2007 U.S. Dist. LEXIS 97647, at *10 (C.D. Cal. Dec. 31, 2007) *aff'd*, 543 F.3d 683 (Fed. Cir. 2008). It sells millions of products in direct competition with Motorola. And unlike Motorola, which pre-committed to license its patents, Apple made no such commitment as to the patents at issue here and presented ample evidence that it has a general policy against licensing its valuable technology to Motorola or anyone else. Neither the district court nor Motorola has cited a single case in any forum denying a trial on these facts.

The district court's fundamental mistake was to substitute its own predictions for the rigors of fact-finding. The opinion is replete with rhetorical tells, such as the assertion that the injunction "would be *likely* to impose costs"; "*could* force Motorola to remove lucrative products"; "*might* do much greater harm to Motorola"; a license "is *likely* to be a superior remedy." A147-48 (emphasis added). The point of a trial—even one before a judge—is to move from debated hypotheses to determined facts. The court erred in denying a trial on these questions. *See*, *e.g.*, *Jones v. Brown*, 461 F.3d 353, 365 (3d Cir. 2006) (reversing district court's grant of summary judgment denying injunctive relief); *Miller v. King*, 384 F.3d 1248, 1278 (11th Cir. 2004) (same).

Apple presented ample evidence that money could not adequately compensate it for Motorola's infringement, *see infra* Point IV.A, and on the other injunction factors, *see infra* Point IV.B.

A. Apple Presented Evidence That Money Cannot Adequately Compensate It For Motorola's Infringement

For two distinct and independently sufficient reasons, Apple has proffered more than enough evidence to entitle it to a trial in which to demonstrate that money damages cannot adequately compensate it for Motorola's copying. First, Apple has a general policy against licensing its inventions, particularly to competitors. Second, Motorola's unlicensed copying of the inventions will continue to erode Apple's market share and consumer loyalty. If these bases are not enough here, as a matter of law, they will not be enough in any future patent case.

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1. Apple has a policy against licensing competitors to practice the three patents.

Apple is innovative to the core. Its business model is all about distinguishing its products from the competition's. A3391, 3393. To achieve that goal, Apple (unlike many of its competitors) develops its devices from the ground up. A3394, 3395, 7487; *see* Apple Inc. Annual Report (Form 10-K) 1 (Oct. 31, 2012), *available at* http://investor.apple.com/secfiling.cfm?filingID =1193125-12-444068&CIK=320193 ("2012 Apple 10-K").

This business model of distinctive innovation does not work if competitors are free to make their products identical. That is why Apple has a policy against licensing [redacted] A30,705-06; *see* A30,700. Apple adduced concrete evidence of this principle in play in the context of this very dispute.

For example, [redacted] A30,710, 30,715. [redacted] A30,711. As Motorola's negotiator recounted it, [redacted] A30,715. [redacted] A30,705-06.

[redacted] A30,706. [redacted] A30,700.

This fact alone puts Apple on the opposite side of the irreparable harm spectrum from the non-practicing entity in *eBay* and Motorola here. It remains as true now as it was before *eBay* that "[t]he essential attribute of a patent grant is that it provides a right to exclude competitors from infringing the patent." *Acumed LLC v. Stryker Corp.*, 551 F.3d 1323, 1328 (Fed. Cir. 2008); *see also eBay*, 547 U.S. at 395 (noting "the difficulty of protecting a right to *exclude* through monetary remedies that allow an infringer to *use* an invention against the patentee's wishes—a difficulty that often implicates the first two factors [damages and adequacy of legal remedies] of the traditional four-factor test") (Roberts, C.J., concurring); *Edwards*, 2012 WL 5476839, at *7 ("The Court in *eBay* did not hold that there is a presumption against exclusivity on successful infringement litigation."); *Fresenius USA, Inc. v. Baxter Int'l Inc.*, 582 F.3d 1288, 1302 n.4 (Fed. Cir. 2009) (affirming district court decision "acknowledging, as did Chief Justice Roberts in *eBay*, that 'courts have granted injunctive relief upon a finding of infringement in the vast majority of cases'"). That is why this Court has emphasized, even post-*eBay*, that "[w]hile the patentee's right to exclude alone cannot justify an injunction, *it should not be ignored*." *Robert Bosch LLC v. Pylon Mfg. Corp.*, 659 F.3d 1142, 1149 (Fed. Cir. 2011) (emphasis added).

Indeed, this Court recently reiterated that "[a]bsent adverse equitable considerations, the winner of a judgment of validity and infringement may normally expect to regain the exclusivity that was lost with the infringement." *Edwards*, 2012 WL 5476839, at *7. This Court identified two examples of "adverse equitable considerations": (1) "where the patentee would experience no competitive injury" if denied an injunction and (2) "where there is an overriding public interest in continued provision of the infringing product" because it is "not available from the successful patentee." *Id.* at *8. Neither is present here.

To the contrary, here equitable considerations compel injunctive relief. A plaintiff's policy of not licensing a competitor strongly supports a finding of irreparable harm—but at a minimum warrants an evidentiary proceeding on the adequacy of monetary relief. That much is clear from this Court's conclusion in a recent case that "the district court correctly considered Broadcom's general policy of not licensing its patents and the harm that would ensue from a compulsory license to its most significant competitor." *Broadcom Corp. v. Qualcomm Inc.*, 543 F.3d 683, 702 (Fed. Cir. 2008); *see also Broadcom*, 2007 U.S. Dist. Lexis

97647, at *16 (monetary relief not adequate in light of patent owner's "chosen strategy" of "not generally licensing its patents"), *aff'd*, 543 F.3d 683 (Fed. Cir. 2008) ("district court provided a well-reasoned and comprehensive opinion addressing injunctive relief").

Instead, the district court here did exactly what this Court cautioned against: It completely "ignored" Apple's licensing history. *Bosch*, 659 F.3d at 1149. The district court reasoned that a "compulsory license with ongoing royalty is likely to be a superior remedy in a case like this because of the frequent disproportion between harm to the patentee from infringement and harm to the infringer and to the public from an injunction, a factor emphasized by Justice Kennedy's concurring opinion in *eBay*." A148. By a "case like this," the district court meant a case where the "'patented invention is but a small component of the product the companies seek to produce and the threat of an injunction *is employed simply for undue leverage in negotiations*.'" *Id*. (quoting *eBay* at 547 U.S. at 396-97 (Kennedy, J., concurring)) (emphasis added).

That is, however, the opposite of this case. *eBay*, and more specifically the observation the district court borrowed from Justice

Kennedy, addressed an "industry" "in which firms use patents not as a basis for producing and selling goods but, instead, primarily for obtaining licensing fees." 547 U.S. at 396 (Kennedy, J., concurring). Apple's licensing policy puts it in a completely different industry. Far from seeking an injunction to apply "undue leverage in negotiations," Apple is instead seeking patent protection "as a basis for producing and selling goods." *Id.* As this Court has explained, Justice Kennedy's remarks (including the reference to component parts) are inapplicable to "traditional cases" where, as here, "the patentee and adjudged infringer both practice the patented technology." *Bosch*, 659 F.3d at 1149-50.

The district court only highlighted the fallacy of extending the *eBay* result to this very different circumstance when it tentatively floated the "suggest[ion]" that perhaps "Apple's goal in obtaining an injunction is harassment of its bitter rival." A154. The court based this surmise on the observation that Apple prefers an injunction—even a delayed one that would give Motorola time to remove the infringing features from its devices—to an "ongoing royalty" that "would yield significant income to Apple." A154-55. But that observation just proves

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our point: Apple was not interested in making money from its *competitors'* products. It preferred to retain what was special about its own products rather than collect revenue in return for allowing competitors to copy its products. That is an argument for granting the injunction, not for denying it—and certainly not for denying such relief without a trial to test the "suggest[ion]."

2. Motorola's infringement will continue to erode Apple's market share and consumer goodwill.

Motorola hails its products as [redacted] A29,095-96. [redacted] A29,613. And both its products and strategies include the very features—touchscreen gestures, real-time signal processing, linked structures—at issue here. If established, these facts justify an injunction—and, at a minimum, more than suffice to survive summary judgment on injunctive relief.

Before introducing its Android based devices in 2009, [redacted] A29,089. But by 2010, [redacted] A22,001; *see* A29,089 [redacted]

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[redacted]; A30,391 [redacted]. Had Motorola not entered the field with its infringing devices, the other smartphone sellers, including Apple, would have divided up that market share.

The harm to Apple extends beyond this loss of market share. Customers in this arena are "sticky." Once a customer chooses a particular operating system (whether Apple's iOS or Android) for its initial smartphone purchase, the customer is more likely to remain with the same operating system for its next purchase. A30,293 [redacted]. So Apple lost out not only on iPhone sales, but also on sales of other devices, as well as sales in other markets, such as its online iTunes and App Stores. *Cf.* A30,395 (describing the App Store); A30,276 [redacted].

The district court understated matters when it acknowledged that the "difficulty of quantifying loss of goodwill or of market share might justify injunctive relief in some cases." A146. That is, in fact, the classic scenario justifying an injunction in favor of a patentee when infringing products compete directly with the patentee's products. *See, e.g., Celsis In Vitro, Inc. v. Cellzdirect, Inc.*, 664 F.3d 922, 929 (Fed. Cir. 2012) ("Price erosion, loss of goodwill, damage to reputation, and loss of business opportunities are all valid grounds for finding irreparable harm.").

Nevertheless, the district court gave two reasons for denying injunctive relief. One related to the nexus to consumer demand and the other to the ease of designing around. Both were flawed.

Nexus to consumer demand. The district court found this case to be an unsuitable vehicle for injunctive relief *as a matter of law* largely because it was unpersuaded by the proof attributing Apple's losses to the very features that Apple accused. A152-53. That ruling is inconsistent with this Court's recent pronouncement that where, as here, "the accused product[s] include[] many features," not all of which are alleged to infringe, a patentee nevertheless is entitled to an

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injunction if it shows that "the harm is sufficiently related to the infringement." *Apple Inc. v. Samsung Elecs. Co., Ltd.*, 695 F.3d 1370, 1374 (Fed. Cir. 2012). Under this precedent, an injunction is warranted if Apple can show that some "consumers buy" Motorola's accused products, in part, "because [they are] equipped with the" functionality claimed in the '949 and '263 patents—in other words, that those features are "driver[s] of consumer demand." *Id.* at 1375.[3] Apple had ample evidence to satisfy this standard—and certainly enough to survive summary judgment—as to each of the claimed inventions.

There is no question that having a superior touchscreen interface—as opposed to a physical keyboard—drives consumer demand for smartphones. [redacted] A30,024. Indeed, [redacted] A29,981, 29,983, 29,986.

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[3] For purposes of this brief, we accept this nexus requirement as binding Federal Circuit precedent. But Apple has sought rehearing en banc challenging that requirement in the *Samsung* case, *see* No. 12-1507, Dkt. 104, and reserves the right to do so here as this appeal progresses.

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The same is true, more specifically, of the scrolling heuristics claimed by the '949 patent. [redacted] A29,594. More specifically, [redacted] A29,627. This is not just a feature consumers "like," *Samsung*, 695 F.3d at 1376, but a must-have feature. Touchscreen interfaces would raise the same "frustrat[ions]," A489, col. 2:15, as the "pushbuttons" and "complex menu systems" they were designed to replace, *id.*, col. 2:3-4, if they did not have heuristics to translate imprecise movements into the basic movements described in claim 1. Thus, a reasonable factfinder could conclude that "consumers would buy" Motorola's accused devices in part because of the functionality covered by the '949 patent. *Samsung*, 695 F.3d at 1376.

Likewise for the real-time signal processing system claimed in the '263 patent. The district court realized that the invention of the '263 patent "unquestionably is a valuable feature of a smartphone as of other types of computer" because it "mak[es] sure that programs which present video or aural material in real time (rather than storing it for later viewing/hearing) are able to present that material smoothly, without interruption or distortion." A116.

The district court refused to even consider an injunction because "[t]he '263 patent in issue in this litigation is not a claim to a monopoly of streaming video!" A153. But Apple's claim for injunctive relief does not depend on the grandiose notion that it invented streaming video. It is grounded in the undeniable truth that Apple devised a feature that has helped make its devices—and now Motorola's devices—so popular. As we demonstrate above, *supra* at 8-10, it is a feature that attracted programmers to develop wildly popular apps. It is a feature that made those apps cheaper. It is a feature that customers use—and benefit from—every single time they watch video or listen to audio.

It is also a feature that Motorola (through Google) copied to accrete those same benefits to itself. The Android platform, and the Motorola devices that rely on it, would be far less successful if they could not use Apple's simplification of streaming technology. [redacted]

[redacted] A29,405. When Motorola highlighted the [redacted] A29,406, it was making the most compelling case for the invention described in the ’263 patent. Without it, a large proportion of the apps that were available to users of Apple devices would have been virtually useless to Motorola’s customers. That is all Apple needed to demonstrate at trial to warrant an injunction.

The third invention, too—the ’647 patent’s structure-detection feature—helps drive demand. A29,594. Again, Motorola itself provided some of the best evidence when it identified this feature as a high priority and a “differentiating” feature. A29,857. Similarly, in Apple’s products, the linking feature has been praised as “[p]erhaps the coolest new features…which pick up on key words and phrases in your e-mails.” A29,893. That is more than enough to create at least a genuine issue as to whether consumers would buy devices based at least in part on this feature.

Design-arounds. The district court also categorically barred Apple from seeking an injunction because it believed that Motorola would find it "eas[y to] design[] around the patent claims at issue," which meant that an injunction "would not avert" Apple's lost market share. A145. The district court's analysis was flawed for two reasons.

First, the district court's easy-design-around assumption rests on erroneous earlier rulings addressed above. The assumption as to the '949 and '647 patents rests on mistaken claim constructions. The ruling on the '949 patent is premised on the court's earlier *Daubert* order, stating that it had explained there "how easy and cheap it would be for Motorola to avoid infringing the finger-gesture claim in the '949 patent," A146, which in turn was premised entirely on its erroneous construction of claim 1 as limited to a "finger tap," A115. Similarly, the crux of the district court's logic as to the '647 patent was: "Given my claims construction of the '647 patent, Motorola could design around simply by creating copies of the code that performs structure detection and linking for each particular program rather than by using a common-code module for all programs; for without a common code that is no 'analyzer *server*,' as required by the patent claim." A145-46. If, as we have argued above, *see supra* at 19-38, the district court erred in either construction, its rationale for denying an injunction as to that patent cannot stand.

The district court's assumption as to the '263 patent stands on a mistaken evidentiary ruling. The court declared that "there is no evidence of the cost of inventing around the surviving claims in it, and for all the record shows the cost may be slight." A146. But the court premised that conclusion on "the deficiencies of Napper's expert report." A156. If, as we have argued above, *see supra* at 44-48, the district court erred in excluding Mr. Napper's testimony, its rationale for denying an injunction as to the '263 patent also cannot stand.

Second, Apple presented ample evidence to refute the notion that Motorola could easily design around these patents. For example, one key question is whether the resulting product would be just as competitive as Motorola's accused products. One Apple expert opined that '263 design-arounds would be [redacted] A29,153-55. Similarly, Motorola's expert opined that Motorola's [redacted] A24,003, which would almost certainly be suboptimal. HTC took four months before it claimed to have a work around that no longer infringed the '647 patent. *See supra* at 49-50. At a minimum, these sorts of factual disputes should have been resolved at trial.

B. Apple Presented Adequate Evidence To Establish That The Balance Of Harms And Public Interest Support An Injunction

The district court made similar mistakes with respect to the perceived harm to Motorola and to the public. A154.

As to Motorola's harm, the district court pointed to the "possibilit[y]" that "the cost to Motorola of retooling its production line to make the redesigned devices would be considerable" and that "Motorola might have to destroy (if it is not feasible to rebuild) the smartphones that are in its inventory." *Id.* This is a contradiction of the court's view that a redesign would probably be costless. *See supra* at 68-71. And, in any event, the reference to what is "possibl[e]" is no basis on which to deny a trial. Furthermore, these concerns are present in any patent suit brought to stop a manufacturer from capturing market share by using a competitor's intellectual property without consent. They may justify efforts to tailor an injunction to minimize costs to the infringer, as Apple suggested in this case. A29,032; *see also Edwards*, 2012 WL 5476839, at *8 (a court can "postpone[] the effective date of an injunction" to "relieve hardship on the infringer"). But they do not justify a denial of injunctive relief. *Cf. Windsurfing Int'l, Inc. v. AMF, Inc.*, 782 F.2d 995, 1003 n.12 (Fed. Cir. 1986) ("One who elects to build a business on a product found to infringe cannot be heard to complain if an injunction against continuing infringement destroys the business so elected.").

As to the public interest, the court worried about the "harm that an injunction might cause to consumers who can no longer buy preferred products because their sales have been enjoined." A154. But again, that harm occurs whenever an injunction is granted. If consumers' inability to buy a preferred product could defeat an injunction, injunctions would almost never be granted. And again, harm to the public could be mitigated by a tailored or delayed injunction such as the one Apple proposed. *Id.*; *see also* A29,032.

The district court suggested that the ordinary injunction rules are inapplicable because "Apple is not a 'small company'; its market capitalization exceeds that of Google and Microsoft combined." A152.

But the district court cited no authority for the proposition that Apple is too big to prevail. *Cf. Bosch*, 659 F.3d at 1156 ("A party cannot escape an injunction simply because it is smaller than the patentee."). In any event, Apple's success is based on its patented inventions. Nothing will undermine its success like a ruling that competitors are free to copy its innovations as long as they are willing to pay a royalty.

CONCLUSION

The Court should remand for a trial to determine whether Motorola infringes Apple's patents and, if so, the appropriate amount of damages and suitability of injunctive relief.

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Respectfully submitted,

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ADDENDUM

TEXT OF CLAIMS 1, 2, 9 and 10
IN
PATENT NO. 7,479,949

’949 patent:

1. A computing device, comprising:

[1] a touchscreen display;

[2] one or more processors;

[3] memory;

[4] and one or more programs, wherein the one or more programs are [5] stored in the memory and [6] configured to be executed by the one or more processors, the one or more programs including:

[7] instructions for detecting one or more finger contacts with the touchscreen display;

[8] instructions for applying one or more heuristics to the one or more finger contacts to determine a command for the device; and

[9] instructions for processing the command;

wherein the one or more heuristics comprise:

[10] a vertical screen scrolling heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command rather than a two-dimensional screen translation command based on an angle of initial movement of a finger contact with respect to the touchscreen display;

[11] a two-dimensional screen translation heuristic for determining that the one or more finger contacts correspond to the two-dimensional screen translation command rather than the one-dimensional vertical screen scrolling command based on the angle of initial movement of the finger contact with respect to the touchscreen display; and

[12] a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.

2. The computing device of claim **1**, wherein the one or more heuristics include a heuristic for determining that the one or more finger contacts correspond to a command to translate content within a frame rather than translating an entire page that includes the frame.

***

9. The computing device of claim **1**, including:

instructions for detecting one or more first finger contacts with the touch screen display while a web browser application is displayed on the touch screen display;

instructions for applying a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device; and

instructions for processing the first command;

wherein the first set of heuristics comprises:

the vertical screen scrolling heuristic; and

the two-dimensional screen translation heuristic; and

instructions for detecting one or more second finger contacts with the touch screen display while a photo album application is displayed on the touch screen display;

instructions for applying a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device; and

instructions for processing the second command;

wherein the second set of heuristics comprises:

the next item heuristic, wherein the respective item in the set of items is a respective image in a set of images; and

a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the respective image in the set of images to displaying a previous image in the set of images.

10. The computing device of claim **9**, wherein the first set of heuristics comprises a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command rather than the two-dimensional screen translation command based on the angle of initial movement of the finger contact with respect to the touch screen display.

TEXT OF CLAIMS 1 and 8

IN

PATENT NO. 5,946,647

’647 Patent

1. A computer-based system for detecting structures in data and performing actions on detected structures, comprising:

an input device for receiving data;

an output device for presenting the data;

a memory storing information including program routines including

an analyzer server for detecting structures in the data, and for linking actions to the detected structures;

a user interface enabling the selection of a detected structure and a linked action; and

an action processor for performing the selected action linked to the selected structure; and

a processing unit coupled to the input device, the output device, and the memory for controlling the execution of the program routines.

***

8. The system recited in claim **1**, wherein the user interface highlights detected structures.

ORDER
DATED JANUARY 16, 2012

UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

APPLE INC. and NeXT SOFTWARE INC. (f/k/a NeXT COMPUTER, INC.),	)	
Plaintiffs,	)	No. 1:11-cv-08540
v.	)	
	)	Judge Richard A. Posner.
MOTOROLA, INC. and MOTOROLA MOBILITY, INC.,	)	
Defendants.	)	

ORDER

Before the court are motions for summary judgment regarding nine patents.

Apple's summary judgment motion regarding U.S. Patent No. 5,319,712 is granted

Apple has moved for summary judgment of noninfringement of Motorola's U.S. Patent Number 5,319,712 ("Method and Apparatus for Providing Cryptographic Protection of a Data Stream in a Communication System"). The patent discloses a method for encrypting data packets that are sent from one device to another. Claim 17 specifies that the algorithm encrypts each packet according to a function whose inputs are a packet sequence number, a transmit overflow sequence number, and a random encryption key. The sequence number increases with each packet encrypted, to a maximum of 128, at which point it begins anew at 1. The transmit overflow sequence number increases each time the packet sequence number resets.

Motorola alleges that a particular encryption method called Wi-Fi Protected Access ("WPA") used by Apple infringes the method disclosed in the '712 patent. The dominant IEEE 802.11 standard requires devices to be capable of WPA encryption, as well as of other encryption methods. Many of Apple's devices are compliant with the 802.11 standard and therefore capable of performing WPA encryption. The disagreement is over whether the extended initialization value used in the WPA encryption process is the equivalent of Motorola's patented transmit overflow sequence number.

During claim construction Judge Crabb limited "transmit overflow sequence number" in Motorola's patent to an overflow number that is *never* transmitted to the receiver device. Her ruling was based on statements that Motorola had made to the Japanese Patent Office to distinguish the Japanese counterpart to the '712 patent from prior art. (Claim 9 of the Japanese patent was identical to claim 17 of the '712 patent.) Motorola told that office that "unlike the key or the packet sequence number, there is no chance to intercept the overflow sequence number [a reference to the 'transmit overflow sequence number' in the '712 patent]; thus it provides a higher level of security"—no chance because that number is never transmitted, unlike its counterpart in Apple's devices that are alleged to infringe.

Foreign patent-prosecution history is relevant even though it must be considered in light of differences between the foreign patent regime and the U.S. regime. *TI Group Automotive Systems (North America), Inc. v. VDO North America, L.L.C.*, 375 F.3d 1126, 1136 (Fed. Cir. 2004); *Tanabe Seiyaku Co. v. United States Int'l Trade Commission*, 109 F.3d 726, 733 (Fed. Cir. 1997). Motorola's statement to the Japanese Patent Office was motivated not by an idiosyncratic rule of foreign patent law, cf. *Pfizer, Inc. v. Ranbaxy Laboratories, Ltd.*, 457 F.3d 1284, 1290 (Fed. Cir. 2006), but by the prohibition—applicable under United States as well as Japanese patent law—against patenting methods that are obvious to someone of ordinary skill in the relevant field of invention who is acquainted with prior art in that field. 35 U.S.C. § 103. In order to distinguish the method disclosed in the '712 patent from prior encryption methods, Motorola emphasized to the Japanese Patent Office the increased security obtained by not transmitting all the encryption inputs, and specifically by *never* transmitting the transmit overflow sequence number, Its statement was precise and unequivocal, in contrast to foreign prosecution history rejected in cases such as *AIA Engineering Ltd. v. Magotteaux Int'l S/A*, 657 F.3d 1264, 1279 (Fed. Cir. 2011), and *Caterpillar Tractor Co. v. Berco, S.p.A.*, 714 F.2d 1110, 1116 (Fed. Cir. 1983). Judge Crabb's construction estops Motorola to assert a broader interpretation of "transmit overflow sequence number" in this proceeding. Because the parties agree that the extended initialization value in WPA is transmitted (and it is the only structure that is potentially analogous to the patented transmit overflow sequence number), Apple's WPA-capable products do not literally infringe Motorola's '712 patent.

Pointing to expert opinion that the broadcast of the extended initialization value does not actually reduce the security of the WPA protocol, Motorola argues that its infringement claim may still prevail under the doctrine of equivalents. But this contradicts its previous ground for distinguishing its method from prior art, and if presented to the Japanese Patent Office would have resulted in rejection of the patent application. "[S]ince, by distinguishing the claimed invention over the prior art, an applicant is indicating what the claims do not cover, he is by implication surrendering such [patent] protection." *Ekchian v. Home Depot, Inc.*, 104 F.3d 1299, 1304 (Fed. Cir. 1997). "[T]he concept of equivalency cannot embrace a structure that [was] specifically excluded from the scope of the claims." *Decisioning.com, Inc. v. Federated Department Stores, Inc.*, 527 F.3d 1300, 1315 (Fed. Cir. 2008); see also *Asyst Technologies, Inc. v. Emtrak, Inc.*, 402 F.3d 1188, 1190 (Fed. Cir. 2005). Motorola relied during the Japanese patent prosecution on a specific narrow characterization of its encryption method—that it did not broadcast the transmit overflow sequence number. The WPA encryption method which Apple's 802.11-compliant devices are capable of performing does not infringe claim 17 of Motorola's patent.

Apple's motion for summary judgment regarding U.S. Patent No. 5,572,193 is granted

Apple has moved for summary judgment of noninfringement and invalidity of Motorola's U.S. Patent Number 5,572,193 ("Method for Authentication and Protection of Subscribers in Telecommunications Systems"). The '193 patent describes methods for encrypting communications signals between devices in a cellular network, to enable the network to authenticate calls from cellphone users while preventing impersonation of one cellular phone user by another.

Claims 29 and 31 of the '193 patent have been incorporated into the CCMP ("Counter Mode with Cipher Block Chaining Message Authentication Protocol," more commonly referred to as WPA2—Wi-Fi Protected Access II) component of the IEEE 802.11 standard. Many Apple devices, including iPhones and iPads, comply with the 802.11 standard and so are usable on networks that use WPA2 encryption.

Apple argues that claims 29 and 31 are invalid because they were anticipated by two items of prior art: U.S. Patent Number 5,091,942 (the Dent patent) and the American National Standard's "Financial Institution Retail Message Authentication, X9.19" (the X9.19 reference). There is no factual dispute that both preceded the '193 patent; the question is whether either of them anticipated the limitations in claims 29 and 31. (Motorola says that it is asserting only claim 31, that is, that it is not alleging infringement of claim 29, but claim 31 is dependent on claim 29, so both claims must be analyzed.) Apple must "show by clear and convincing evidence that a single prior art reference discloses each and every element of a claimed invention." *Silicon Graphics, Inc. v. ATI Technologies, Inc.*, 607 F.3d 784, 796 (Fed. Cir. 2010).

Claims 29 and 31 are as follows:

> **29.** A method of authenticating a subscriber unit in a communication system, comprising:
> (a) providing the subscriber unit with at least part of a plurality of information bits which uniquely identify a target communication unit;

> (b) generating an authentication message in the subscriber unit as a function of the at least part of the plurality of information bits; and(c) transmitting the authentication message and the at least part of the plurality of information bits from the subscriber unit to the communication system.
>
> **31.** The method of claim **29** wherein the authentication message is generated in the subscriber unit further as a function of a random number known to the subscriber unit.

Claim 29 describes a method for creating an authentication message—an encrypted message that confirms the identity of the cellphone user to the network and thus prevents impersonation. The user dials on the cellphone ("the subscriber unit") a telephone number; the cellphone creates the authentication message "as a function of" the target's phone number and transmits to the network both the target's phone number and the authentication message. Claim 31 incorporates claim 29 and adds that the authentication message must also be created "as a function of" a random number "known to the subscriber unit." The quoted phrases—"as a function of" and "known to the subscriber unit"—are the focus of the dispute between the parties, as it is clear that both the Dent patent and the X9.19 reference anticipate the other elements of claims 29 and 31.

The Dent patent describes an algorithm that generates an authentication message using both a random number that is "known to the mobile station in advance" and the "dialed digits" of the target's phone number. The question is whether this description anticipates the "known to the subscriber unit" element of claim 31. Motorola argues that this phrase cannot be taken literally if it is to add anything to the claim. Of course, to use a number for encryption the cellphone must "know" that number, so the addition of the phrase "known to the subscriber unit" must signify something more if it is to be given independent meaning. I think that what "known to the subscriber unit" means is that the number used for encryption must be "known to the subscriber unit well in advance of its use"; this excludes, for example, the case in which the network sends the cellphone a random number immediately prior to the use of the number in the encryption process, or in which the user must enter a random number into the phone every time he makes a call. In the Dent patent the random number *is* known to the cellphone in advance of its use in creating an authentication message. The cellphone periodically receives a new random number from the network and stores that number in its memory for use in authentication messages. So when the authentication message is created as a function of the random number, the random number is known to the cellphone. That is all that claim 31 claims.

Motorola points to language in the specification of the '193 patent that discusses and criticizes prior art in which the random number is generated by the network and transmitted to the cellphone rather than originating in the cellphone. The criticism—that this "random number transmission required for encipherment necessitates additional communication between [the cellphone and the network] which increases the probability of transmission error and adds a transmission step to the…authentication protocol routine"—is applicable to the process discussed in the Dent patent, and the '193 patent lists the Dent patent as a reference. This shows that Apple was aware of prior art in which the random number is transmitted to the cellphone by the network, and viewed the elimination of that extra transmission step as among its innovations over the prior art. Yet nothing in the specification says where the random number is supposed to come from, by contrast to other numbers that are said to be either dialed in by the user or stored in the cellphone's memory; there is no suggestion that the cellphone is capable of generating random numbers or contains in its memory a list of random numbers.

The drafter of the patent must ensure that the claims reflect all the innovations he seeks to claim; if he fails to include such an element in a claim he has failed to provide sufficient notice of his invention. Language in the specification may be useful in interpreting vague or ambiguous limitations in the claims but cannot add limitations to unambiguous claims. *CollegeNet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 1231 (Fed. Cir. 2005); *Bayer AG v. Biovail Corp.*, 279 F.3d 1340, 1348 (Fed. Cir. 2002); *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). Motorola asks me to read into claim 31 "a random number known to the subscriber unit *that was never transmitted from the base station to the subscriber unit*." I can't do that.

Because the "known to the subscriber unit" element of claim 31 is clearly anticipated in the Dent patent and there is no serious question that all other elements of claims 29 and 31 are also anticipated, those claims in the '193 patent are invalid. They are also anticipated by the X9.19 reference, which describes an authentication method for use in electronic financial transactions. A limitation of claim 29 describes the generation of an authentication method "as a function of" the target's telephone number. X9.19 also describes the use of the target communication unit's number in the creation of an authentication message, but uses that number as part of the number to be encrypted by the encryption algorithm—"an authentication element [that] represents the data stream that the authentication algorithm acts upon." I can't see a meaningful distinction between these formulations, and I note that "the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc).

Motorola's motion for summary judgment regarding U.S. Patent No. 7,479,949 is denied

Motorola has moved for summary judgment determining invalidity or alternatively noninfringement of Apple's U.S. Patent Number 7,479,949 ("Touch Screen Device, Method, and Graphical User Interface for Determining Commands By Applying Heuristics"). This is a patent for applying "heuristics" to the movements of the user's fingers on the screen of touch-screen devices (such as Apple's iPhone) that change the visual field or select files. According to the specification, "in some embodiments, heuristics are used to translate imprecise finger gestures into actions desired by the user." In particular, the patent provides a heuristic for determining whether a user who swipes his finger along the screen of the touch-screen device intends to scroll perfectly vertically or to shift the screen diagonally. Users often wish to scroll vertically, yet it's hard for a user to swipe his finger perfectly vertically; so if the touch-screen device simply shifts the screen in the same exact direction of the user's finger swipe, users who intend to scroll vertically will often instead produce diagonal motions (what the patent calls "two-dimensional screen translation"). The patent's solution is a heuristic that treats "substantially vertical" swipes—swipes that are within a specified range of a perfectly vertical swipe (for instance, within 27 degrees of perfectly vertical)—as commands for vertical scrolling; outside that tolerance swipes produce diagonal motion in the direction of the swipe.

Motorola argues that the '949 patent is invalid because its use of the term "heuristic" renders the patent indefinite, 35 U.S.C. § 112, ¶ 2, and that it is a means-plus-function patent, see § 112, ¶ 6, that fails to indicate any definite structure (for instance, an algorithm for a computer program) in its specification. Indefiniteness is a question of law. *Bancorp Services, L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1371 (Fed. Cir. 2004).

Motorola's primary evidence of indefiniteness consists of statements in depositions of nine of the inventors listed in the patent, most of whom concede that "heuristics" is "sort of a vague word" or are otherwise unable to define it. But defining a word is often more difficult than grasping its meaning in a specific context. It is "particularly inappropriate to consider inventor testimony obtained in the context of litigation in assessing validity under section 112, paragraph 2, in view of the absence of probative value of such testimony." *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379 (Fed. Cir. 2000). And in fact some of the inventors were able to define the term (essentially as equivalent to "rule" or "algorithm"), and both parties were able to offer definitions for purposes of claim construction. Apple defined "heuristics" as "one or more rules to be applied to data to assist in drawing inferences from that data," which is an adequate definition. Section 112 requires invalidation for indefiniteness only where a claim is "insolubly ambiguous" and cannot "be given any reasonable meaning," *Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1352 (Fed. Cir. 2009), quoting *Young v. Lumenis, Inc.*, 492 F.3d 1336, 1346 (Fed. Cir. 2007), and a claim can be definite even when "reasonable persons will disagree" about its meaning. *Source Search Technologies, LLC v. LendingTree, LLC*, 588 F.3d 1063, 1076 (Fed. Cir. 2009), quoting *Exxon Research & Engineering Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001).

Means-plus-function claims are usually identified as such by inclusion of the term "means," and there is a rebuttable presumption that claims that lack that term—such as the claims of the '949 patent—are not means-plus-function claims. The presumption is rebutted if the claim "fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function." *Massachusetts Institute of Technology v. Abacus Software*, 462 F.3d 1344, 1353 (Fed. Cir. 2006), quoting *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1369 (Fed. Cir. 2002). Patents that claim a means for performing a computer-implemented function must thus thdisclose the algorithm, or "step-by-step process," for performing that function. *Aristocrat Technologies Australia Pty Ltd. v. International Game Technology*, 521 F.3d 1328, 1332–33 (Fed. Cir. 2008); see also *In re Katz Interactive Call Processing Patent Litigation*, 639 F.3d 1303, 1314–15 (Fed. Cir. 2011); *Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1249 (Fed. Cir. 2005).

The claims in patent '949 gesture toward such a step-by-step process, but don't describe one. The specification does, however, in Figure 39C; and a patent's diagrams can substitute for a written description. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1565 (Fed. Cir. 1991).) Motorola contends that Figure 39C "relates only to the claim limitation relating to vertical scrolling," but that is wrong; it also relates to diagonal movement. The patent does not describe program code to perform the heuristics it claims, but disclosure of code is unnecessary when a person of ordinary skill in the relevant field of invention would be able to write a program to perform the described algorithm without difficulty. *Medical Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1214 (Fed. Cir. 2003). Whether that is so here is a disputed question of fact, which therefore cannot be answered in the context of a motion for summary judgment.

Motorola further argues that even if the patent is valid, its products do not infringe because they use a wider tolerance for determining a user's intent to scroll vertically than the example given in Figure 39C—within 33.7 degrees of perfectly vertical rather than 27 degrees. Infringement is a question of fact, *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1129–30 (Fed. Cir. 2011), and whether 33.7 degrees is close enough to 27 degrees to infringe Apple's patent, in light of evidence that a small difference in angle affects performance substantially, is a disputed question that cannot be resolved on summary judgment. *Jeneric/Pentron, Inc. v. Dillon Co.*, 205 F.3d 1377, 1383 (Fed. Cir. 2000). Apple mentions 27 degrees only as an example, moreover; the patent claims are not limited to that angle; hence we need not consider whether, if so limited, Motorola would nevertheless be infringing under the doctrine of equivalents. Motolora's argument that the patent-prosecution history is inconsistent with the charge of infringement fails for the same reason: the language of the patent on which the argument pivots—"based on an angle of initial movement of a finger contact with respect to the touch screen display," which was added after an interview between Apple representatives and the PTO examiner—does not specify an angle.

Motorola's motion for summary judgment regarding U.S. Patent No. 5,455,599 is granted, and Apple's motion for summary judgment regarding the same patent is denied

Apple's U.S. Patent No. 5,455,599 ("Object-Oriented Graphic System") is an invention for drawing graphics on an output device (like a display screen). The patented system is "object-oriented," meaning the graphics are produced by a series of objects (such as straight lines and curved lines) that are described mathematically, as opposed to being produced as a series of dots arranged in a pattern. Object-oriented graphics systems allow the programmer greater flexibility to manipulate the graphics.

Apple contends that Motorola products infringe claim 15 and also claim 26 (which however is derivative from 15) of the '599 patent. Motorola counters that the claims are invalid because indefinite, which Apple denies. The controversy revolves primarily around limitation (g) of claim 15, which describes an apparatus for graphic processing that includes "means for capturing state information and rendering information at the grafport object."

"[S]tate information" is information about the graphic's appearance (color, line thickness, etc.); "rendering information," which the parties agree is the "drawing sequence of a graphic object," is instruction to other parts of the device on how to render the graphic (as by rendering a square by drawing a line in a specified way, such as left, up, right, and down from a given point); and the "grafport object" is the interface between the graphic objects and the output system (displays, memory, printers, etc.). The grafport stores the graphic information by "capturing" it into a polymorphic cache; once the information is stored there, the grafport makes it available to other parts of the system. Thus the function of claim 15(g) is "capturing state information and rendering information at the grafport object."

The dispute is over the structure that performs that function. To avoid invalidity for indefiniteness, the patent must describe the structure in the specification. *Biomedino, LLC v. Waters Technologies Corp.*, 490 F.3d 947, 950 (Fed. Cir. 2007). Apple argues that the polymorphic cache is the structure—it performs the capturing function. Motorola agrees that information is stored in the polymorphic cache, but counters that this tells us nothing about how the information gets into the cache. Maybe the polymorphic cache does the capturing itself, like a Venus flytrap, or maybe some undisclosed structure captures the information and transports it to the cache for storage. Motorola further argues that even if the polymorphic cache performs the capturing, it captures only state information, and 15(g) requires the capture of both state *and* rendering information.

Motorola points to the following language in the specification: "the graphic port captures state information…into a polymorphic cache." That suggests that the structure for capturing *rendering* information has not been specified, though it also undermines Motorola's argument that the claim is indefinite, because at least it discloses the structure for capturing state information: it is the graphic port that does that capturing. This does not explain precisely how the grafport performs the capturing, but it clearly associates structure with performance, and that is sufficient to defeat Motorola's indefiniteness challenge, *Biomedino, LLC v. Waters Technologies Corp.*, *supra*, 490 F.3d at 950 ("this is not a high bar"); *Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc.*, 296 F.3d 1106, 1113 (Fed. Cir. 2002), at least insofar as the capturing of state information is concerned (a vital qualification, as we are about to see). Bearing in mind the Federal Circuit's admonition that the bar is not high for finding a link in the specification between structure and function, I conclude that the graphic port captures state information and stores it in a polymorphic cache.

Apple's expert, Dr. Egbert, argues that the grafport captures rendering information in a polymorphic cache too: "The grafport object, as used in the '599 patent, captures both geometry (rendering information) and state information." Egbert Decl., ¶ 8. But "geometry" and "rendering information" are not synonymous, as the expert opined; nor is rendering information a subset of geometry. An object's geometry tells an output device what to draw: rectangle, line, curve, point, etc. ('599 patent at 8:16–20); rendering information tells the device how to draw it. The patent doesn't "clearly associate" any structure with performance of the function of making rendering information available for producing a graphic.

That invalidates claim 15 (and its derivative claim 26) for indefiniteness—unless we accept Apple's proposed claim construction of "capturing." (The term was not construed at the claim-construction phase of this litigation.) Apple contends that "capturing" is synonymous with "storing," pointing to the term "captured state" in Figure 2 of the patent. "Captured" state is "stored" state all right, but storage is the outcome of capturing; you capture a mutinous sailor, and store him in the brig. Sometimes, it's true, capture and storage are indistinguishable.

Apple argues that when a child captures fireflies in a jar, the structure that performs the "capturing" function is the jar, and the jar then stores the fireflies. But while the jar indeed stores the fireflies, the child may have captured the fireflies with a net or with his hands and then placed the captives into the jar. The same ambiguity arises when rendering information is captured "into a polymorphic cache."

Motorola's motion for a summary judgment ruling of invalidity for claims 15 and 26 of the '599 patent are granted, and Apple's motion for a summary judgment ruling that the claims are not indefinite is denied.

Apple's motion for summary judgment regarding U.S. Patent No. 5,311,516 is denied

Apple has moved for a summary judgment ruling that Motorola's U.S. Patent Number 5,311,516 ("Paging System Using Message Fragmentation to Redistribute Traffic") is invalid and in any event that Apple has not infringed it. The patent describes a method for transmitting long messages wirelessly that involves chopping the message into sequential data packets, each containing an address and message data, including an indication of whether more packets for that message are on the way. The receiver determines whether a packet is intended for it by comparing its own address to the incoming packet's destination address. The patent calls this comparison process "correlation." If there's a successful correlation, the receiver decodes and stores the packet's message data. When the receiver determines from a packet that no further packets containing data that are part of the message are coming, it deems the chopped-up message complete and thus ready to be read.

Apple contends that the '516 patent is invalid because anticipated by prior art, namely U.S. Patent Nos. 4,908,828 ("Tikalsky") and 4,975,972 ("Mabey")—patents that like the '516 describe methods for transmitting long messages in fragments. The dispute is over whether these earlier patents disclose limitation (d) of claim 1 of the '516 patent, which is "successively storing the decoded message data of each message packet of the one or more message packets to reconstruct the fragmented message, the fragmented message being completely reconstructed after detection in the decoded message data of one of the…message packets an indication that no more message packets are to be received for the fragmented message." The dispute is over "successively storing," which requires the receiver to receive the packets in their original order; the question is whether the prior art both successively stores packets and satisfies the requirement that reconstruction be complete when the receiver detects that it won't be receiving any more packets containing fragments of the message. Invalidity must of course be proved by clear and convincing evidence. *Eli Lilly & Co. v. Barr Laboratories, Inc.*, 251 F.3d 955, 962 (Fed. Cir. 2001).

The Tikalsky patent discloses a system for sending message fragments repetitively to minimize transmission errors, and recommends up to five transmissions of each fragment. If, for example, a message contains 5 fragments, the receiver might receive packets 1 and 4 on the first try, 5 on the second, 2 on the third, and 3 on the fourth, and it will rearrange the series of packets in proper order, thus reconstructing the entire message. The Mabey patent is similar. Apple argues that the method in the Tikalsky and Mabey patents—receiving fragments out of order and then placing them in order—necessarily includes Motorola's simpler method—receiving the packets sequentially. For in the inventions described in those patents, Apple argues, if the first transmission results in the error-free receipt of the entire message (rather than in transmission of just fragments of the message), the fragments will *automatically* be stored sequentially—"successively stor[ed]."

True, the prior art doesn't mention receipt of an error-free message in a single transmission, but Apple argues that such receipt has been "inherently" anticipated—it's "necessarily present" in the anticipating reference. But "inherency… may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient." *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991) (emphasis in original); see also *Schering Corp. v. Geneva Pharmaceuticals*, 339 F.3d 1373, 1377 (Fed. Cir. 2003). But that is all that Apple has shown thus far.

There is also a triable issue of whether the prior art satisfies limitation (d)'s requirement that a message's last packet contain "an indication that no more message packets are to be received." The prior art methods do notify the receiver which fragment occupies the last position in the sequence of packets, but that notification is not "an indication that no more message packets are to be received." Subsequent packets may be received, as in our example in which the fifth packet, which is the last, is received before the second and third.

Asking in the alternative for a ruling of noninfringement, Apple argues that Motorola hasn't presented evidence of any infringement. Motorola must show that it's "more likely than not [that] one person somewhere in the United States had performed the claimed method using [the alleged infringer's] products." *Lucent Technologies, Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1318 (Fed. Cir. 2009). By pointing to its expert's tests on Apple's products as well as tests performed by Apple's third-party testing institutions, Motorola has created a triable issue of whether the '516 patent was directly infringed.

Against this conclusion Apple argues that its products don't practice limitations (c) or (d) of claim 1 in the '516 patent. It argues that its products comply with Institute of Electrical and Electronics Engineers Standard 802.11 for wireless communication between devices, and that it's not possible both to conform to the 802.11 standard and to practice those limitations. The 802.11 standard calls for certain data (including indications whether more fragments are being sent) to be received and decoded prior to correlation, whereas '516 requires that message data be decoded "in response to a successful [address] correlation." Motorola describes this pre-correlation decoding as merely an extra step above and beyond the steps required by '516. It thus invokes the rule that "absent some special circumstance or estoppel which excludes the additional factor, infringement is not avoided by the presence of elements or steps in addition to those specifically recited in the claim." *Vivid Technologies, Inc. v. American Science & Engineering, Inc.*, 200 F.3d 795, 811 (Fed. Cir. 1999). Even if this extra step precludes literal infringement, Motorola contends that Apple's products infringe under the doctrine of equivalents because the initial decoding step doesn't alter the invention in any meaningful way. See *Insta-Foam Products, Inc. v. Universal Foam Systems, Inc.*, 906 F.2d 698, 702 (Fed. Cir. 1990). These arguments involve factual disagreements that cannot be resolved on summary judgment.

Apple's motion for summary judgment regarding U.S. Patent No. 6,359,898 is denied

Apple has moved for summary judgment of invalidity and noninfringement as to Motorola's U.S. Patent Number 6,359,898 ("Method for Performing a Countdown Function During a Mobile-Originated Transfer for a Packet Radio System").

The '898 patent provides a method for efficiently allocating channels in a wireless communications system. Data are transmitted in small increments of time called "frames." Each frame includes eight "time slots," which are the channels. Each time slot transmits one block (a small quantity of data) per frame; thus a total of eight blocks can be transmitted per frame. A time slot allocated to a given cellphone will transmit one block per frame until the transmission is complete. Multiple time slots can be assigned to a given signal, increasing the speed of the transmission. For example, a transmission of 10 blocks will require 10 frames if the signal is allocated to only one time slot, but only five frames if two time slots are allocated to the signal.

When a transmission is completed, the cellphone no longer needs time slots and the network must reallocate them to other phones (or other devices) that have data to send. The overall speed of the network depends on the network's being able to perform this reallocation efficiently, without downtime between the completion of one transmission on a given time slot and the beginning of another. Because channel and processing delays create a lag time of several frames, the network needs advance warning of a transmission's impending completion if it is to reallocate its time slots without downtime. A cellphone can give advance warning by indicating in each frame the number of blocks remaining in the transmission. The '898 patent claims methods of providing this advance warning, particularly in cases in which multiple time slots are allocated to a single signal.

Claims 1, 2, and 5 of the '898 patent are at issue. They provide:

> 1. In a wireless communication system, a method for transmitting a communication signal comprising a plurality of units of information [the "blocks"], the method comprising: transmitting the plurality of units of information via a predetermined number of channel resources [the "time slots"]; determining a number of the plurality of units remaining in at least a portion of the communication signal; based on the predetermined number of channel resources, adjusting the number of the plurality of units remaining to produce an adjusted number of units remaining; and transmitting the adjusted number of units remaining to the wireless communication system.
>
> 2. The method according to claim 1, wherein the step of adjusting further comprises: dividing the number of the plurality of units remaining by the predetermined number of channel resources.
>
> 5. The method according to claim 1, wherein the predetermined number of channel resources is greater than one.

Apple argues that the '898 patent is invalid because it was anticipated and/or made obvious by prior art, specifically a publication of the communications company Nortel ("the Nortel reference") just over a year before the priority date of the '898 patent. See 35 U.S.C. § 102(b).

The Nortel reference describes a mobile device, such as a cellphone, that begins a transmission by sending a "channel request" to the network, which opens a channel through which the cellphone tells the network how many blocks of data it has to transmit. The network responds by telling the cellphone how many time slots the cellphone has been allocated, the start time for the transmission, and a duration time for each time slot; there may be multiple different duration times because the Nortel reference allows for each time slot to be allocated to a given signal for a different amount of time. Having determined the start time and duration times itself from the number of blocks to be transmitted and the number of time slots allocated, the network knows how long the transmission will last and can reallocate its time slots to other signals upon completion of the transmission.

Apple's anticipation argument fails because the Nortel reference does not anticipate one element of claim 1 of Motorola's patent: "transmitting the adjusted number of units remaining to the wireless communication system." The adjusted number is calculated by the mobile unit and then transmitted to the network, while in the Nortel reference the network performs the calculation and transmits the adjusted number (the duration times) to the mobile unit. It's true that "wireless communication system" is somewhat ambiguous: throughout the remainder of the '898 patent the phrase is used to refer to the entire system, consisting both of mobile units and of the network's base units, such as communications satellites and cellphone towers. But in the present context that definition makes no sense, because both the base units and the mobile units are part of the wireless communication system, yet one of them must be doing the transmitting. And the "wireless communication system" could hardly be the mobile unit; it must be the base unit or units. By the same token, the term "network" can refer to the entire system, consisting both of users' mobile units and the company's base units, or only to the base units, or to one particular base unit. (Apple does not address its obviousness argument to this element of the '898 patent.) So claim 1 is not anticipated by the Nortel reference, and this conclusion precludes invalidation of claims 2 and 5 as well, which are dependent on claim 1.

Apple makes the further argument that claims 1 and 2 are invalid because indefinite: the step "based on the predetermined number of channel resources, adjusting the number of the plurality of units remaining to produce an adjusted number of units remaining" is incoherent, it argues, and therefore indefinite where only one channel resource (time slot) is allocated to the transmission, because the number of blocks cannot be "adjusted" by the number 1. Multiplication by 1 doesn't do anything. But to "adjust" the number of blocks based on the number of time slots is merely to apply the latter number to the former, for instance by dividing the number of blocks by the number of time slots, as provided in claim 2. Dividing by one, rather than being incoherent or indefinite, is a trivially simple operation. That the quotient will equal the dividend in the particular case does not mean that division by 1 is not a form of adjustment.

Apple further argues that Motorola has failed to create a disputed issue of material fact concerning whether Apple has infringed claim 5. Apple asserts that Motorola must produce evidence that the Apple products are ever assigned more than one time slot by the networks, as is required for violation of claim 5. Motorola may rely on circumstantial evidence in arguing infringement, *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 1272 (Fed. Cir. 1986), abrogated on other grounds by *Egyptian Goddess, Inc. v. Swisa, Inc.*, 543 F.3d 665 (Fed. Cir. 2008) (en banc), and a finder of fact may find infringement if at some point during the relevant period if it was "more likely than not [that] one person somewhere in the United States had performed the claimed method using the [accused] products." *Lucent Technologies, Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1318 (Fed. Cir. 2009). Motorola has presented evidence from which a jury could find that the

Apple devices are capable of transmitting in multiple time slots and are given the opportunity to do so by their networks at least some of the time.

Motorola's motion for summary judgment regarding U.S. Patent No. 6,343,263 is dismissed as premature

Motorola moves for a summary judgment ruling of noninfringement of Apple's U.S. Patent Number 6,343,263 ("Real-Time Signal Processing System for Serially Transmitted Data"). Apple's patent describes a computer system that performs realtime signal processing on serially transmitted data. Claim 1 describes two subsystems—a "host central processing unit" and a "realtime signal processing subsystem"—connected by a realtime application program interface. The realtime API interfaces between the two subsystems, requesting realtime services (for instance, video image processing) from the realtime signal processing subsystem on behalf of applications running on the host subsystem.

Motorola argues that its devices don't infringe because their signal-processing systems lack a realtime API. Underlying the dispute is a claim-construction dispute over the meaning of the term "realtime API." Motorola contends that it's an API that has realtime functionality, which it defines as "constant bit rate handling," while Apple contends the term refers to an API that facilitates realtime signal processing.

Neither party sought construction of the term at the claim-construction hearing, and as a result the motion for summary judgment is premature, and is therefore dismissed. The parties shall submit briefs on construction of the term "realtime application program interface" in claim 1 of Apple's '263 patent no later than January 23.

Motorola's motion for summary judgment on U.S. Patent No. 5,566,337 is denied

Motorola has moved for summary judgment of noninfringement of Apple's U.S. Patent Number 5,566,337 ("Method and Apparatus for Distributing Events in an Operating System"). The '337 patent describes a method for distributing "events" between devices in a computer system. An event is "any occurrence in a computer of which software programs running on that computer or on a connected computer need to be informed." Events include keystrokes, mouse clicks, and file modifications. The occurrences are generated by "event producers," and the programs which need to be informed are referred to as "event consumers." A simple example is asking a computer to calculate "2 + 2." The "2" and "+" keys are pressed and the program monitoring keystrokes informs the calculator program, which sends the answer, 4, to the monitor control program, which orders the monitor to display a "4." Each device could notify all others, but that would involve inefficient communication (especially as the chain of communication grows longer) and risk events being sent out of order. The '337 patent proposes a centralized system with specific structures to keep track of which programs are to be notified, to control the timing of notifications, and to distribute them to the relevant programs.

Claim 1 describes the storage, control, and distribution components of the event-management system, each component being described as a means-plus-function limitation tied to specific structures disclosed in the patent. *Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc.*, 296 F.3d 1106, 1113 (Fed. Cir. 2002). The "storing means" component of the system corresponds (meaning, as *Cardiac Pacemakers* explains, that the specification in the patent "must clearly associate the structure with performance of the function") to what is called the "sequential consumer database" (as well as to a "subscription matrix" not challenged in this motion). The sequential consumer database keeps track of which programs are to be informed of various events and the order in which they are to be informed. (Obviously the word "consumer" does not bear its usual meaning in this context.)

Motorola asks for a summary judgment ruling of noninfringement on the ground that the Android operating system, which runs on its allegedly infringing phones and tablet devices, has no sequential consumer database and thus cannot infringe the '337 patent's event-management method. Summary judgment is warranted if it is clear that the Android operating system lacks any structure identical or equivalent to the sequential consumer database described in Apple's patent. *Commonwealth Scientific & Industrial Research Organization v. Buffalo Technology (USA), Inc.*, 542 F.3d 1363, 1383 (Fed. Cir. 2008).

Apple points to Android structures—"mReceiverResolver" and "the mFilters set of the IntentResolver"—that it contends are equivalent to the sequential consumer database and subscription matrix described in its patent. Its expert, a professor of computer science skilled in the relevant art, opines that these structures are equivalent, and his extended analysis of the Android event-management structures is more than mere *ipse dixit*. Cf. *Tech Search, L.L.C. v. Intel Corp.*, 286 F.3d 1360, 1371 (Fed. Cir. 2002). A reasonable jury could find that the Android operating system's method of tracking event consumers infringes on the storage method disclosed in claim 1. Motorola's expert disagrees, but that creates a factual dispute rather than resolving it. See, e.g., *In re Gabapentin Patent Litigation*, 503 F.3d 1254, 1259–60 (Fed. Cir. 2007).

Motorola argues that its operating system lacks any structure corresponding to the third limitation of claim 1, which describes a "distributor means for receiving the event from the control means and directing said control means to distribute an appropriate event to an appropriate event consumer." Although structures corresponding to the distributor means were not identified during claim construction, the parties appear to agree that at least one requisite structure must be an API. An API, short for "Application Programming Interface," is a specification allowing various programs to communicate with each another. Since the claim describes communication between programs, an API is necessary to enable it. Apple's expert has opined that specific Android operating system elements are identical or equivalent to Apple's API described above. He has supported his opinion sufficiently to create a material question of fact about whether Motorola's products infringe the thrid limitation of claim 1.

Apple's motion for summary judgment regarding U.S. Patent No. 6,175,559 is denied in part and deferred in part

Apple has moved for a summary judgment ruling of invalidity or alternatively of noninfringement of Motorola's U.S. Patent Number 6,175,559 ("Method for Generating Preamble Sequences in a Code Division Multiple Access System"). The '559 patent discloses a method for generating "preamble sequences," which are numbers used to identify cellphones in a cellular division multiple access ("CDMA") system. CDMA enables multiple cellphones to transmit data to cellular towers using the same frequency, thus economizing on bandwidth; but it gives rise to a concern that simultaneous transmissions from multiple cellphones on the same frequency will interfere with each other. The '559 patent describes a method of generating preamble sequences that uses orthogonal codes (codes that minimize interference). The method helps a cellular tower identify, on the basis of the preamble sequence attached to each transmission it receives, which phone sent which transmission,.

Apple manufactures cellphones that communicate on CDMA networks. Motorola alleges that the cellphones' use of the CDMA standard requires preamble sequences to be generated in a manner that infringes its '559 patent. Apple ripostes that the '559 patent is invalid and alternatively that Apple's devices don't infringe the patent.

Apple argues that a preliminary application for U.S. Patent No. 7,173,919 (the Dabak patent) predates the '559 patent's filing date by 26 days and anticipates the method claimed in '559. A preliminary application can establish priority over a later-filed patent if it discloses sufficient detail to cover the latter patent's claims. 35 U.S.C. § 119(e); cf. *In re Giacomini*, 612 F.3d 1380, 1383 (Fed. Cir. 2010). But if Motorola can prove that the '559 patent was conceived before the Dabak application date, it regains priority. *Spansion, Inc. v. International Trade Commission*, 629 F.3d 1331, 1356 (Fed. Cir. 2010).

Motorola argues that the '559 patent was actually conceived on June 2, 1999, five days before the Dabak application was filed. It relies on a memorandum to the Motorola patent committee that contains a declaration by the inventor that June 2, 1999, was the date of conception. Apple disputes this evidence. But whatever the date, Motorola has raised significant doubts whether the preliminary Dabak application and subsequent patent sufficiently disclosed the method of the '559 patent "either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation." *Id.* at 1355–56; *Dewey & Almy Chemical Co. v. Mimex Co.*, 124 F.2d 986, 989 (2d Cir. 1942) (L. Hand, J.). The preliminary application is four pages long and does not mention the sequence generators discussed in the '559 patent. And Motorola has submitted an expert opinion (which I rule admissible over Apple's objection) that the Dabak application does not anticipate the '559 patent's claims in sufficient detail to invalidate that patent.

Apple next argues that claims 4 and 5 of the Motorola patent disclose only abstract mathematical manipulations. Mathematical formulae are unpatentable, 35 U.S.C. § 101, if divorced from a new and useful process. *Parker v. Flook*, 437 U.S. 584, 590–91 (1978). But the '559 patent's claims are expressly limited to the process of generating preamble sequences "in a CDMA system," and the '559 patent purports to improve this specific system. These limitations leave many uses of the mathematical formula in the public domain. *Id*.

Apple also requests summary judgment of noninfringement. It compares its phones' actual preamble generation process with the method claimed in the '559 patent and asserts, on the basis of differences between the two methods, that there is no direct infringement. The smallest unit of a preamble sequence is a binary chip. Apple's phones generate preambles chip-by-chip, combining the generated chips with a third number and transmitting the result before repeating the cycle. In contrast, the method disclosed in claims 1, 4, and 5 of the '559 patent consists of forming an outer code and an inner code and multiplying the two together. Read naturally the language of '559 implies generating the codes in their entirety before multiplying them together. But Motorola's expert has explained that one skilled in the art would know how to implement the method described in the '559 patent chip-by-chip, which, if true, revives Motorola's infringement claim.

Apple, however, notes other differences between its preamble generation system and that described in the '559 patent. Its system requires three numbers in its preamble generation system rather than the two claimed in the '559 patent and combines the numbers by means of an XOR operator (expressed in formal logic terms as "P or Q, but not both") rather than the multiplication operator ("P and Q"). And its inner and outer codes are based on single repeated codewords, while the '559 inputs are a "set of Hadamard codewords" and a "set of orthogonal codewords." (Hadamard codewords are a subspecies of orthogonal codewords.) But Motorola provides plausible explanations for why these differences are either insubstantial or illusory. *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*, 339 U.S. 605, 608 (1950). Since infringement under the doctrine of equivalents is a question of fact, *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1129–30 (Fed. Cir. 2011), and a jury could find Motorola's explanations convincing, I reject Apple's argument that no jury could find its products directly infringe the '559 Patent.

Apple further requests a ruling of no contributory infringement, based on Motorola's failure to identify a specific hardware or software component of Apple's devices that has no substantial use apart from uses that infringe the '559 patent. 35 U.S.C. § 271(c); *Ricoh Co. v. Quanta Computer Inc.*, 550 F.3d 1325, 1336 (Fed. Cir. 2008). Motorola responds that further third-party discovery is needed to identify such a componen. Having granted Motorola's request for further discovery pursuant to Fed. R. Civ. P. 56(d) (a request that was unopposed), I defer consideration of Apple's motion for summary judgment on contributory infringement until the discovery is completed.

Apple also wants me to rule that there has been no induced infringement. It argues that Motorola has presented no evidence of Apple's "specific intent to encourage another's infringement" of the '559 patent. 35 U.S.C. § 271(b); *DSU Medical Corp. v. JMS Co.*, 471 F.3d 1293, 1305 (Fed. Cir. 2006). But Motorola's expert identified Apple guides that instruct users how to operate their phones on CDMA networks, and that operation is alleged to infringe. A genuine issue of material fact is presented, barring summary judgment on this issue. *Fujitsu Ltd. v. Netgear Inc.*, 620 F.3d 1321, 1332 (Fed. Cir. 2010); *DSU Medical Corp. v. JMS Co.*, *supra*, 471 F.3d at 1305.

Apple's motion for summary judgment regarding the '559 patent's invalidity and also regarding direct infringement is therefore denied. Regarding indirect infringement the motion is denied in part and deferred in part, as just explained.

SO ORDERED.

Richard A. Posner

United States Circuit Judge,
Sitting by designation

January 16, 2012

ORDER
DATED MARCH 19, 2012

UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

APPLE INC. and NeXT SOFTWARE INC. (f/k/a NeXT COMPUTER, INC.),	)	
Plaintiffs,	)	No. 1:11-cv-08540
v.	)	
	)	Judge Richard A. Posner.
MOTOROLA, INC. and MOTOROLA MOBILITY, INC.,	)	
Defendants.	)	

ORDER OF MARCH 19, 2012

On the basis of the hearing on claims construction that I conducted on March 12, 2012, and the parties' briefs, I adopt the following claims constructions. Cf. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 978–79 (Fed. Cir. 1995) (en banc), affirmed, 517 U.S. 370 (1996). This is the second round of claims construction in this litigation; the first was conducted by Judge Crabb before she transferred the case to me. See *Apple, Inc. v. Motorola, Inc.*, No. 3:10-cv-00662 (W.D. Wis. Oct. 13, 2011).

Apple's U.S. Patent No. 6,493,002

Apple's '002 patent ("Method and Apparatus for Displaying and Accessing Control and Status Information in a Computer System") covers the well-known control strips and toolbars found in personal computer operating systems. The purpose of a toolbar is to provide the user with easy access to basic information about his device, such as its sound volume level or internet connection, in a single location. The parties propose competing constructions of four terms that pertain to characteristics of the covered toolbars and the underlying programming.

The first term is "programming module." Claim 1 of the patent describes:

> a window generation and control logic…to create an operating environment for a plurality of individual *programming modules* associated with different application programs that provide

> status and/or control functions, wherein the window generation and control logic generates and displays a first window region having a plurality of display areas…and wherein each of the plurality of display areas is associated with one of the plurality of individual *programming modules* (emphases added).

The nontechnical reader confronted with this textual edifice sees through a glass, darkly; but the parties agree that "programming module" refers to computer code, and their disagreement appears to be a narrow one. Apple says the term denotes "a self-contained unit of code," while Motorola says it denotes "a program file (or files) associated with the control strip that contains the code necessary to perform the module's specified functions."

The parties appear to agree that "programming module" refers to a body of software code that is sufficient in itself to perform some task. Apple's definition is consistent with one of the common meanings of "module" in ordinary use: a distinct component of a larger system that performs a given task and is interchangeable with other components (that is, other modules). Motorola's proposal would limit programming modules to those chunks of code that constitute full program files. The parties don't define "program file," and as Apple's definition seems correct and Motorola has failed to explain what it means by "full program files," I adopt Apple's definition.

The next term to be construed is "implemented in a window layer that appears on top of application programming windows that may be generated." The parties' proposals aren't easy to distinguish on the semantic level: compare Apple's "when generated, the first window region appears in a window layer that is in front of active application windows," with Motorola's "implemented in a specific layer such that the first window and associated display areas, while generated, are always on top of and cannot be obscured by any application windows that may be generated."

I construed this phrase of the '002 patent in my January 25, 2012, summary judgment order, when I said that "a toolbar is a window that, when it appears at all, appears in a top 'window layer' that other windows—those displaying files or running programs—cannot overlap or block though they can overlap one another." I added that the asserted claims "do not require that that the window be always visible but only that it appear on top of other windows and never be obstructed when it is generated." Most windows in common operating systems can be partially obstructed by other windows; a key feature of the toolbar, distinguishing it from other windows, is that it cannot be *partially* blocked by other windows; such obstruction would interfere with its function of conveying information to the user in one convenient location. The toolbar is always on top of other windows in the sense that it cannot be partially obstructed by another window; but of course by opening certain programs, from the toolbar or elsewhere, the user can make the toolbar disappear completely while that program is open.

I reject both parties' proposals and adhere to my own, as set forth in the previous paragraph.

The third term is "interactive display activity," but at the claims construction hearing the parties informed me that the term's meaning is no longer disputed; the parties' proposed definitions were similar, and they have agreed to accept Apple's construction: "enabling at least one of the display areas and associated programming modules to be responsive to user output."

The fourth term is "message-based communication." Apple proposes the construction "communications that do not require immediate action by the recipient." Motorola counters with "a method of communication that involves passing a specific data structure ('message') from one component to another component to either tell the receiving component what to do or to obtain information about the receiving component." At the claims construction hearing, however, both parties conceded that neither proposed construction is particularly satisfactory, and seemed to agree that the term "message-based communication" is more straightforward than either proposal. I construe "message-based communication" to mean "communication that contains a message."

Apple's U.S. Patent No. 6,343,263

The parties seek construction of two terms in Apple's '263 patent ("Real-Time Signal Processing System for Serially Transmitted Data"), which describes a data-transmission system that performs realtime signal processing on serially transmitted data. The system is made up of two subsystems—a "host central processing unit" and a "realtime signal processing subsystem"—connected by a realtime application program interface, or "realtime API." As described in my order of January 25 construing the claim term "realtime API," the invention functions as follows: If an application running on the host subsystem needs "realtime services"—voice or video-image processing, for example—the host tells the realtime API, which in turn requests realtime data processing from the realtime signal processing subsystem. The realtime API then provides the realtime signal processing subsystem with signal-processing parameters supplied by the host.

In my January 25 order I adopted Apple's proposed construction of realtime API—"[an] API that allows realtime interaction between two or more subsystems"—rejecting Motorola's proposed construction: "[an] API facilitating constant bit rate data handling." I observed that there was no disagreement over the meaning of "realtime," as both parties accepted the definition in Philip A. Laplante, *Real-Time Systems Design and Analysis: An Engineer's Handbook* 10 (1993): to be "realtime" a system "must satisfy explicit (bounded) response-time constraints or risk severe consequences," namely degraded performance. (The parties have not been able to explain what "bounded" adds to "explicit," but the precise meaning of these terms is not germane to the constructions.)

Now the parties ask me to construe the terms "realtime signal processing subsystem" and "realtime services." The latter term requires no construction, given the parties' agreement on the meaning of "realtime." As for "realtime signal processing subsystem," the patent specifies that the invention contains "a real-time data engine [the realtime signal processing subsystem] for processing isochronous streams of data." The word "isochronous" means transmitted at a constant bit rate. So the realtime signal processing subsystem must be capable of constant bit rate handling. But it doesn't follow that Motorola's proposed construction—"a subsystem that has explicit (bounded) response-time constraints and must assure constant bit rate handling of data"—is correct. The patent specification doesn't limit the realtime subsystem's handling capabilities to isochronous data; it purports instead to cover any type of data delivered over any type of transmission medium, including data transmitted at a variable bit rate ("asynchronous" streams of data). Motorola's proposed construction, in implying that the response-time constraints to which the realtime signal processing subsystem is subject must be internally imposed, is also inconsistent with language in the specification to the effect that the realtime API—a distinct component of the invention—supplies the realtime subsystem with its processing parameters.

I therefore construe "realtime signal processing subsystem" in claim 1 of the '263 patent to mean "subsystem that processes data subject to explicit (bounded) response-time constraints and is capable of handling data transmitted at a constant bit rate."

Apple's U.S. Patent No. 5,566,337

Apple's '337 patent ("Method and Apparatus for Distributing Events in an Operating System") describes a centralized method for alerting components in a computer of developments ("events") elsewhere in the system. The inventor, taking full advantage of his license to be his own lexicographer, *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996), has assigned many idiosyncratic meanings to commonly used words in the patent. The computer component generating the event is called a "producer" and the component to be notified is called the "consumer." The system receives events from producers, consults its database of consumers to be alerted for each type of event, and notifies the appropriate consumers of each event in the correct order.

The first two terms for construction appear in claim 1, which describes in relevant part:

> a system for distributing events comprising:
> storing means for storing a specific set of events of which said at least one event consumer is to be informed;
> *event manager control means for receiving the event from the event producer, comparing the received event to the stored set of events, and distributing an appropriate event to an appropriate event consumer*; and
> *distributor means for receiving the event from the control means, directing said control means to distribute an appropriate event to an appropriate event consumer* (emphases added).

Both the "event manager control means..." and the "distributor means ..." are means-plus-function claims. 35 U.S.C. § 112, ¶ 6. For each I must therefore identify the claimed function and the structure disclosed in the '337 specification that implements the claimed function. *Biomedino LLC v. Waters Technologies Corp.*, 490 F.3d 946, 950 (Fed. Cir. 2007). When the claimed function is to be performed by a computer, the corresponding structure is the algorithm that enables the processor to perform the function, rather than the computer itself. *Dealertrack Inc. v. Huber*, Nos. 2009-1566, 2009-1588, 2012 WL 164439, at *11–12 (Fed. Cir. Jan. 20, 2012); *Aristocrat Technologies Australia Pty Ltd. v. International Game Technology*, 521 F.3d 1328, 1332–33 (Fed. Cir. 2008); see also *In re Katz Interactive Call Processing Patent Litigation*, 639 F.3d 1303, 1314–15 (Fed. Cir. 2011); *Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1249 (Fed. Cir. 2005).

The parties agree that "event manager control means..." claims the function "receiving the event from the event producer, comparing the received event to the stored set of events, and distributing an appropriate event to an appropriate event consumer." Apple contends that the corresponding structure is the "event manager control unit [listed in Figure 2 of the '337 patent] consist[ing] of at least one software routine which manages the event manager data structures." The control unit is the computer itself. *Harris Corp. v. Ericsson Inc., supra*, 417 F.3d at 1254. The "software routine which manages the event manager data structures" sounds like an algorithm, but as it says nothing about how the control unit (the computer) receives, compares, and distributes events, it is equivalent to claiming that a computer with "appropriate programming" is the relevant structure, a gambit that the Federal Circuit rejected in *Aristocrat Technologies Australia Pty. Ltd. v. International Game Technology*, *supra*, 521 F.3d at 1334. I therefore reject Apple's proposed construction.

Motorola's proposed construction incorporates the '337 patent specification's description of how the event manager control unit performs the event receipt, comparison, and distribution functions. Though based in part on the specification's discussion of an embodiment, that embodiment is the only one disclosed that describes how the event manager control unit functions. Cf. *Nomos Corp. v. Brainlab USA, Inc.*, 357 F.3d 1364, 1368-69 (Fed. Cir. 2004). The quid pro quo for means-plus-function claiming is being bound by the structural details of the specification, including embodiment descriptions, and Motorola's construction appropriately narrows the event manager control unit's algorithm.

Motorola further proposes that the structure of the event manager control means includes APIs ("application programmer interfaces"—code that enables communication between software components) for enabling a producer to submit events, enabling consumers to register as either broadcast or sequential consumers (these terms are construed below), and distributing event notifications to event consumers. Because the claimed function clearly contemplates communication between producers, consumers, and the event control means, and the API discussion beginning at column 10:16 provides the only explanation of how these APIs would facilitate that communication, I agree that they too are part of the event manager control unit's algorithm.

I therefore accept Motorola's proposal that the structure applicable to the claimed event manager control means is the algorithm that controls the event manager control unit listed as 305 in Figure 2 of the patent. And I agree with Motorola that the details of that algorithm are set forth in the sections of the specification that it cites in its proposed construction. I caution, however, that Motorola's actual proposed construction will not be intelligible to a jury evaluating the '337 patent, and will have to be substantially simplified before I will permit it to be presented to a jury.

The second term for construction is the "distributor means...," which the parties also agree is a means-plus-function claim. And they agree that it claims the function of "receiving the event from the control means and directing said control means to distribute an appropriate event to an appropriate event consumer." This too is a computer-implemented function and the appropriate structure is the algorithm that enables the processor to perform the function.

I reject Apple's proposal that the appropriate structure is "software instructions that moderate the connection between producers and consumers of an event" for the same reasons I rejected its proposal for the first term. "Software instructions" doesn't identify a structure found in the specification of the '337 patent.

I accept Motorola's proposal that the structure includes event distributors for each event type, which control communication with broadcast consumers and are controlled by an algorithm that performs the steps visualized in Figure 9D and described in Motorola's citations to the '337 specification. I also accept Motorola's contention that the structure applicable to the claimed distributor means includes APIs that enable communication with third-party distributors and thus allow the '337 system to handle new event types. The specification states at column 10:18–26 that "according to the present invention," the distributors may be written by third parties, and goes on to define APIs "which allow[] these third parties to communicate with the event manager." The prefatory clause means that every incarnation of the invention envisions communication with third-party distributor modules. *Honeywell Int'l, Inc. v. ITT Industries, Inc.*, 452 F.3d 1312, 1318 (Fed. Cir. 2006). APIs are necessary to facilitate communication with those modules, and are included in Motorola's proposed description of the structure. As before, although I adopt Motorola's proposed structure for the "distributor means" claim, it will have to be substantially simplified before it is presented to a jury.

Claim 3 of the patent contains terms "broadcast consumer" and "sequential consumer." Claim 6, which Apple asserts in this case, is based on claim 3, which describes:

> The system according to claim 1, wherein a plurality of event consumers are included in the computer and the plurality of consumers comprise:
>
> *broadcast consumers* having no relationship with other consumers, the broadcast consumers operating independently of other consumers and of the order in which consumers are informed of the event; and
>
> *sequential consumers* having relationships with other consumers, the sequential consumers requiring that no other consumer be told about an event while they themselves are processing the vent and having an ability to influence when they receive the event relative to the other consumers (emphases added).

Neither term appears in a means-plus-function claim, so the general principles of patent claim construction apply. Apple's proposal that a broadcast consumer "has no relationship with other consumers" and a sequential consumer "requires that no other consumer be told about an event while it is still processing the event" adds nothing. Motorola proposes that a broadcast consumer is one "that has registered to receive events of a given event kind via a broadcast mode of distribution and will receive the event via a broadcast mode of distribution" and a sequential consumer is one that "has registered to receive events of a given kind via a sequential mode of distribution and will receive the event via a sequential mode of distribution." This narrows Apple's definition by clarifying that consumers of each type must register to receive, and in fact receive, event notifications through either the broadcast or sequential type of event notification.

This limitation is supported by the specification's description of the invention. The specification describes "the present [i.e. '337] invention" as allowing a program to "subscribe as a sequential consumer for some kinds of events and as a broadcast consumer for other kinds of events." Columns 6:48, 7:22–25. Subscription is synonymous with registration. Motorola finds no similar support in the specification for its requirement that the broadcast and sequential consumers actually receive event notifications through those particular forms. Its specification references for this limitation are either unresponsive or focused on a particular embodiment of the '337 invention, which is an improper foundation for claim limitations outside the means-plus-function context.

I therefore conclude that a broadcast consumer is "a consumer that has registered to receive events of a given event kind via a broadcast mode of distribution" and a sequential consumer is "a consumer that has registered to receive events of a given event kind via a sequential mode of distribution."

Apple's U.S. Patent No. 5,946,647

Apple's '647 patent ("System and Method for Performing an Action on a Structure in Computer-Generated Data") describes a system that recognizes phone numbers, email addresses, dates, and other patterns in text, and presents the user with a menu of actions that can be performed on the relevant data. For example a smartphone practicing the '647 system could recognize a phone number in a text message and present the user with a menu asking whether he would like to call the phone number or store it in his address book.

The '647 system relies on an "analyzer server" component that is programmed to recognize a wide range of data patterns (the patent calls these patterns "structures") in data from a wide range of files, such as text messages, emails, and web pages. Applications submit documents to the analyzer server for detection of structures and for linking. After the analyzer server recognizes structures in a document, it links each structure to operations (called "actions") commonly performed on data of that type (such as linking phone numbers to the functions for calling or storing phone numbers). It then returns the document and links to the application that submitted it.

A benefit of the '647 system is that the analyzer server performs the pattern recognition and linking before the user actually requests any of it. That's useful because it reminds the user of the actions available and relevant to, say, a phone number, in a convenient list next to it in the document. So even if the user hadn't thought to call the number, the option to do so (and to do so without having to write down the number and then retype it into the phone application) is presented to him.

The parties request construction of two terms in claim 1 of the patent. Claim 1 describes "a memory storing information including program routines including an *analyzer server* for detecting structures in the data, and for *linking actions to the detected structures...*" (emphasis added).

The "analyzer server" performs the core functions of the '647 system, namely structure detection and linking. Apple describes the analyzer server as "a program routine(s) that receives data, uses patterns to detect structures in the data, and links actions to the detected structure." Motorola proposes that it is "a server routine separate from a client that receives data having structures from the client." Under Apple's interpretation, any set of routines that performs structure detection and linking would be an analyzer server. But that is just a definition of an "analyzer." "Server" becomes superfluous, as Apple's expert implicitly acknowledges by stating that "the inventors used ['server'] in a generic sense intending to describe a *service* that includes various functionalities." That understanding renders any piece of code a "server."

Motorola interprets "server" to mean a client-server relationship between the analyzer server and the applications that request structure detection and linking. The '647 specification supports this understanding by visualizing the "program" (item 165) that contains the analyzer server as a separate box from the "application" (item 167), which submits a data file to the program for structure detection and linking. Had the patent intended the analyzer server to be integrated into the application, rather than separate, the program box would logically appear inside the application box in Figure 1.

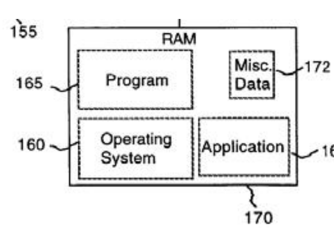

FIG. 1

Also, Motorola's construction entails that the analyzer server is a single routine. Apple's expert states that multiple routines would be necessary to implement '647's functions. "Routine" seems to be used imprecisely throughout this litigation, but the parties haven't requested construction. Routines often consist of subroutines--and in fact the '647 patent describes the analyzer server as a subroutine (Column 2:26), indicating that the inventor had a broader conception of the term "routine" than either party. In the present context "routine" is synonymous with "module" or "component," all of which describe a piece of programming necessary to perform a specific function; routines consist of subroutines, and I find nothing wrong with describing the analyzer server as one routine.

I therefore construe "analyzer server" to mean "a server routine separate from a client that receives data having structures from the client."

The second term for construction, also in claim 1, is "linking actions to the detected structures." Apple proposes that this means "associating detected structures to computer subroutines that cause the CPU to perform a sequence of operations on the particular structures to which they are associated." Motorola proposes "creating a specified connection between each detected structure and at least one computer subroutine that causes the CPU to perform a sequence of operations on that detected structure." The constructions diverge on two points.

One is the interpretation of "linking." Apple interprets it to mean "associating." Motorola requires the creation of "a specified connection" from the structure to the code that performs the associated action. The '647 specification states that "upon detection of a structure, analyzer server links actions associated with the responsible pattern to the detected structure, using conventional pointers." A term of art in computer engineering, a "pointer" stores a computer memory address. Linking by pointers thus entails storing the memory address of the code that performs the action relevant to the recognized structure. The analyzer associates structures with actions, as Apple contends (which explains the repetition of "associating" in proximity with "linking" in the specification, but doesn't establish that they are one and the same). But '647 makes clear that linking is accomplished through pointers. Motorola's explanation of pointers—a concept that Apple's brief ignores—convinces me that such linking constitutes a "specified connection."

Second, Motorola's construction requires "at least one" action to be linked to each detected structure. Citing the consistent reference to actions (plural) throughout the claims and specification of '647, Apple argues that two or more actions must be linked to each structure. But Figure 4 of the patent, which contemplates an analyzer that links dates to just one action—"put in electronic calendar"—undermines this interpretation. And the ability to link a structure to a single action still comports with the patent's plural reference, so long as other structures are linked to other actions. An analyzer that links dates to the calendar and phone numbers to the phone book still "links structures to actions."

I therefore adopt Motorola's proposal for the term "linking actions to the detected structures."

Apple's U.S. Patent No. 5,519,867

Apple's '867 patent ("Object-Oriented Multitasking System") discloses a "wrapper" for procedural operating systems that enables object-oriented applications to access procedural operating system services. This permits these otherwise incompatible applications and systems to communicate with one another.

The parties submitted for construction four mean-plus-function claims from this patent. One is "means for storing said executable program logic in an object-oriented class library." When construing a means-plus-function claim, the first step is to determine the function identified by the claim term. Motorola argues that the function tracks the claim language: its proposed construction is "storing said executable program logic in an object-oriented class library." In its claim chart and at the hearing, Apple countered that the function is merely "storing said executable program logic." But a footnote in its brief disclaims any "meaningful dispute" with Motorola over function. I agree with Apple's latter characterization and adopt Motorola's proposed construction. The claim requires not just that the executable program logic be stored, but that it be stored in a specific location. The claim's locational condition thus limits the scope of the claimed function; and the Federal Circuit holds that "the function of a means-plus-function claim must be construed to include the limitations contained in the claim language." *Lockheed Martin Corp. v. Space Systems/Loral, Inc.*, 324 F.3d 1308, 1319 (Fed. Cir. 2003).

Apple needed the function to be truncated in order to free up the object-oriented class library to serve as its structure, "one or more object-oriented class libraries, which contain executable program logic." (The truncation is omitting "in an object-oriented class library" from its proposed function.) But a means-plus-function claim states a function "without the recital of structure," which instead must be disclosed in the specification. 35 U.S.C. § 112, ¶ 6; *Envirco Corp. v. Clestra Cleanroom, Inc.*, 209 F.3d 1360, 1365 (Fed. Cir. 2000); *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 531 (Fed Cir. 1996). So Apple's proposed structure won't work.

Motorola argues that no structure is disclosed in the specification, rendering this limitation indefinite and claim 1 invalid. To identify structure, one asks: "What performs the claimed function?" If the function is "storing…executable program logic in an object-oriented class library," the pertinent question is, "What performs (or carries out) the storing in a class library?" Apple's answer—"object oriented class libraries, which contain executable program logic"—is wrong both for the reason described above (structure can't appear in the claim language) and because it doesn't make sense linguistically (under Apple's proposed construction, the claim would effectively read, "class libraries containing executable program logic for storing executable program logic in a class library").

Claim 1 is therefore invalid because the specification discloses no structure corresponding to "means for storing said executable program logic in an object-oriented class library." Having found claim 1 to be invalid, I need not construe the other three terms submitted by the parties for construction. A single indefinite limitation invalidates an entire claim. E.g., *NetMoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1366–67 (Fed. Cir. 2008). The other three claims submitted for construction all appear in claim 1, which I have just ruled indefinite under 35 U.S.C. § 112, ¶ 2, so no purpose would be served by my construing them.

Apple's U.S. Patent No. 7,479,949

Apple's '949 patent claims "heuristics" for translating a user's finger movements on a touch screen device (such as an iPhone or iPad) into computer commands, for instance to scroll up or to shift the location of an on-screen item. Claim 1 claims heuristics for determining whether the user wants to scroll vertically or shift the view diagonally "based on an angle of initial movement of finger contact" and a heuristic for translating finger movements into commands to switch from one item to the next, as when the user is flipping through a series of digital photos. Claim 2 claims a heuristic for determining whether the user intends to move an on-screen item rather than shift the frame of view itself. Claim 10 claims a heuristic, similar to the first one mentioned, for distinguishing between commands to scroll horizontally and commands to shift the view diagonally, again "based on the angle of initial movement of the finger contact." In my January 16 summary judgment order I rejected Motorola's argument that the term "heuristics" is indefinite and stated that Apple's definition of that word—"one or more rules to be applied to data to assist in drawing inferences from that data"—is correct.

The phrase "based on the angle of initial movement of the finger contact" is the first term to be construed. Apple urges that the phrase is clear as it stands and needs no construction, but in the alternative urges the construction "based on at least the detected direction of initial movement of the finger contact with respect to the X-Y plane." Motorola's interpretation is "using the angle of the initial movement of a finger contact as the sole criteria [*sic*]."

Apple is right that this phrase needs no construction; it is just a slightly clunky way of saying that the heuristic allows the device to determine what the user wants to do, using as one input the angle at which he has swiped his finger on the touch screen—more specifically, the angle at which his swipe began ("the angle of initial movement"). Motorola wants me to construe "based on" to mean "based exclusively on." Motorola's interpretation is contrary to the usual usage of the phrase "based on," which does not exclude other possible bases for the decision.

I decline to construe the phrase "based on the angle of initial movement of the finger contact"; it's okay as is.

A second issue is Motorola's argument that claims 1, 2, and 10 are "means plus function" claims, see 35 U.S.C. § 112, ¶6, and that the patent specification fails to provide the structure necessary to perform the claimed functions.

The claims are as follows:

> **1.** A computing device, comprising: a touch screen display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including: instructions for detecting one or more finger contacts with the touch screen display; instructions for applying one or more heuristics to the one or more finger contacts to determine a command for the device; and instructions for processing the command; wherein the one or more heuristics comprise:
>
> > *[1] a vertical screen scrolling heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command rather than a two-dimensional screen translation command based on an angle of initial movement of a finger contact with respect to the touch screen display;*
> >
> > *[2] a two-dimensional screen translation heuristic for determining that the one or more finger contacts correspond to the two-dimensional screen translation command rather than the one-dimensional vertical screen scrolling command based on the angle of*

> *initial movement of the finger contact with respect to the touch screen display;*
>
> and *[3] a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.*
>
> **2.** The computing device of claim 1, wherein the one or more heuristics include *[4] a heuristic for determining that the one or more finger contacts correspond to a command to translate content within a frame rather than translating an entire page that includes the frame.*
>
> **10.** The computer device of claim 9, wherein the first set of heuristics comprises *[5] a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command rather than the two-dimensional screen translation command based on the angle of initial movement of the finger contact with respect to the touch screen display.*

Motorola argues that each of the five italicized portions (I've numbered them for ease of reference) describes a function and that no structure for performing these functions is described in either the claim or the specification. If Motorola is correct on both points, the claims are invalid.

Are the quoted claim terms indeed means-plus-function terms? The usual format for a means-plus-function term includes the word "means" immediately prior to the description of the function, and that word is absent from the quoted claims. So there is a presumption that these are not means-plus-function limitations. But the presumption is rebutted if "the claim term fails to 'recite sufficiently definite structure' or else recites 'function without reciting sufficient structure for performing that function.'" *Invento AG v. Thyssenkrupp Elevator Americas Corp.*, 649 F.3d 1350, 1356 (Fed. Cir. 2011), quoting *CCS Fitness v. Brunswick Corp.*, 288 F.3d 1359, 1369 (Fed. Cir. 2002).

The quoted claims cover various functions, each of which can be described as the translation of a user's finger movements into computer commands. Do the quoted claims recite sufficient structure to perform the claimed functions? Apple points out that claim 1, from which the others ultimately depend, describes a computing device and lists the generic components of a generic touch screen computer. It's true that a touch screen computer is the device on which the claimed functions can be performed. But patents that claim a means for performing a computer-implemented function must, as I noted earlier, disclose the algorithm, or "step-by-step process," for performing that function—that is the "structure" required by the statute. The touch screen device is not itself a step-by-step method for translating a user's finger movements into particular computer commands. And while disclosure of the actual code that would perform the translations is unnecessary if a person of ordinary skill in the art would be able without difficulty to write a program to execute the described algorithm, *Medical Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1214 (Fed. Cir. 2003), the claims at issue do not describe an algorithm that would be executed by the code. It is inherent in the concept of a touch screen computer that the user would want to enter commands to tell it to do things, that he would enter those commands by moving his fingers on the touch screen, and that the device would need to apply some set of rules to a given finger input to determine which command was intended. Apple's patent cannot cover every means of performing the function of translating user finger movements into common computer commands on a touch-screen device—that would be a patent on all touch-screen computers.

The patent does provide a bit more detail as to three of the five functions that I italicized; it instructs on translating finger movements into commands based on the angle at which the user moves his fingers on the touch screen. But as I said in my January 16 summary judgment order, to say that a heuristic determines what a user wants to do based on his angle of finger movement hints at a step-by-step algorithm as required by *Aristocrat Technologies* but does not actually describe one; and two of the italicized terms, [3] and [4], don't even provide that much information. Because the claims describe functions without describing the structure necessary to perform the functions, these are means-plus-function claims despite not using the word "means."

The question is therefore whether the specification recites sufficient structure for the functions in claims 1, 2, and 10. In my January 16 summary judgment order I accepted Apple's argument that Figure 39C adequately specifies structure for the limitations that I numbered [1] and [2]. Motorola ignores my holding and makes the same arguments that I rejected at summary judgment.

The parties have not briefed the question whether the specification contains enough structure to justify the other limitations. The parties shall file simultaneous briefs on this question by March 26.

Motorola's U.S. Patent No. 6,175,559

Motorola's '559 patent ("Method for Generating Preamble Sequences in a Code Division Multiple Access System") concerns the creation of numerical "preamble codes" that precede cellular transmissions and identify the transmitting cell phone to the receiving tower. Verifying the source of each transmission is important because, in a CDMA phone system, multiple cell phones communicate with a tower on the same frequency. The preamble code is created by mathematically combining two strings of binary bits: an "inner code" that identifies the transmitting phone and an "outer code" that identifies the recipient tower. When the tower receives a transmission it runs the combination algorithm in reverse to extract the inner code (since it knows its own outer code) and thus identify the source of the transmission.

Both claim terms for construction relate to the '559 method for generating the inner code, which identifies the sending cell phone. The inner code is itself made up of individual "codewords" (actually series of digits, not letters) each a much shorter string of binary bits. Those codewords are "orthogonal" if, when two codewords are compared bit-by-bit, the number of matching bits is equal to the number of non-matching ones (in other words, if you multiply the corresponding elements of two codewords and then add the results, you get zero). For example, the code words {1, 1, -1, -1} and {1, -1, 1, -1} are orthogonal to each other because 1*1 + 1*(-1) + (-1)*1 +(-1)*(-1) = 1+(-1)+(-1)+1 = 0, whereas the codeword {1, 1, 1, -1} would not be orthogonal to either of them. And a codeword is never orthogonal to itself since all bits match, meaning that each corresponding term will multiply to 1, and so the sum of those terms will not equal zero. Orthogonal codewords are (among other properties) unique, which furthers the inner code's function of differentiating cell phones transmitting on the same channel.

Claim 4 of the '559 patent is "A method for generating preamble sequences in a CDMA system in accordance with claim 1, *wherein the inner codes comprise a set of Hadamard code words*" (emphasis added). Hadamard codewords are a class of codewords each of which is orthogonal to all the others. The parties request construction of passage in the claim that I've italicized. Motorola proposes "wherein the inner codes for the preamble sequences are taken from a set of Hadamard code words." Apple proposes "wherein the inner codes contain at least one Hadamard code word." Their dispute boils down to a disagreement over the term "comprise."

When it appears in a patent claim, "comprise" is generally understood to mean "including but not limited to." E.g., *Exergen Corp. v. Wal-Mart Stores, Inc.*, 575 F.3d 1312, 1319 (Fed. Cir. 2009); *Manual of Patent Examining Procedure* § 2111.03, p. 2100-44 (8th ed., revision 6, Sept. 2007), www.uspto.gov/web/offices/pac/mpep/mpep_e8r6_2100.pdf (visited March 13, 2012). Motorola's construction interprets comprise to mean "taken from" or "made from" or "derived from," all of which are far afield from the meaning quoted in *Exergen* and the patent examiner's manual. Although the patentee can supply his own definition for a patent term, *Vitronics Corp. v. Conceptronic*, *supra*, 90 F.3d at 1582, nowhere in the specification or claim terms does the '559 redefine comprise to take on this idiosyncratic meaning, so its ordinary meaning in patent law governs. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc).

Apple's definition equates "comprise" with "contain at least one," which comports with the term's common definition. It's true that Apple's construction may exclude the embodiments disclosed in the '559 patent specification at column 4:5–21, which contemplate inner codes taken from Gold codes, or codes subjected to certain manipulation techniques (upsampling and quadrature transformations, the details of which are irrelevant to construing this claim). While there is a strong presumption against constructions that have the effect of excluding embodiments specified in the patent, *In re Katz Interactive Call Processing Patent Litigation*, *supra*, 639 F.3d at 1324, the embodiments excluded by Apple's construction in this case are limited to "alternate embodiments," some of which may be excluded under Motorola's proposal as well (for example, "In an alternate embodiment of the present invention, the code words are taken from a set of orthogonal Gold codes"—Gold codes aren't taken from Hadamard codes.). Apple's construction includes the '559 patent's preferred embodiment, and the cases upon which *In re Katz* relies caution against construing a claim to exclude the preferred embodiment but are silent on the subject of alternates.

I therefore accept Apple's proposal that "wherein the inner codes comprise a set of Hadamard code words" in claim 4 of the '559 patent means "wherein the inner codes contain at least one Hadamard code word."

Claim 5 of the '559 patent describes a particular method for selecting and combining the codewords to create the inner code. It claims, in relevant part, the method of:

> forming an inner code in the mobile station utilizing the following equation:
>
> $$c_i(k) = \sum_{j=0}^{M-1} s_j(k - jP)$$
>
> *where s_j, j=0,1, … , M-1 are a set of orthogonal codewords of length P, where M and P are positive integers*... (emphasis added).

The claim construction dispute turns on whether the set of codewords forming the inner code (*s* in the claim's terminology) must contain orthogonal elements, as Apple proposes, or whether it just must be drawn from a set of orthogonal elements, as Motorola posits. The constructions diverge when each draw from the set of orthogonal codewords is a repeat of the last one, resulting in a set entirely of repeats. Such a set contains no orthogonal elements, since a codeword, as explained above, cannot be orthogonal to itself. Motorola's construction encompasses such a set, while Apple's does not.

Motorola's construction requires that the disputed term in claim 5 cover all sets of codewords "taken from a set of orthogonal codewords of length P." This includes the preferred embodiment, which describes drawing the inner code's component codewords from a set of Hadamard codewords. (Each element of the Hadamard set is orthogonal to every other). And the set of drawn codewords needn't all be unique—the specification makes this clear at column 3:57; there can be repeats. Permitting repeats might not be thought wholly inconsistent with the requirement that the drawn set be "orthogonal," because a set containing some identical, hence non-orthogonal, codewords as well as some different ones might still be described as "a set of orthogonal codewords if the latter predominated. But a set consisting *entirely* of repeats contains no elements orthogonal to each other, and so it cannot be "a set of orthogonal codewords."

Consider {A, B, C, D} to represent four Hadamard codewords. (In reality each Hadamard code word is a collection of 1's and -1's, but I represent each codeword as a letter for simplicity's sake. A is orthogonal to B, C, and D, but not to itself.) Motorola argues that the set {A, A, A, A, A} is still "orthogonal" in the sense that it is orthogonal to a set that repeats a different Hadamard codeword, {B, B, B, B, B} for example. This would be more convincing if claim 5 covered "an orthogonal set of codewords," but in fact it claims "a set of orthogonal codewords," suggesting that the words, not the series, must be orthogonal. There is no intra-set orthogonality in {A, A, A, A, A}.

Apple's proposed construction—"the codewords consist of one or more codewords... wherein if there are more than one codwords, at least two must be orthogonal to each other"—comports with an ordinary understanding of these terms and is correct.

Motorola's U.S. Patent No. 6,359,898

Motorola's '898 patent ("Method for Performing a Countdown Function During a Mobile-Originated Transfer for a Packet Radio System") describes a method for efficiently allocating channels in a wireless communications system, such as a cell phone or Wi-Fi network. Wireless data transmissions are transmitted in small increments of time called "frames." Each frame includes eight "time slots"—those are the channels. Each time slot transmits one block of data per frame, so a total of eight blocks are transmitted per frame. A network can allocate its time slots to different signals from mobile units (such as cell phones or Wi-Fi capable devices), either allocating each time slot to a different mobile unit or allocating multiple time slots to a single mobile unit. A time slot allocated to a given mobile unit transmission will transmit one block per frame until the transmission is completed; hence the more time slots that are allocated to a given transmission, the faster it will be completed. For example, a transmission of 10 blocks will require 10 frames if the signal is allocated only a single time slot, but will require only 5 frames if it is allocated 2 time slots.

When a transmission is completed, the mobile device no longer needs time slots and the network must reallocate them to other devices that still have data to transmit. The overall speed of the network depends on its being able to perform this reallocation with minimal downtime between the completion of one transmission on a given time slot and the beginning of another. Channel and processing delays create a lag time of several frames, so the network needs advance warning of a transmission's impending completion if it is to reallocate its time slots without downtime. A cell phone or other device can give advance warning by indicating in each frame the number of blocks remaining in the transmission. The '898 patent claims methods for providing this "countdown," particularly in cases in which multiple time slots are allocated to a single signal.

The parties debate the construction of the word "predetermined" in the term "predetermined number of channel resources," which appears several times in claims 1, 2, and 5. Claim 1 is "transmitting the plurality of units of information [the data blocks] via a predetermined number of channel resources [the time slots]" and "based on the predetermined number of channel resources, adjusting the number of the plurality of units remaining to produce an adjusted number of units remaining"—in other words, dividing the number of data blocks by the number of time slots to yield the number of frames remaining in a transmission; that countdown number can be transmitted to the network in each frame to enable the network to reallocate the time slots as soon as the countdown reaches zero.

Apple argues that "predetermined number of channel resources" requires that the number of time slots (channel resources) be "determined at the beginning of the transmission of the communication signal and…cannot be changed during the transmission of the communication signal." Motorola urges that "predetermined" just means that the number is determined "before transmission of the units of information." So the question is whether the number of time slots is determined before the entire transmission (Apple's position), or just before some group ("plurality") of blocks, of which a transmission could contain many (Motorola's position).

Motorola's proposed construction is correct: "transmitting the plurality of units of information via a predetermined number of channel resources" implies only that the number of time slots is determined before transmission of blocks, not that it has to be determined before any portion of the message is transmitted. The fact that the claim says "the" plurality rather than "a plurality" may seem to imply all the blocks. But that is not correct. The claim says "a plurality" first, and then later says "the plurality" to make clear, by use of the definite article, that it is referring to the same "plurality" that had already been mentioned; and then it refers to "the plurality of units remaining," presumably a subset of "the plurality of units" that is, because only a subset, smaller than the transmission as a whole. Here is the language: "1. In a wireless communication system, a method for transmitting a communication signal comprising *a plurality of units of information*, the method comprising: transmitting *the plurality of units of information* via a predetermined number of channel resources;…based on the predetermined number of channel resources, adjusting the number of *the plurality of units remaining*…" (emphases added). As I said earlier, "comprise" in patentspeak means "including but not limited to," so "a plurality of units of information" need not be equal to the transmission as a whole—it can be just "a number of data blocks," for instance the several blocks transmitted in different time slots during a single frame. Nothing in the claim language suggests that the number of time slots assigned cannot change mid-transmission; Apple is trying to add that limitation to the text.

Motorola's construction is also reasonable in view of the operation of the patented method. The network base station determines how to allocate its time slots among different mobile units, but the mobile units perform the patented countdown and report it back to the base station in each frame. So when the patented method is practiced—when the mobile unit "adjusts" the number of blocks remaining by the number of time slots assigned—the number of time slots has already been "predetermined" by the base station. That doesn't preclude the base station from altering the number of time slots assigned to a given signal, since the new number will necessarily have been "predetermined" by the time the mobile unit uses it to calculate the new countdown number.

I adopt Motorola's proposed construction: "a number of channel resources determined before transmission of the units of information."

United States Circuit Judge

March 19, 2012

ORDER

DATED MARCH 29, 2012

UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

APPLE INC. and NeXT SOFTWARE INC. (f/k/a NeXT COMPUTER, INC.),	)	
Plaintiffs,	)	No. 1:11-cv-08540
v.	)	
	)	Judge Richard A. Posner.
MOTOROLA, INC. and MOTOROLA MOBILITY, INC.,	)	
Defendants.	)	

ORDER OF MARCH 29, 2012

In my claims construction order of March 19, 2012, I held that the asserted claims of Apple's U.S. Patent No. 7,479,949 are means-plus-function claims and therefore subject to the requirements of 35 U.S.C. § 112, ¶ 6, including the requirement that the patent's specification describe "corresponding structure" capable of performing the claimed function. *Biomedino, LLC v. Waters Technologies Corp.*, 490 F.3d 946, 948 (Fed. Cir. 2007). If the specification fails to do this, the claim is invalid as indefinite. *Ergo Licensing, LLC v. Carefusion 303, Inc.*, 2012 WL 987833, at *1 (Fed. Cir. Mar. 26, 2012).

The required level of disclosure is "not a high bar," *Biomedino, LLC v. Waters Technologies Corp.*, *supra*, 490 F.3d at 950; "a challenge to a claim containing a means-plus-function limitation as lacking structural support requires a finding, by clear and convincing evidence, that the specification lacks disclosure of structure sufficient to be understood by one skilled in the art as being adequate to perform the recited function." *Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1376–77 (Fed. Cir. 2001).

Patents that claim a means for performing a computer-implemented function, such as the '949 patent, must describe the algorithm—a "step-by-step process" —for performing that function, *Aristocrat Technologies Australia Pty Ltd. v. International Game Technology*, 521 F.3d 1328, 1332–33 (Fed. Cir. 2008); see also *In re Katz Interactive Call Processing Patent Litigation*, 639 F.3d 1303, 1314–15 (Fed. Cir. 2011), though they need not disclose computer code for implementing that step-by-step process if a person of ordinary skill in the relevant technology would be able without difficulty to write a program to implement the steps. *Medical Instrumentation & Diagnostic Corp. v. Elekta AB*, 344 F.3d 1205, 1214 (Fed. Cir. 2003). A patent's specification may disclose structure through diagrams, along with any other format that would communicate the requisite information to one skilled in the art. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1565 (Fed. Cir. 1991); see also *Typhoon Touch Technologies, Inc. v. Dell, Inc.*, 659 F.3d 1376, 1385 (Fed. Cir. 2011).

Here are the claims, with the terms for construction italicized and preceded by bracketed numbers for ease of reference:

> **1.** A computing device, comprising: a touch screen display; one or more processors; memory; and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including: instructions for detecting one or more finger contacts with the touch screen display; instructions for applying one or more heuristics to the one or more finger contacts to determine a command for the device; and instructions for processing the command; wherein the one or more heuristics comprise:
>
> > *[1] a vertical screen scrolling heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command rather than a two-dimensional screen translation command based on an angle of initial movement of a finger contact with respect to the touch screen display;*
> >
> > *[2] a two-dimensional screen translation heuristic for determining that the one or more finger contacts correspond to the two-dimensional screen translation command rather than the one-dimensional vertical screen scrolling command based on the angle of initial movement of the finger contact with respect to the touch screen display;*
> >
> > and *[3] a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.*

> **2.** The computing device of claim 1, wherein the one or more heuristics include *[4] a heuristic for determining that the one or more finger contacts correspond to a command to translate content within a frame rather than translating an entire page that includes the frame.*
>
> **10.** The computer device of claim 9, wherein the first set of heuristics comprises *[5] a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command rather than the two-dimensional screen translation command based on the angle of initial movement of the finger contact with respect to the touch screen display.*

I have already determined that terms [1] and [2] are adequately supported by structure in the patent's specification, particularly Figure 39C and the associated text. See my summary judgment order of January 16 and my claims construction order of March 19. I construe term [1] as follows, based on Apple's proposed construction:

- <u>Function</u>: determining that the user's finger contacts correspond to a one-dimensional vertical screen-scrolling command rather than a two-dimensional diagonal screen translation command based on the initial angle of the finger's movement on the screen.
- <u>Structure</u>: a heuristic that uses as one input the initial angle of the user's finger swipe gesture and determines whether that angle is within a predetermined range of being perfectly vertical, as shown for example in Figure 39C at 3937.

Ditto for term [2]:

- <u>Function</u>: determining that the user's finger contacts correspond to two-dimensional diagonal screen translation command rather than the one-dimensional vertical screen-scrolling command based on the initial angle of the finger's movement on the screen.
- <u>Structure</u>: a heuristic that uses as one input the initial angle of the user's finger swipe gesture and determines whether that angle is within a predetermined range of being perfectly vertical, as shown for example in Figure 39C at 3939.

The function claimed by term [3] is "determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items." The structure (if any) that performs this function must be a "heuristic" (i.e., an instruction) disclosed by the structure that takes as its input a user's finger contacts and determines whether or not the user intends to implement the "next item" command, as when a user flips through photos on an iPhone's camera roll.

Apple argues that the specification provides two such heuristics, both displayed in the patent's Figures 12A and 16A and described in the text accompanying them. Each heuristic takes a certain user input and interprets it as a next item command. The first input is a horizontal right-to-left finger swipe (see Figure 12A's element 1220 and Figure 16A's element 1616), and the second is a finger tap on the right side of the screen (Figure 12A's element 1218 and Figure 16A's element 1620). "Thus, the 949 patent teaches that if a user either makes a right to left swipe gesture on a displayed item, or taps the screen on the right side of the displayed item, the heuristic determines that the command is to transition from the current item in a set of items to the next item." The diagrams provide roughly the same level of detail about term [3] as Figure 39C provides about terms [1] and [2].

Apple runs into problems with the horizontal finger swipe. Claim 1 of the patent claims heuristics for performing three different functions (the three I've discussed thus far): [1] determining whether the user intends to scroll vertically, [2] determining whether he intends to shift the view diagonally, and [3] determining whether he intends to move to the next item in a set. Heuristics [1] and [2] and the associated structure (Figure 39C) explain what rules the device applies to distinguish between vertical and diagonal movement commands: if the user's finger swipe is within a certain range on either side of perfectly vertical, the device implements the vertical scrolling command; otherwise it alters the screen in the direction of the user's finger swipe. According to heuristics [1] and [2], a horizontal finger swipe should be interpreted as a command to shift the screen horizontally (or nearly horizontally, if the finger swipe is not perfectly horizontal). Yet Apple now argues that the same gesture is a distinct command, the next item command. If the same user finger movement is understood to communicate two separate commands, the heuristic fails to perform the function of "determining" which "command" "the one or more finger contacts correspond to." So I reject the horizontal finger swipe as a potential structure for function [3].

But the finger tap heuristic provides the required structure: if the user taps the right side of the screen, the device interprets the tap as a command to display the next item in the set. That is a valid heuristic, like the one for distinguishing between vertical and diagonal movement. I therefore adopt the following construction:

- Function: determining that the user's finger contacts correspond to a command to transition from displaying one item in a set of items to displaying the next item in the set.
- Structure: a heuristic that uses as one input a user's finger tap on the right side of the device's touch screen.

The function claimed by term [4] is "determining that the one or more finger contacts correspond to a command to translate content within a frame rather than translating an entire page that includes the frame." A touch screen device often has to determine whether the user is trying to shift the entire view or just move one object ("a frame") within it.

Apple argues that the specification discloses two separate heuristics for performing this function. The first, disclosed by Figures 42A, 42B, and 42C, determines whether the user means to move just a frame or the entire screen on the basis of the number of fingers the user has swiped along the screen. For instance, the device could interpret the user's swipe of a single finger as a command to translate the whole view screen in the direction of the swipe and interpret a two-finger swipe as a command to move the frame within the view screen while keeping the view screen static. The numbers one and two are only examples, and the structure covers any program that takes as an input the number of fingers used in performing the function.

The second heuristic proposed by Apple as structure for this function would not rely on the number of fingers used but would instead determine whether the user intended to move the entire screen or just a frame on the basis of whether he made a finger motion within the frame (which would shift the frame) or outside of it (which would shift the screen). Apple argues that such a heuristic is inherent in claim 2's language "one or more finger contacts correspond to a command" and is depicted in Figures 42A, 42B, and 42C.

I accept the first proposed heuristic, which is adequately described by the diagrams and the patent's description of them. I reject the second proposed heuristic, for which there is no basis in either the claim language or the diagrams and descriptions. So I adopt this amended version of Apple's proposed construction:

- Function: determining that the user's finger contacts correspond to a command to shift content within a frame rather than shifting the whole page that includes the frame.

- Structure: a heuristic that uses as an input the number of fingers the user has employed in touching the touch screen, as shown for example in Figures 42A through 42C at 4210 and 4214.

The final term for construction is [5], which is in claim 10 and claims the function of determining that the user's finger contacts correspond to a one-dimensional horizontal screen-scrolling command rather than the two-dimensional diagonal screen shift command, on the basis of the angle of initial movement of the finger contact with respect to the touch screen display. This function differs from term [1] only in relating to horizontal rather than to vertical movement. The patent's specification describes adequate structure for performing this function. "In some embodiments, in one heuristic of the one or more heuristics, a contact comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly horizontal with respect to the touch screen display corresponds to a one-dimensional horizontal screen scrolling command. For example, a finger swipe gesture that initially moves within 27 degrees of being perfectly horizontal corresponds to a horizontal scrolling command, in a manner analogous to vertical swipe gesture 3937 (Fig. 39C)." Col. 111:40–48; see also Col. 75:4–12; Col. 110:31–34.

I reject Motorola's argument (this is the third time they've made it and the third time I reject it) that the structure must be limited to the 27-degree angle used as an example by the specification. It is just an example. I therefore construe term [5] as follows:

- Function: determining that the user's finger contacts correspond to a one-dimensional horizontal screen-scrolling command rather than a two-dimensional diagonal screen-scrolling command based on the initial angle of the finger's movement on the screen.
- Structure: a heuristic that uses as one input the initial angle of the user's finger swipe gesture and determines whether that angle is within a predetermined range of being perfectly horizontal, in a manner analogous to that shown for vertical motion in Figure 39C at 3937.

United States Circuit Judge

March 29, 2012

ORDER

DATED APRIL 27, 2012

UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

APPLE INC. and NeXT SOFTWARE INC. (f/k/a NeXT COMPUTER, INC.),	)	
Plaintiffs,	)	No. 1:11-cv-08540
v.	)	
	)	Judge Richard A. Posner.
MOTOROLA, INC. and MOTOROLA MOBILITY, INC.,	)	
Defendants.	)	

ORDER OF APRIL 27, 2012

Motorola has moved for summary judgment of noninfringement of Apple's U.S. Patent No. 7,479,949 ("Touch Screen Device, Method, and Graphical User Interface for Determining Commands By Applying Heuristics"), arguing that its products do not infringe in light of my interpretation of the patent's language in my claims construction order of March 29, 2012. On April 7 I denied Motorola's previous summary judgment motion, permitted the parties to supplement their expert reports with new evidence based on my claims construction, and granted Motorola leave to file a renewed motion for summary judgment based on the supplemented expert reports. I have now received both Motorola's new summary judgment motion and Apple's brief in opposition. I grant Motorola's motion in part.

The motion and response focus on a single limitation (that is, claim provision) of the '949 patent, the "next item" heuristic, which Motorola argues is not practiced by any of the products that Apple alleges infringe. The limitation is in claim 1 of the patent, and the other claims that Apple asserts—claims 2, 9, and 10—depend on claim 1.

The limitation describes "a next item heuristic for determining that the one or more finger contacts [that is, the user's touching the screen of a touch-screen device with his finger] correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items." I have ruled that claim 1 and its dependent claims are means-plus-function claims (see 35 U.S.C. § 112, ¶ 6), that the function covered by the next-item heuristic is "determining that the user's finger contacts correspond to a command to transition from displaying one item in a set of items to displaying the next item in the set," and that the structure that performs this function is "a heuristic that uses as one input a user's finger tap on the right side of the device's touch screen."

In less technical terms, the covered function is switching from one item to the next on a touch-screen device such as an iPhone or one of Motorola's smartphones, as when a user flips through photos; the patent covers that function only when the user performs it by tapping his finger on the right side of the screen. I rejected Apple's argument that the patent also covers performing the function with a horizontal finger swipe rather than a finger tap.

Apple accuses Motorola's products of infringing the patent by six applications that can run on Motorola devices: "Gallery," "Music," "Browser" (specifically, the Browser application's bookmark feature), "YouTube," "Google Image Search," and "Kindle Reader."

I conclude that the Gallery, Music, Browser bookmarks, and YouTube applications do not infringe. Each of those applications presents the user with an array of options ("items," in the language of the patent) in graphic form: photographs (in the Gallery application), album covers (the Music application), screenshots of bookmarked websites (Browser bookmarks), and still images from YouTube videos (YouTube). The array (or a portion of it) appears on the screen, and by tapping one of the items the user moves that item to the center of the screen. Apple claims that these applications infringe the next-item limitation because the user can select (bring to the center of the screen) one of the "next items" displayed on the right side of the screen by tapping it with his finger, and if he does so he will have selected a next item by way of a finger tap on the right side of the screen. That is literally true, but Apple's reading of my claims construction is *too* literal. For what the user is actually doing is selecting an option by tapping *the option itself* with his finger, a mode of selection not covered by the limitation. What the next-item limitation covers is the selection of an item by tapping not on the item to be selected but on the right side of the screen. This interpretation is confirmed by the two diagrams from the '949 patent's specification that I relied on in holding that the specification specified enough structure to perform the next-item function. These are Figures 12A and 16A, and in both diagrams one item is displayed on the screen and the user can switch to the next image by tapping on the right side of the screen (gestures 1218 and 1620).

The Google Image Search and Kindle Reader applications, by contrast, both appear to include the '949 patent's next-item functionality. A user who performs a Google Image Search using the Browser application can select one of the images brought up by the search, which then fills the device's screen, and then switch to the next image in the sequence by tapping the right side of the screen. Similarly, a user reading an e-book in the Kindle Reader application can turn to the next page by tapping the right side of the screen.

It is true as Motorola points out that the computer code that performs the next-item function during a Google Image Search is not preloaded or stored permanently on the Motorola devices. Instead the instructions for implementing the function "are contained within the JavaScript downloaded from Google when the search is being performed." And it is also true that the fact "that a device is capable of being modified to operate in an infringing manner is not sufficient, by itself, to support a finding of infringement." *Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1330 (Fed. Cir. 2001). The operation of a computer (and a modern cell phone is a computer) is "modified" routinely by applications that enable the computer to perform functions that it could not perform without the applications. But Motorola may do more than just make it possible for users to conduct a Google image search by selling them a computer that can be made to perform that function. According to Apple, Motorola's devices come preloaded both with a Google search application and with a Browser search application that uses Google as its default search engine. When a user searches for an image using either application, the Motorola device uses Google Image Search, and that invokes the next-item function.

So the cell phone itself does not infringe, but it invites and enables infringement, and "whoever actively induces infringement of a patent shall be liable as an infringer." 35 U.S.C. § 271(b). But liability for inducement requires "knowledge that the induced acts constitute infringement" at the time of the inducement. *Global-Tech Appliances, Inc. v. SEB S.A.*, 131 S. Ct. 2060, 2068 (2011). Apple has pointed to no evidence that Motorola knew (or was reckless in failing to learn) that switching to a next item by means of a finger tap in the Google search engine might be held (in combination with the other limitations of claim 1) to infringe the '949 patent. I therefore grant summary judgment to Motorola with respect to Google Image Search.

Kindle Reader is an application created by Amazon that allows users to read e-books on computers other than Amazon's Kindle devices, including desktops, laptops, touchpads, and smartphones. Motorola is not liable for infringement caused by end users who choose to download Kindle Reader onto their Motorola devices. See *Telemac Cellular Corp. v. Topp Telecom, Inc.*, *supra*, 247 F.3d at 1330. But Apple points out that at least some of Motorola's devices ship at least some of the time with Kindle Reader pre-installed. In those cases, Motorola itself cannot elude a finding of infringement by not being the author of the application, because by installing the application onto its devices it has made and then sold an infringing device. I therefore grant Motorola's motion for summary judgment insofar as it pertains to the Kindle Reader application installed by users, rather than pre-installed by Motorola.

I must also consider Apple's argument that a horizontal finger swipe is "equivalent" to a finger tap—equivalent either under the patent law's means-plus-function provision, 35 U.S.C. § 112, ¶ 6, which requires that means-plus-function claims be interpreted to cover the structure for performing the claimed function that is disclosed in the specification "and equivalents thereof," or under the doctrine of equivalents.

Apple contends that the finger swipe is equivalent to a finger tap because the two gestures are interchangeable: touch screen devices are often programmed so that the two gestures can both perform the same next-item command. That does not make them equivalent. Some consumers prefer one of the methods of flipping to a next item and some prefer the other, and so programmers often provide both and let the user choose. If consumers distinguish between the two, they are not interchangeable; if they were interchangeable, programmers would be content to use one or the other method rather than providing a choice. Equivalence refers to a situation in which, in an effort to avoid liability for infringement without making a substantive change in a patented product, the alleged infringer makes a trivial change that neither lowers a producer's costs or alters the consumer's experience, as in *International Nickel Co. v. Ford Motor Co.*, 166 F. Supp. 551 (S.D.N.Y. 1958). This is not such a case.

Apple's equivalents argument is also inconsistent with my claims construction. In my March 29 order I held that the finger-tap gesture recited in the specification was structure that could perform the next-item function, but I rejected Apple's argument that the finger-swipe gesture was an alternative structure also disclosed by the specification. My reason was that I had already accepted Apple's argument that a finger swipe performed another function in claim 1—the two-dimensional screen translation function—and that single gesture could not perform both functions, since then the device would be unable to determine when a user swiped his finger on the screen what command the user was trying to give the device. That would have been unacceptable because the patented invention codes user gestures as commands to the computer. "[A]n element of an accused product or process is not, as a matter of law, equivalent to a limitation of the claimed invention if such a finding would entirely vitiate the limitation." *Freedman Seating Co. v.*

American Seating Co., 420 F.3d 1350, 1358 (Fed. Cir. 2005). The limitations in claim 1 are assignments of user gestures to commands—one gesture to one command.

Apple's final equivalents argument is that "a tap is a zero-length swipe." That's silly. It's like saying that a point is a zero-length line.

Richard A. Posner
United States Circuit Judge

April 27, 2012

ORDER

DATED MAY 22, 2012

**IN THE
UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION**

No. 1:11-cv-08540

APPLE, INC. and NeXT SOFTWARE INC.,
(f/k/a NeXT COMPUTER, INC.),

Plaintiffs,

v.

MOTOROLA, INC.,
and MOTOROLA MOBILITY, INC.,

Defendants.

OPINION and ORDER of May 22, 2012

POSNER, *Circuit Judge*, sitting by designation. On May 16, I conducted a *Daubert* hearing to consider challenges based on Fed. R. Evid. 702 and 703 to four party damages experts: Michael J. Wagner (Motorola), Brian W. Napper (Apple), Carla S. Mulhern (Motorola), and Charles R. Donohoe (Motorola). The four experts, besides having submitted reports pursuant to Fed. R. Civ. P. 26(a)(2), testified at the hearing, followed by oral argument by counsel for Apple and Motorola.

The only issue of any significance concerning Donohoe was a possible conflict of interest owing to his former employment by

Samsung, a firm whose interests so far they relate to this case parallel those of Motorola. He testified without being contradicted that he has no financial stake in Samsung; he neither owns stock in nor has a pension from the company. I reject the challenge to his proposed expert testimony.

The challenges to the other damages experts encompass testimony on all six patents that remain in this litigation, and I will discuss the challenges patent by patent.

But I begin with a few general remarks about *Daubert* hearings. Their purpose is to enable the judge to screen expert evidence in advance of trial. By the time the hearing is held, the expert will have submitted a report and been deposed, the objecting party will have filed a brief in support of its challenge to the expert, and the party desiring to call the expert as a witness at trial will have had an opportunity to file a response to the objecting party's brief. The purpose of the hearing and submissions is to enable the judge to decide whether the expert's proposed evidence is sufficiently reliable to be considered by the jury, if, as in this case, trial is to be to a jury, or by the judge if it is to be a bench trial. The burden of persuading the judge to allow the expert to testify is on the party tendering the expert, and is by a preponderance of the evidence. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 592 n. 10 (1993); *Bourjaily v. United States*, 483 U.S. 171, 175–76 (1987); *Lewis v. CITGO Petroleum Corp.*, 561 F.3d 698, 705 (7th Cir. 2009); Committee Notes on 2000 Amendment to Fed. R. Evid. 702.

The biggest challenge to the judge at a *Daubert* hearing, if as in this case the subject matter of the proposed expert testimony is within the judge's comprehension, is to distinguish between disabling problems with the proposed testimony, which are a ground for excluding it, and weaknesses in the testimony, which are properly resolved at the trial itself on the basis of evidence and cross-examination. "Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence." *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, *supra*, 509 U.S. at 596; see also *Bielskis v. Louisville Ladder, Inc.*, 663 F.3d 887, 894 (7th Cir. 2011); *Heller v. Shaw Industries, Inc.*, 167 F.3d 146, 152, 160 (3d Cir. 1999); *In re Paoli R.R. Yard PCB Litigation*, 35 F.3d 717, 746 (3d Cir. 1994) ("the judge should not exclude evidence simply because he or she thinks that there is a flaw in the expert's investigative process which renders the expert's conclusions incorrect. The judge should only exclude the evidence if the flaw is large enough that the expert lacks 'good grounds' for his or her conclusions"). The focus thus is not on results but on methodology. The expert must use a "proper methodology," an "acceptable methodology." *Walker v. Soo Line R.R.*, 208 F.3d 581, 587 (7th Cir. 2000).

An important test for deciding whether a problem with proposed expert testimony is disabling, or merely a weakness, is whether the expert "employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field." *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 152 (1999); see also *Zenith Electronics Corp. v. WH-TV Broadcasting Corp.*, 395 F.3d 416, 419 (7th Cir. 2005); *Sheehan v. Daily Racing Form, Inc.*, 104 F.3d 940, 942 (7th Cir. 1997); *Best v. Lowe's Home Centers, Inc.*, 563 F.3d 171, 181–82 (6th Cir. 2009). If so, then with possible exceptions not necessary to examine in this opinion the testimony is admissible and its weaknesses are to be left to be explored at trial. If not—if the expert, though he could have used in the lawsuit the same approach that he would have been required by the applicable professional standards to use to deal with an identical issue outside the litigation context, failed to do so—then (again with possible exceptions inapplicable to this case) his proposed testimony should be barred. *Id.*; *Guinn v. AstraZeneca Pharmaceuticals LP*, 602 F.3d 1245, 1255 (11th Cir. 2010) (per curiam).

Another test of the adequacy of proposed expert testimony is whether the expert has sufficiently explained how he derived his opinion from the evidence that he considered. In other words the judge must determine whether the methods used by the expert were properly applied to the facts of the case. See Fed. R. Evid. 702(c), (d). "[A]ny step that renders the analysis unreliable…renders the expert's testimony inadmissible. This is true whether the step completely changes a reliable methodology or merely misapplies that methodology." *In re Paoli R.R. Yard PCB Litigation*, *supra*, 35 F.3d at 745 (emphasis omitted). A trial court "may conclude that there is simply too great an analytical gap between the data and the opinion proffered." *General Electric Co. v. Joiner*, 522 U.S. 136, 146 (1997); see also *United States v. Mamah*, 332 F.3d 475, 478 (7th Cir. 2003); *Milward v. Acuity Specialty Products Group, Inc.*, 639 F.3d 11, 15 (1st Cir. 2011); Committee Notes to 2000 Amendment of Fed. R. Evid. 702.

It remains to note that even where expert testimony is admissible, it may be too weak to get the case past summary judgment. Thus *Hirsch v. CSX Transportation, Inc.*, 656 F.3d 359, 362 (6th Cir. 2011), distinguishes between the admissibility of evidence and its sufficiency, and upheld a grant of summary judgment on the ground that the expert testimony offered in opposition to a motion for summary judgment, though admissible under the *Daubert* standard, did not preclude summary judgment.

The reader should bear this background discussion in mind as I proceed through the patents.

Apple '002 is the patent feature on the toolbar notification window that gives the user basic information about the state of his device, such as battery strength; it's analogous to an automobile's dashboard. Apple contends that Motorola infringes the patent by including on its cell phones (and other handheld devices, such as tablets—but for simplicity I'll pretend in this opinion that the case involves just cell phones) Apple's patented invention of a software program that prevents the notification window from being partially obstructed by an application program selected by the user. Total, as opposed to partial, obstruction occurs when, for example, the user selects the camera program on the iPhone, which fills the entire screen; the patented invention does not prevent total obstruction.

Mr. Wagner asserts that a reasonable royalty for Motorola's use of Apple's invention would be $100,000. Motorola would pay no more, he contends, because creating the allegedly infringing notification window in the first place had cost only $67,000, and so it would (he reasons) cost even less to alter the code for the notification window slightly so that it would not prevent applications from partially obstructing the window, thus avoiding infringement. Wagner interviewed Dr. Richard Cooper, one of Motorola's technical experts in this litigation, who wrote a bit of code into the application window program that allowed it to be partially obstructed by other application windows. Apparently he was able to do this in a single afternoon. Wagner further asserts that consumers wouldn't be put off by an occasional partial obstruction, which if true means that Motorola has obtained no revenue from its infringement and so owes Apple no royalty beyond the meager cost savings that it derived from not inventing around. Wagner rounded up to $100,000 out of an excess of generosity.

Wagner's proposed testimony that the infringing notification window cost Motorola $67,000 to develop is not expert testimony but fact testimony. The special limitations that Rule 26(a)(2) places on expert testimony are not intended for a witness who merely testifies that his company spent $x to make something. It also is not the best evidence of that fact, if it is a fact; and while an expert witness is permitted to base an opinion on hearsay evidence, he isn't permitted to use that privilege merely to shield the source of the evidence from cross-examination.

As for Wagner's report of his conversation with Cooper, it is, like the $67,000 figure, a mere echo of another witness—another interested witness—and it thus violates the principle that a testifying expert must use the same approach (if it is feasible for him to do so) that he would use outside the litigation context. So imagine that Motorola had not been sued, but had approached Wagner and told him "we're concerned that we may be accused of infringing Apple's patent '002; we'd like you to advise us how much it would cost us to invent around the patented invention." Wagner would not ask an engineer at Motorola; Motorola would ask an engineer at Motorola. Wagner would canvass software firms in search of the lowest price and report back to Motorola. The same approach applied in this case would have required Wagner to shop around. He would not have asked a Motorola engineer, because Motorola doesn't have to hire an outside consultant who is not an engineer to ask an engineering question of a Motorola engineer.

The inadequacy of Wagner's proposed testimony (surprising in light of his careful expert testimony upheld against *Daubert* challenge in *i4i Ltd. Partnership v. Microsoft Corp.*, 598 F.3d 831, 853–55 (Fed. Cir. 2010)) compels me to exclude it. But we are about to see that its exclusion is academic.

Apple's damages expert with respect to patent '002, Mr. Napper, estimates that a reasonable royalty (covering the period up until the trial) would be a lump sum of $14 million. In other words, he differs with Mr. Wagner by a factor of 140. The size of the disparity is a warning sign. Either one of the experts is way off base, or the estimation of a reasonable royalty is guesswork remote from the application of expert knowledge to a manageable issue within the scope of that knowledge.

Napper bases his $14 million estimate on a consumer survey conducted by Motorola, in which the survey respondents were asked to pick, from a list of the attributes of a Motorola cell phone, those attributes that were among the respondent's top five "main reasons" for buying the $270 phone. Fifteen percent of the respondents selected "appealing features & functions" as among their top five "main reasons" for buying the phone; and Napper, multiplying $270 by .15, assigned $40 in consumer value to "appealing features & functions." Napper further assumed that the only "appealing features & functions" that contribute to the phone's value to consumers are those used by a consumer every day. That is an unreasonable assumption. The owner of a cell phone may not use it every day to make a telephone call, but the capability to make a call is obviously a feature that drives consumer demand for a cell phone, just as the fact that a car had airbags might be important to a consumer even though in all likelihood he would never use them.

Four percent of the survey respondents replied that they "reviewed notifications" every day. That is vague—what does "notification" in the cell phone context mean, exactly? When the user clicks on email, for example, he is "notified" of the latest emails he's received. But I'll assume—very generously to Mr. Napper—that the survey respondents assumed it to mean that they look at the notification window at least once a day. Napper multiplied $40 by .04, yielding $1.60, then divided that by two (a totally arbitrary choice of divisor) to reach $0.80. He did this because "reviewed notifications" might not be limited to looking at the notifications window (indeed). He multiplied that figure by the number of cell phones that Motorola sold, and the product of the multiplication was $14 million.

The survey asked users to name the five attributes that were their main reasons for buying, rather than just the top attribute. Napper in his report assigns to each attribute a value equal to the total cost of the device multiplied by the percentage of people who listed that attribute among their top five. By this methodology, the total value of all the attributes on each respondent's list would come to 500 percent of the value of the phone. That's impossible.

All other objections to Napper's method to one side, it depended on the unverified, indeed arbitrary, assumption that occasional partial obstruction of the notification window would force Motorola to reduce the price of its cell phone from $270 to $269.20 ($270 – $0.80). Critically, Napper failed to compare a cell phone that has a notification window that can't be partially obstructed with one that has a notification window that can be. So at most all he established is that a small percentage of Motorola consumers value the notification window enough to consult it at least once a day (assuming "reviewed notifications" refers exclusively to viewing the notification window). Suppose they consult it before opening any windows; then they would be indifferent to partial obstruction, because it would never occur when they wanted to look at the notification window.

Now imagine how Mr. Napper would have proceeded had he been hired by Motorola to determine the value to consumers of an unobstructed notification window. Suppose there were no question of infringement; Motorola just didn't know whether it should bother with providing an unobstructed notification window rather than a window that provides notifications but sometimes is obstructed by other applications. It needed to get a sense of the value of such a window to consumers. Suppose Napper conducted the identical survey that he used in this litigation (that is, a Motorola survey) and reported back to Motorola that the average value to the consumer was $0.80. Motorola would say to him: "Dummy! You haven't estimated the value of the non-obstruction feature. You've just estimated the value of the notification window. What you need to do is find out how many consumers think it worthwhile to pay a higher price for a Motorola phone to avoid occasional partial obstruction of that window. So you'll have to ask the survey respondents: How often do you look at the notification window in an average day? What windows do you open most frequently in an average day? Suppose the answer includes three windows which when opened would partially obstruct the notification window. The next question would be: If each of these windows, when opened, partially obstructed the notification window, would that be a big annoyance, a little annoyance, or no annoyance? How much lower would the price of a smartphone have to be to compensate you for the occasional partial obstruction caused by these windows?"

I'm not trying to draft a consumer survey. I am merely asserting that the survey that Motorola did conduct, which did not look for aversion to partial obstruction and so far as I can tell had nothing to do with pricing, but rather with helping the company to determine which programs and features are particularly important to cell phone users, is not the kind of survey that Napper—assuming him to be a responsible adviser on marketing or consumer behavior—would have conducted had he been hired outside the litigation context to determine the relative values to Motorola's consumers of a notification window that can be partially obstructed and one that cannot be.

Granted, the Motorola survey isn't quite all that Napper relied on. His report also mentioned an application called "List Notifier Widget," which smartphone users can download for $1.33 and which performs some of the same functions as the patented notification window. To eliminate from comparison the features of List Notifier Widget that do not duplicate the patented invention, he halved the price, thereby obtaining an estimated value for the notification window of $0.66, which is close to the $0.80 estimate that he got from the survey. But by ignoring the non-obstruction feature he opens himself to the same criticism as his use of the survey.

I am mindful that a degree of speculation is permitted in calculating damages, *J. Truett Payne Co. v. Chrysler Motors Corp.*, 451 U.S. 557, 566–67 (1981); *BCS Services, Inc. v. Heartwood 88, LLC*, 637 F.3d 750, 759 (7th Cir. 2011), especially but not only in cases in which the defendant's wrongful conduct has made the calculation of damages difficult. *Haslund v. Simon Property Group, Inc.*, 378 F.3d 653, 658 (7th Cir. 2004). That doesn't seem to be a factor in this case, but nevertheless when the plaintiff has done his best to prove damages his inability to dispel uncertainty concerning the accuracy of his claim is not fatal. But if an expert witness fails to conduct a responsible inquiry that would have been feasible to conduct, his failure cannot be excused by reference to the principle that speculation is permitted in the calculation of damages; that permission presupposes the exhaustion of feasible means of dispelling uncertainty. Uncertainty is a bad; it is tolerated only when the cost of eliminating it would exceed the benefit. Apple could have conducted a survey of Motorola customers (or consumers, or would-be consumers, of cell phones generally) targeted on determining the value consumers attach to having a notification window that is never partially obstructed by another window; consumer surveys designed to determine the value of a particular feature or property of a consumer product are a common and acceptable form of evidence in patent cases. E.g., *i4i Ltd. Partnership v. Microsoft Corp.*, *supra*, 598 F.3d at 855–56; *Lucent Technologies, Inc. v. Gateway, Inc.*, 580 F.3d 1301, 1333–34 (Fed. Cir. 2009). Such a survey might well have dispelled the uncertainty that I conclude vitiates Mr. Napper's proposed testimony about the '002.

Remember that "a court may conclude that there is simply too great an analytical gap between the data and the opinion proffered," *General Electric Co. v. Joiner*, *supra*, 522 U.S. at 146—a judge must exclude expert evidence that fails to meet a minimum threshold of reasonableness. The patentee therefore "must in every case give evidence tending to separate or apportion the defendant's profits and the patentee's damages between the patented feature and unpatented features, and such evidence must be reliable and tangible, and not conjectural or speculative." *Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1318 (Fed. Cir. 2011), quoting *Garretson v. Clark*, 111 U.S. 120, 121 (1884). Apple thinks it enough that Napper used actual numbers from Motorola's own consumer survey—it doesn't defend the bizarre way in which he threw those numbers together to come up with his unsupportably high damages figure. No lower figure can be extracted from his report, so there is no basis for a damages estimate that Apple can fall back upon. And so Napper's evidence with regard to damages for the alleged infringement of patent '002 must be excluded.

Apple '949. Wagner's procedure (as well as conclusion—damages of $100,000) in estimating a reasonable royalty for a license to use this patent (assuming infringement) was identical to the procedure he employed to generate his estimate of damages from the alleged infringement of the '002. I granted summary judgment of noninfringement on this patent except with regard to cell phones that come preloaded with Amazon's Kindle Reader application (those are the only Motorola cell phones that employ the "tap for next item" heuristic claimed by the patent). So, to avoid the alleged infringement, Motorola would have had either to (1) remove the tap gesture from the Kindle Reader application, so that the user could turn the page only with a swiping motion, or (2) not ship cell phones preloaded with the application, since a consumer who wants the application can download it at no charge. Motorola would not have paid more to license the patent from Apple than the cost of the cheaper of those two options. The second alternative would impose an inconvenience on some consumers, though probably a slight one; but Wagner provided no analysis of it. The first alternative he estimated to cost only $18,000, and rounded up to $100,000 only (I am guessing) because jurors would be more skeptical of the lower number, especially in light of the extremely high number that Wagner could anticipate from Apple's expert witness. Again his procedure for cost estimation was improper. The $18,000 figure came from an interview he conducted with the supervisor of the Google engineer who added the swipe gesture functionality to the Android operating system (the operating system used in Motorola cell phones, which was created by Google). Wagner calculated that the engineer's salary allocable to that project was $18,000. But his assumption that the tap functionality is similar to the swipe functionality and that removing a function takes no more time than adding it did is not within Wagner's competence. His proposed testimony must therefore be excluded, but again the exclusion has only academic significance because the procedure used by Apple's expert, again Mr. Napper, was improper.

Napper estimated Apple's damages from the alleged infringement of the '949 at $35 million ($2 per Motorola cell phone sold during the damages period). This figure is based on the price that Apple charges for a device called Magic Trackpad which can be plugged into a desktop computer and used as an alternative to a mouse. Whereas a mouse operates by the user's moving it on a mouse pad and pushing its buttons to move the cursor on the computer screen and select items with it, a track pad operates by the user's moving his finger on the pad and then clicking; it is that movement that moves the cursor on the computer screen. The fact that some consumers will pay more for Magic Trackpad than for a mouse—$69.99, according to Napper's report, versus $49.99 for Apple's mouse—suggests that some consumers indeed value gestural as opposed to mouse-driven control of the cursor.

At this point in the litigation the dispositive element of the '949 patent is the use of a tap on the right-hand side of the screen to switch to the next page of a Kindle book that has been loaded on the cell phone. The value of that feature to the consumer is again a question the answer to which could be elicited, within a permissible (because unavoidable) range of uncertainty, by a properly designed and executed consumer survey.

Napper's comparison with the Magic Trackpad fails to isolate the value to consumers of the "tap for next item" function. That a consumer will pay something for gestural control does not enable an estimation of how much he will pay for a particular improvement in a system of such control, such as the addition of a new gesture to perform a function that can already be performed with another gesture. The next-item function can be performed with a swipe of the finger as well as a tap, and I've ruled that the tap but not the swipe is covered by the patent.

This is one fatal defect in Napper's proposed testimony but there is another, and that is a failure to consider alternatives to a $35 million royalty that would enable Motorola to provide the superior gestural control enabled by the relevant claim in the Apple patent. There is no basis in any expert report for supposing that it would cost Motorola millions of dollars, either in invent-around software development or in loss of consumer goodwill (resulting in a loss of sales revenue), to drop the tap for turning the page in the Kindle application (though to do this it would need Amazon's permission) or to drop the Kindle application itself, leading consumers who wanted it to download it themselves (which costs nothing). As it is, Motorola sells many of its cell phones without the Kindle application.

Apple argues that as long as its expert produces a plausible method of avoiding infringement (here, licensing the patent) and thus a basis for estimating a reasonable royalty (the royalty being the cost of the method), the existence of alternative methods that might be substantially cheaper is an issue to be resolved at trial by a comparison of the patentee's evidence with adverse evidence presented, or cross-examination by the lawyer for the alleged infringer, and is irrelevant to the admissibility of the expert's testimony. That cannot be correct, for again one must consider how the expert would proceed in a parallel non-litigation context. So suppose Motorola came to Mr. Napper and said: find out for us how we can at lowest cost, whether in software development or loss of consumer goodwill, avoid infringing Apple's patent; we need to know that lowest cost because it will be the ceiling on our willingness to pay for a patent license. If we can avoid infringement at $1 a phone, we will not pay a royalty in excess of $1.

In response to such an assignment the expert would not say: It will cost you $35 million to buy a chip that will duplicate the functionality of Apple's patent without infringing it. Because Motorola would ask him: Is that the only way we can avoid infringement? The expert would reply: Well actually you can drop the tap heuristic from your Kindle application or you can drop the application and tell your consumers that if they want it they can download it without charge; and this is what each of these alternatives would cost you in lost sales, contract damages, or whatever. An expert witness "must provide reasons for rejecting alternative hypotheses 'using scientific methods and procedures' and the elimination of those hypotheses must be founded on more than 'subjective beliefs or unsupported speculation,'" *Clausen v. M/V NEW CARISSA*, 339 F.3d 1049, 1058 (9th Cir. 2003), quoting *Claar v. Burlington Northern R.R.*, 29 F.3d 499, 502 (9th Cir. 1994); see also Committee Notes on 2000 Amendment to Fed. R. Evid. 702, as an aspect of his more general duty to be as "as careful [in his litigation work] as he would be in his regular professional work outside his paid litigation consulting." *Sheehan v. Daily Racing Form, Inc.*, *supra*, 104 F.3d at 942; see also *Kumho Tire Co. v. Carmichael*, *supra*, 526 U.S. at 152.

But I cannot end my analysis of Napper's proposed testimony here, because Napper's report was submitted before my pretrial rulings on the scope of the '949 patent. He had proceeded on the assumption that the patent claim would not be limited to the right-tap heuristic on the Kindle application, but would encompass the use of a horizontal swipe to turn a page or otherwise change screens. I ruled that the claim was limited to the tap, and this narrowed the case to the Kindle Reader application because that's the only case in which Motorola's cell phones use a "tap for next item." The part of the patent claim on which Napper's proposed testimony is mainly based is a heuristic (an instruction to the cell phone) that "tells" the cell phone to treat an upward or downward motion of the finger as a vertical swipe even if it is not perfectly vertical; as long as it is within a specified range to right and left of vertical (think of a fan), the cell phone interprets the gesture as a perfectly vertical gesture. This is almost certainly a more valuable feature of a cell phone than the finger-tap heuristic for turning pages in pre-installed Kindle applications.

But Napper's proposed testimony does not provide a reliable basis for inferring the value even of the vertical scrolling feature. The fact that many consumers will pay more for a Magic Trackpad than for a mouse tells one nothing about what they will pay to avoid occasionally swiping unsuccessfully because their swiping finger wasn't actually vertical to the screen. Maybe consumers would pay $2, but there is no evidence they would, or at least none furnished by Napper.

Against this background, the question whether he should be allowed to supplement his expert report to provide an estimate of a reasonable royalty for the Kindle Reader application finger-tap page-turning feature is easily answered: no. For if as I have just said his methodology (the Magic Trackpad comparison) is inadequate to provide a reliable estimate of the value of the vertical-scrolling-in-a-range program, how can it provide a reliable estimate of the value of the page-turning program?

It is conceivable that there is some program or device other than Magic Trackpad that could be matched with the page-turning program to provide an estimate of the value of the latter. But if so it should have been in Napper's report. He was asked to provide an estimate of Apple's damages from the alleged infringement of its '949 patent, and one of the components of those damages was damages for infringing the finger-tap page-turning element of the patent. He mentioned the component in his expert report as an advance over existing methods but he did not estimate its value. Either that component is buried somewhere in the $35 million, with the Magic Trackpad meant to provide an analogy to the page-turning program (though this seems unlikely, since tapping as distinct from swiping seems more like clicking on a mouse than moving one's finger on a track pad), or Napper considered the damages likely to be applicable to such an infringement too slight to bother about, as he has provided no evidence on which to base an estimate of a reasonable royalty for that program, let alone for the subprogram applicable only to the Kindle application. So far as appears, the only evidence that could be provided would be consumer-survey evidence; it is much too late for Apple to be permitted to conduct a survey.

Napper's testimony about Apple patent '949 is excluded.

Apple '263. This is a patent on a system for making sure that programs which present video or aural material in real time (rather than storing it for later viewing/hearing) are able to present that material smoothly, without interruption or distortion. This unquestionably is a valuable feature of a smartphone as of other types of computer. Mr. Napper asserts in his expert report that it would cost Motorola $29 to $31 million to add a chip to its smartphones that would replace the functionality of the '263 patent. The disabling objection is similar to the objection to Wagner's damages estimate for the '002: in both cases the party's damages expert obtained the essential information, namely the identity of the chip that would avoid infringement, from an agent of the party rather than from a disinterested source. The agent in this case is Nathaniel Polish, Apple's principal technical expert.

Suppose Napper had been hired by Motorola to advise on how at lowest cost Motorola might obtain the functionality of the '263 without infringing that patent. Obviously Napper would not have gone to the patentee for that information! For it would be in the patentee's interest to suggest a method of inventing around that was extremely costly, because the costlier the invent-around, the higher the ceiling on a reasonable royalty. Of course Polish is not Apple; he is an independent contractor. And if he were the only person competent to opine on substitutes for the '263, his evidence would be admissible, and the jury would be warned that he had a conflict of interest because he is handsomely compensated by Apple to provide technical evidence in support of Apple's claim that Motorola has infringed the '263. But there is no evidence that he is the only engineer who is familiar with computer hardware (or software) that duplicates the functionality of the '263. So again imagine this imaginary conversation between Napper and Motorola, which I'll pretend hired Napper to advise on how at lowest cost to duplicate the patent's functionality without infringement: Motorola: "What will it cost us to invent around, for that will place a ceiling on the royalty we'll pay Apple?" Napper: "Brace yourself: $35 million greenbacks." Motorola: "That sounds high; where did you get the figure?" Napper: "I asked an engineer who works for Apple." Motorola: "*Dummkopf!* You're fired."

Napper's proposed testimony regarding damages for alleged infringement of Apple's patent '263 is excluded.

Apple '647 (structure detection and linking). Napper's report states that it would cost Motorola $10.5 million to duplicate the functionality of Apple's patent without infringement. He based this estimate on the price of a program called "Clipboard Manager" which is available for download by iPhone users from the iPhone app store for $1. Napper apportioned $0.60 of the $1 to the functionality covered by the patent and multiplied by the number of Motorola cell phones sold during the damages period to reach the $10.5 million figure.

"Clipboard manager" is actually a generic term; the capitalized name refers to a specific version offered in the iPhone app store. During the damages period, Clipboard Manager (the Apple version) was a set of five sub-applications (that is, it did five different things). Three of the sub-applications related to structure detection and linking, the other two to alphabetization and images—that's why Napper apportioned three-fifths of the application's $1 price to the '647 invention. The three that relate to structure detection and linking are redundant to the superior technology for structure detection and linking that is included in the iPhone—the superior technology is the technology covered by the '647. Napper's report acknowledges both that the '647 technology comes preloaded on the iPhone and that it is superior to Clipboard Manager's version of that functionality. From this it follows that any knowledgeable consumer who buys Clipboard Manager is buying it solely for its alphabetization and images functionality, because its structure detection and linking technology has no value to someone who owns an iPhone; and iPhone users are the only individuals who would be downloading the Clipboard Manager application from the iPhone app store. If all consumers are knowledgeable, the purchase of Clipboard Manager provides zero information on the value to consumers of structure detection and linking, because they already have that functionality; and if so, then Napper's allocation of $0.60 of the $1 price to that functionality is senseless.

Of course not all consumers are knowledgeable, and doubtless most value structure detection and linking (not in that terminology of course, but the terms refer to the cell phone's ability to recognize patterns in text such as phone numbers, web addresses, and dates and then to present the user with a list of the actions he or she can take in regard to the patterns, such as calling the phone number or creating a calendar entry). Many of those who don't realize they have it already may indeed be willing to pay $0.60 to get it (though it seems odd to base damages on sales revenues obtained as a result of mistakes by consumers for which the seller seems largely responsible). But Napper provided no estimate of how many such ignorant consumers there are, still another question that could be answered within the limits of tolerable uncertainty by a competently designed and administered consumer survey. So once again I must exclude Napper's evidence.

Motorola '559 (preamble sequence) and '898 (countdown). I can discuss these two Motorola patents together. They provide for telecommunication between cell phones and cellular base stations. I assume for purposes of the *Daubert* analysis that these are "standards essential" patents, which is to say patents that cell phone makers must have a license for in order to communicate over specified telecommunications networks, and therefore that Motorola must license to Apple at fair, reasonable, and nondiscriminatory ("FRAND") rates.

Motorola's damages expert Mulhern estimates that a proper FRAND royalty would have cost Apple $347 million; I assume in this opinion that this figure satisfies FRAND. But Mulhern failed to consider the range of plausible alternatives (to licensing Motorola's patents) facing Apple, alternatives that she would doubtless have considered in non-litigation consulting if asked by Apple (say), what is the lowest-cost method of obtaining access to the functionality of these patents? The answer is to contract with another carrier, rather than AT&T, because Motorola's cellular patents are necessary only in communications over AT&T's network. Apple chose AT&T over the alternatives, of which the most attractive, it appears, would have been Verizon. So presumably any other alternative would have been inferior, and therefore Apple obtained a benefit from contracting with AT&T instead of Verizon, and if that benefit was a fruit of infringement it is a proper basis for computing a reasonable royalty. But Mulhern has not tried to quantify the benefit; nor does she argue that the benefit, though substantial, *cannot* be quantified.

She began her testimony at the *Daubert* hearing by explaining that $347 million, while a seemingly large number, is nothing to Apple—a company that made some $30 billion in revenue from the products that Motorola contends infringe the Motorola patents. The implication is that even if Apple could have saved, say, $100 million by launching on Verizon, what's the difference to Apple of having to pay $347 million versus $247 million? Either figure is less than 1 percent of Apple's total profits during the damages period. Obviously a damages estimate cannot be based on such reasoning. For imagine her being hired by Apple for advice on how to minimize its liability to Motorola, and her advising Apple that although her highest estimate of the cost of avoiding infringement is $347 million, that's probably too high by a couple of hundred million dollars, but that she hasn't bothered to consider avoidance measures that would cost less than $347 million because one hundred million dollars or so is chicken feed to Apple and so it wouldn't want to pay an additional fee to her to search the alternatives. That is nonsense.

Motorola points out that the contract that AT&T signed was exclusive; during its term, Apple could not have switched to Verizon. That is incorrect. If it could not have negotiated a modification or abrogation of the contract, it could simply have broken it, at a cost measured by the damages to which AT&T would have been entitled. Mulhern made no effort to estimate those damages. She devoted only one page of her report to the possibility of Apple's having contracted with Verizon instead of AT&T; all she says is that Apple and Verizon were unable to strike a deal. True; but the question is, had Apple known that it was infringing Motorola's cellular patents, would it have struck a deal with Verizon? Mulhern gives no reason to doubt that it would have. The deal would have been inferior to the deal with AT&T if there were no issue of infringement, as otherwise Apple would have negotiated a contract with Verizon rather than with AT&T in the first place. But Mulhern offers no evidence that it would have been $347 million more costly to Apple. Her failure to analyze Apple's alternative of contracting with Verizon marks her approach to calculating a reasonable royalty for Apple's cellular patents as unreliable; and she offers no backup estimate based on a reliable methodology.

She does offer an alternative measure of damages to her $347 million estimate of a reasonable royalty. The alternative is $468 million and includes lost profits of Motorola plus a reasonable royalty on sales not subject to a lost-profits analysis.

The lost-profits estimate posits a counterfactual world in which there is no Apple product on the market because Apple doesn't have a license to use Motorola's cellular patents. This is science fiction. Apple infringes those patents only on the AT&T network, and at worst Apple could have paid the 2.25 percent royalty demanded by Motorola. The alternative-universe approach must take account of alternatives the alleged infringer would have embraced in order to avoid a trip to that universe. *Grain Processing Corp. v. American Maize-Products Co.*, 185 F.3d 1341, 1350–51 (Fed. Cir. 1999). Apple would not have said to itself that because it couldn't launch the iPhone on AT&T without infringing the Motorola patents it would not make a cell phone.

I exclude Mulhern's evidence.

Motorola complains that Napper's references to Motorola's FRAND obligations in his rebuttal report to Mulhern are prejudicial and asks me to strike all FRAND references under Fed. R. Evid. 403. But Motorola's obligation to license its standards-essential patents on FRAND terms—the content of those terms to be determined in the bench trial immediately upon the liability trials—is highly relevant to the royalty it would have been able to extract from Apple had they successfully negotiated a reasonable royalty ex ante. I therefore decline to strike Napper's mention of FRAND.

There are several other issues relating to damages for the alleged infringement by Apple of Motorola's cellular patents governed by FRAND. But they are best deferred to the FRAND trial, in which the central issue will be whether in its dealings with Apple over the cellular patents Motorola violated its obligation to offer licenses that comply with FRAND.

OPINION AND ORDER
DATED JUNE 22, 2012

IN THE
UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

No. 1:11-cv-08540

APPLE, INC. and NeXT SOFTWARE INC.,
(f/k/a NeXT COMPUTER, INC.),

Plaintiffs,

v.

MOTOROLA, INC. and MOTOROLA MOBILITY, INC.,

Defendants.

OPINION and ORDER of June 22, 2012

POSNER, *Circuit Judge*, sitting by designation. In my opinion and order of May 22, following the *Daubert* hearing held on the 16th, I ruled that proposed testimony by three of the parties' damages experts (one for Apple and two for Motorola) was inadmissible. *Apple, Inc. v. Motorola, Inc.*, No. 1:11-cv-8540, 2012 WL 1959560 (N.D. Ill. May 22, 2012); see Fed. R. Evid. 702, 703. This ruling precipitated motions by both parties for summary judgment with respect to their opponents' damages claims, followed by motions for summary judgment directed at each other's injunction claims as well. These submissions prompted me to ask the parties to brief the question whether, if all damages and injunctive claims dropped from the case, the case could be kept alive by Apple's claim for declaratory relief. Motorola had in its answer to Apple's amended complaint asked for a declaratory judgment that each of Apple's patents sought to be enforced in this suit was invalid. But unlike Apple it acknowledges that such a request can't keep a case going once all claims for monetary or injunctive relief are rejected.

After further briefing, and an oral hearing on June 7, I tentatively concluded that the case would have to be dismissed. And so I canceled the trials on liability, which had been scheduled to begin on June 11. I said that an opinion would follow, definitively resolving the question. On June 13, however, I granted Apple's request, made at the June 7 hearing, for a further hearing on injunctive relief. I said that I had "decided to grant Apple's request...for 'a hearing at which the parties could attempt to satisfy the *eBay* factors and do a traditional injunction hearing.'… [At the hearing] each party may argue that it would be entitled to injunctive relief as to its patent or patents were the other party found to have infringed. The parties may submit briefs, if they wish, no later than the close of business on Monday, June 18. The parties should be prepared to address the possibility of substitution for an injunction of an equitable decree for a reasonable royalty going forward. They should indicate any evidence in the existing record (for it is too late to supplement the record) bearing on the question of injunctive or other equitable relief. And if Motorola means to argue for injunctive relief it should be prepared to address the bearing of FRAND on the injunction analysis."

The parties filed briefs and responses and the hearing was held as scheduled. The question whether the case must be dismissed without a determination of liability is now fully ripe for decision. I begin with the damages claims and then move to the equitable issues addressed in the recent submissions and hearing and then to declaratory relief.

Damages. When the summary judgment motions were filed, my expectation was that the liability trials (one a trial of Apple's claims of infringement, the other of Motorola's claims of infringement) would be followed immediately (if any claims of infringement were upheld in the liability trials) by trials on issues of relief: a jury trial on damages and a bench trial on equitable relief. The trials on relief would have involved five patents—four Apple patents ('002, '263, '647, and '949) and one Motorola patent ('898)—if all were found to have been infringed. Apple concedes that my exclusion of proposed testimony by its damages expert witness Brian W. Napper dooms its claims for damages for infringement of the '002 and '949 patents, and that leaves only the '263 and '647 patents for me to consider in evaluating Motorola's motion for summary judgment on damages.

Regarding the '263 (the realtime patent), I said in my *Daubert* ruling that "Mr. Napper asserts in his expert report that it would cost Motorola $29 to $31 million to add a chip to [each of] its smartphones that would replace the function performed by the invention that is the subject of the '263 patent. The disabling objection [to Napper's proposed testimony] is…[that he] obtained the essential information, namely the identity of the chip that would avoid infringement, from an agent of the party rather than from a disinterested source. The agent in this case is Nathaniel Polish, Apple's principal technical expert." 2012 WL 1959560, at *9.

Apple wants to substitute Dr. Polish, a computer scientist whose competence to testify as an expert witness on liability was not questioned, for Napper as its damages expert for the '263. The expert report by Polish on which Apple relies (Polish filed more than one report) does say that Motorola could have bought a chip (that is, a piece of computer hardware) that would have enabled Motorola to perform the same functions performed by the '263, without infringing. But Polish did not identify the chip, let alone price it, let alone suggest that he had searched across all (or at least many, or some, or even a few) of the chips that Motorola might have bought, or of alternative ways in which it might have invented around Apple's patent. (To simplify, I'll generally call all ways of substituting a noninfringing for an infringing invention "inventing around.") All the report says is that "running without a DSP [digital signal processor] would be slower and the CPU would realize a substantially shorter battery life. Thus, *it is likely that instead of pursuing this approach, a different solution would be purchasing an additional chip to provide dedicated audio and video decoding capabilities*. Such a multi-chip solution would not need the codecs currently running on the DSPs in the Accused Products" (emphasis added).

Napper says that Polish named the chip to him in a private conversation not mentioned in Polish's report. That was too late and anyway the mere existence of a chip that would substitute for the '263 is not enough to establish damages. An expert's report must contain "a *complete* statement of all opinions the witness will express *and the basis and reasons for them*." Fed. R. Civ. P. 26(a)(2)(B)(i) (emphasis added). There is no basis in Polish's report for a claim that his mystery chip is a feasible, let alone an economical, substitute for the '263.

Apple has not asked me to allow Polish to supplement his report. Nor would the needed supplementation be within his competence as disclosed in his report. There is no suggestion that he is familiar with the range of chips that might constitute feasible and economical substitutes for the '263. A competent damages witness would be one who was involved in the procurement of chips, or who advised as a consultant on the choice of chips; there is no suggestion that Polish has such experience. He was, it is true, listed as a damages witness. But his only role in a damages trial was to be to testify about technical matters relevant to damages, namely design around. And the only opinion in his expert report that is relevant to design around is his statement about the existence of the chip that he later told Napper about.

The only testimony that I have found in Polish's four expert-witness reports that actually bears on damages is a statement that Motorola's DSP chip (alleged to infringe Apple's '263 patent) is part of a set of chips, and the set costs $14.05. Polish said the DSP function is a substantial part of the overall functionality of the chip set, and so the value of the DSP in the allegedly infringing devices—a value that might be used to estimate the royalty to which Apple would be entitled if the DSP infringes Apple's '263 patent—should be a substantial fraction of the $14.05. But Polish didn't estimate the fraction, and this compelled Napper to acknowledge in his report that since "the DSP within the accused products is integrated with other functionality, and not sold or priced separately, I am unable to determine the portion of the $14.05…that would relate to DSP functionality, though I understand it is a substantial piece." Apple has not tried to base a damages estimate on this chip.

Apple argues that to establish a prima facie case it need only show that there is one chip, however costly, somewhere in the world of computer hardware, that Motorola could have substituted for the '263. It argues that the cost of that chip is a sufficiently accurate estimate of Apple's damages to shift the burden of production to Motorola to prove the existence of cheaper chips. Such an allocation of burdens of production might make sense if knowledge of those alternatives to Apple's proposed mode of avoiding infringement were uniquely within Motorola's knowledge and difficult for Apple to access even with all the tools of modern discovery. *Campbell v. United States*, 365 U.S. 85, 96 (1961) ("the ordinary rule, based on considerations of fairness, does not place the burden upon a litigant of establishing facts peculiarly within the knowledge of his adversary"); cf. *McDonnell Douglas Corp. v. Green*, 411 U.S. 792 (1973); *Ybarra v. Spangard*, 154 P.2d 687 (Cal. 1944); *Duncan v. Duck-*

worth, 644 F.2d 653, 656 (7th Cir. 1981). That is not argued, however, and would not be credible. The parties—both leading manufacturers of cell phones—have equal access to information about computer hardware for such devices.

Other than in a case of unequal access by one side of the lawsuit (rare given modern discovery, at least when the opposing parties are roughly equal in resources and sophistication, as Apple and Motorola are), a plaintiff to withstand summary judgment must present enough evidence to make a prima facie case—that is, enough evidence to justify a trier of fact in finding in favor of the plaintiff if the defendant presents no contrary evidence. *Reeves v. Sanderson Plumbing Products, Inc.*, 530 U.S. 133, 142–43 (2000); *Texas Department of Community Affairs v. Burdine*, 450 U.S. 248, 252–55 (1981). Even if Motorola presented no evidence concerning other chips, the mere fact that there is *a* chip that might substitute for the alleged infringing invention would not enable the trier of fact to infer that the cost of *that* chip approximates the cost that Motorola avoided by (allegedly) infringing, and hence the royalty it might have had to pay Apple for a license to use Apple's patented chip.

At the June 7 hearing, Apple's counsel remarked—about requiring a patentee to "identify or be able to opine that that is the absolute lowest cost best design-around, so it is the best measure of damages"—"I am not aware of any law to that effect." True, but Apple still must show that the chip that it suggested that Motorola could have purchased was a commercially reasonable design-around. As I said (not very articulately, I'm afraid) at that hearing, "Apple didn't have to show that the chip identified by Dr. Polish was the very best design-around. Obviously, there are limits to how much of a burden you place on [the plaintiff. If] Dr. Polish said…this is the standard thing, this is what other people use[, t]hat might well be enough, but—of course, that's not in his report, and I don't think a computer scientist really is…the only expert you need on damages. You need someone who is involved more in a financial part of the company or the selling part, the marketing, the procurement [part]."

I also agree with what Apple's counsel said next: "our belief is [that] the law is that as long as your expert puts forth a cognizable, *proper measure of damages*, one that if by itself were presented to a jury, it would be *sustainable as proper evidence*, that that is sufficient to bear the burden of proof by that party at that time" (emphasis added). I take it by "sustainable as proper evidence" counsel did not mean admissible, which goes without saying, but that the evidence establishes a prima facie case. Polish's testimony about the chip does not establish a prima facie case. It invites guesswork. That won't do.

The '647, to which I now turn, is an Apple patent on what is called "structure detection and linking." The term refers to a cell phone's ability to recognize patterns such as phone numbers, web addresses, and dates in text and then present the user with a menu of possible responses, such as calling the phone number or creating a calendar entry. I rejected Napper's attempt to use sales of an iPhone application called "Clipboard Manager" to estimate the value of the functions performed by the '647. No rational iPhone owner would knowingly purchase Clipboard Manager for its structure detection and linking capabilities, because the capabilities built into the iPhone for doing these things are already superior to the Clipboard Manager's method of structure detection and linking.

Apple argues that there is an alternative basis for assessing damages for the alleged infringement—Napper's proposed testimony (which I was not asked to exclude at the *Daubert* hearing) about the cost of duplicating the functions performed by the '647 without infringing. That estimate, intended to make Napper's proposed damages figure (the one based on Clipboard Manager that I disallowed) seem conservative, was based on the time it took another cell phone manufacturer, HTC, to design around the '647 patent after the International Trade Commission, finding that HTC cell phones infringed the '647, threatened to forbid their importation to the United States. *In re Certain Personal Data & Mobile Communications Devices & Related Software*, Inv. No. 337-TA-710 (Dec. 19, 2011), http://info.usitc.gov/ouii/public/337inv.nsf/RemOrd/710/$File/337-ta-710.pdf (visited June 22, 2012). An infringer enjoined from using a patented invention has to stop selling the infringing product until it purges the infringement, as by an invent-around. The cost (including lost sales) of having to invent around is therefore one method of estimating the reasonable royalty for a license.

The estimate of Apple's damages based on HTC's experience was an afterthought; it occupies only two pages in Napper's report and says nothing about HTC the company, or about HTC's cell phones, or about the engineering resources that HTC devoted to modifying its phones in response to the International Trade Commission's exclusion order, which permitted HTC to import the offending phones for four more months before it had to prove that it had successfully designed around the '647. Napper's report also doesn't mention that the International Trade Commission's construction of the patent's claims differs from my construction of the same claims. So while at the June 7 hearing Apple's counsel was literally correct in saying that HTC was "faced with the exact same patent," the statement was misleading because as construed the claims were different and that means that the cost of designing around may have been different, an issue that responsible expert testimony would have to address but that Napper's report ignores.

Apple argues last-minute that *any* act of infringement, even if it gives rise to no measurable damages, is an injury entitling it to a judgment. It points to a distinction between a breach of contract and a tort. A breach of contract is a wrong, so even if the victim of the breach (the other party to the contract) fails to prove that he was injured by it he is entitled to judgment and the symbolic award of nominal damages. *Mindgames, Inc. v. Western Publishing Co.*, 218 F.3d 652, 654 (7th Cir. 2000); E. Allan Farnsworth, *Contracts* § 12.8, p. 784 (3d ed. 1999). In contrast, a tort does not come into existence until there is an injury, without which negligence or recklessness or other tortious behavior, in the sense of behavior that *if* it causes an injury gives rise to a tort, is not a basis for relief. *Chang v. Baxter Healthcare Corp.*, 599 F.3d 728, 733–34 (7th Cir. 2010); W. Page Keeton et al., *Prosser & Keeton on the Law of Torts* § 30, pp. 164–65 (5th ed. 1984); cf. *Restatement (Second) of Torts* § 899, comment c (1977).

To this as to most legal generalizations there is an exception: intentional trespass to land is a tort actionable even if no damage results. *Restatement (Second) of Torts*, *supra*, § 163. The reason is to prevent the trespasser from acquiring title by adverse possession. *Chang v. Baxter Healthcare Corp.*, *supra*, 599 F.3d at 733. A suit for "harmless" trespass is analogous to a suit to quiet title, though the latter proceeding is *in rem* and thus if successful establishes title good against the world rather than just against a single trespasser.

More fundamentally, exclusion is *the* fundamental right that ownership of property confers and it is not limited (as tort rights are) to intrusions that cause palpable injury. It would be ridiculous to think that to get an injunction against people picnicking on your front lawn you'd have to prove they weren't cleaning up after themselves or were sitting in your favorite picnic spot.

A patent is property too, and a suit to establish the validity or scope of a patent by means of a suit against an alleged infringer would be analogous to a "harmless trespass" suit, see *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 895 F.2d 1403, 1406 (Fed. Cir. 1990), and could therefore justify an award of nominal damages if no injury were proved. *Dobson v. Dornan*, 118 U.S. 10, 17 (1886); *Nike, Inc. v. Wal-Mart Stores, Inc.*, 138 F.3d 1437, 1441 (Fed. Cir. 1998). Nominal damages are awarded in other types of case as well, for example cases in which a violation of procedural due process is proved even if no actual injury is shown. E.g., *Farrar v. Hobby*, 506 U.S. 103, 112 (1992). *Why* nominal damages are ever awarded is a separate question, for which I doubt there is a satisfactory answer. Nominal damages "may be little better than a fossil remnant of an earlier legal system, when it was thought that to say such things as that 'from my earliest reading, I have considered it laid up among the very elements of the common law, that, wherever there is a wrong, there is a remedy to redress it; and that every injury imports damage in the nature of it; and, if no other damage is established, the party injured is entitled to a verdict for nominal damages,' *Webb v. Portland Mfg. Co.*, 29 Fed. Cases 506, 507 (Cir. Ct. Me. 1838) (Story, J.), was to say something, rather than to talk in a circle." *Habitat Education Center v. United States Forest Service*, 607 F.3d 453, 460 (7th Cir. 2010).

But without questioning the propriety of an award of nominal damages in patent-infringement as in other classes of case, I strongly doubt (despite a contrary intimation in *Morrow v. Microsoft Corp*., 499 F.3d 1332, 1339 (Fed. Cir. 2007)) that a patentee can *sue* for nominal damages, at least not in a federal court given the meaning that the Supreme Court has given to the terms "Cases" and "Controversies" in Article III of the Constitution. Without an actual or prospective tangible injury, a federal court has no subject-matter jurisdiction. In *Farrar v. Hobby*, *supra*, the plaintiffs sued for $17 million but were awarded nominal damages because they failed to prove actual damages. They had not sued for nominal damages. What rational person would?

It's not as if nominal damages were compensation for a nominal harm. They are a symbolic recognition of a wrong that produced no harm, though it may have infringed a right. You can't go into federal court and say you had a contract with X and X broke it and you're really annoyed even though you sustained no injury of any sort (in fact you made money because you re-contracted at a higher price) so please give me a judgment for $1 that I can pin on my wall. No more can Apple be permitted to force a trial in federal court the sole outcome of which would be an award of $1. Which anyway it doesn't want to do. When Motorola filed a motion for summary judgment contending that Apple cannot establish "any amount of damages arising from alleged infringement of" its patents, Apple did not respond that summary judgment should be denied because Apple could obtain nominal damages if it proved infringement; it responded that Motorola was wrong to think Apple couldn't establish substantial damages.

But I must consider the possible bearing of 35 U.S.C. § 284, a provision of the Patent Act that provides in relevant part that "upon finding for the claimant *the court shall award the claimant damages* adequate to compensate for the infringement, *but in no event less than a reasonable royalty* for the use made of the invention by the infringer, together with interest and costs as fixed by the court" (emphasis added). This conceivably could be read to entitle a patentee to a royalty if it proves infringement even if it presents no evidence at all of harm; and presumably the royalty that the court would award wouldn't be a nominal royalty. Neither party is seeking such relief here—a substantial royalty predicated on no showing of harm. But for completeness I want to dispel any impression that such relief—substantial "compensatory" damages for no tangible injury—would be proper even apart from constitutional limitations on the jurisdiction of the federal courts.

A reasonable royalty is a form of damages when awarded in the damages phase of an infringement litigation, though it usually is a form of equitable relief, as we'll see, when it is imposed, in lieu of an injunction, to prevent future harm to the patentee. The difference between conventional damages and a royalty is that often a royalty is actually a form of restitution—a way of transferring to the patentee the infringer's profit, or, what amounts to the same thing, the infringer's cost savings from practicing the patented invention without authorization. Although the Federal Circuit in *Dow Chemical Co. v. Mee Industries, Inc.*, 341 F.3d 1370, 1382 (Fed. Cir. 2003), spoke of "the presumption of damages when infringement is proven," it quickly added: "But, the district court's obligation to award some amount of damages 'does not mean that a patentee who puts on little or no satisfactory evidence of a reasonable royalty can successfully appeal on the ground that the amount awarded by the court is not 'reasonable' and therefore contravenes section 284.'" *Id*.

The quotation is from *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., supra*, 895 F.2d at 1407, so we go to that opinion and learn (*id*.) that "'one who fails to submit evidence in support of a position cannot be heard on appeal to complain that the trial court failed to find facts upholding that position,'" quoting *Railroad Dynamics, Inc. v. A. Stucki Co.,* 727 F.2d 1506, 1519 (Fed. Cir. 1984). *Lindemann* cites *Devex Corp. v. General Motors Corp.,* 667 F.2d 347, 363 (3d Cir. 1981), affirmed on other grounds, 461 U.S. 648 (1983), which had "affirm[ed an] award of zero damages for lack of evidence" and in doing so had said that "the statute [35 U.S.C. § 284] requires the award of a reasonable royalty, but to argue that this requirement exists even in the absence of any evidence from which a court may derive a reasonable royalty goes beyond the possible meaning of the statute." Not even nominal damages could be awarded.

Any intimation that proof of infringement is alone enough to warrant a remedial order (as when *Dow* posits an "obligation to award some amount of damages" if infringement is proved) was scotched by the Supreme Court in *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 391–92 (2006). And with specific reference to calculating a royalty, *Dow* itself instructs district courts not pull the royalty out of a hat but instead "to consider the so-called *Georgia-Pacific* factors in detail, and award such reasonable royalties as the record evidence will support." 341 F.3d at 1382 (citation omitted); see also *Lucent Technologies, Inc. v. Gateway, Inc.*, 580 F.3d 1301 (Fed. Cir. 2009); *Parental Guide of Texas, Inc. v. Thomson, Inc*., 446 F.3d 1265, 1270 (Fed. Cir. 2006).

So let's take a look at those factors (*Georgia-Pacific Corp. v. United States Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970)):

> A comprehensive list of evidentiary facts relevant, in general, to the determination of the amount of a reasonable royalty for a patent license may be drawn from a conspectus of the leading cases. The following are some of the factors *mutatis mutandis* seemingly more pertinent to the issue herein:
> 1. The royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty.
> 2. The rates paid by the licensee for the use of other patents comparable to the patent in suit.
> 3. The nature and scope of the license, as exclusive or non-exclusive; or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold.
> 4. The licensor's established policy and marketing program to maintain his patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly.
> 5. The commercial relationship between the licensor and licensee, such as, whether they are competitors in the same territory in the same line of business; or whether they are inventor and promoter.
> 6. The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of his non-patented items; and the extent of such derivative or convoyed sales.
> 7. The duration of the patent and the term of the license.
> 8. The established profitability of the product made under the patent; its commercial success; and its current popularity.
> 9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results.

> 10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention.
> 11. The extent to which the infringer has made use of the invention; and any evidence probative of the value of that use.
> 12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions.
> 13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer.
> 14. The opinion testimony of qualified experts.
> 15. The amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement; that is, the amount which a prudent licensee—who desired, as a business proposition, to obtain a license to manufacture and sell a particular article embodying the patented invention—would have been willing to pay as a royalty and yet be able to make a reasonable profit and which amount would have been acceptable by a prudent patentee who was willing to grant a license.

This is a formidable list. The "some" in the second sentence is particularly rich—how many additional factors may be lurking somewhere? And could a judge or a jury really balance 15 or more factors and come up with anything resembling an objective assessment? We needn't try to answer these questions. Apple has not presented admissible evidence that the *Georgia-Pacific* factors support its damages claim.

The remaining patent for which damages are sought is Motorola's '898, part of a portfolio of patents for enabling communication between cell phones and cell towers (called "cellular base stations" in the patent). The '898 and '559 (a Motorola patent for which I granted Apple's motion for summary judgment of noninfringement) have both been declared by Motorola to be "standards essential" patents. These are patents that cell phone makers *must* use to communicate over specified telecommunications networks and therefore that the patentee (Motorola) has committed to licensing to anyone on fair, reasonable, and nondiscriminatory (acronym "FRAND," or sometimes "RAND"—the word "fair" adds nothing to "reasonable" and "nondiscriminatory") terms, as required by the standards-setting organizations as a condition of the patented technology's being deemed essential to compliance with the standard.

My summary judgment order of June 5, finding that Apple had not infringed Motorola's '559 patent, may seem inconsistent with the proposition that Apple's 3G ("third generation") mobile devices, which are governed by the Universal Mobile Telecommunications Standard (UMTS), must therefore use patents declared essential to that standard, such as the '559. But there is no inconsistency. Motorola's standards-essential patents (including the '898 still at issue in this case) are merely *claimed* to be standards-essential. The European Telecommunications Standards Institute collects declarations by companies that claim to own patents essential to compliance with the UMTS standard, but the Institute does not determine whether they really are essential. See "ETSI IPR Database FAQ," www.etsi.org/website/aboutetsi/iprsinetsi/IPRdb_FAQ.aspx (visited June 22, 2012); *Apple Inc. v. Samsung Electronics Inc.*, No. 11-CV-01846, 2012 WL 1672493 (N.D. Cal. May 14, 2012). Apple showed that although its cell phones generate the preamble sequences (the subject of Motorola's '559 patent) required by the 3G UMTS standard, they do not do so in the manner claimed by '559, and so the '559 isn't essential.

With its principal damages witness for the '898, Carla S. Mulhern, excluded as a result of my *Daubert* ruling, Motorola has fallen back on another of its expert damages witnesses, Charles R. Donohoe, who was not excluded. Mr. Donohoe is qualified to opine on the licensing of standards-essential patents, but the bottom line of his 8-page declaration (he did not submit a formal report, as Rule 26 requires, Fed. R. Civ. P. 26(a)(2)(B); *Meyers v. National R.R. Passenger Corp.*, 619 F.3d 729, 734 (7th Cir. 2010); *Gay v. Stonebridge Life Ins. Co.*, 660 F.3d 58, 62 (1st Cir. 2011)) is that if Apple had wanted to license any of the patents in Motorola's standards-essential portfolio, the license fee would have exceeded the product of the percentage of the portfolio represented by the patent and the value of the entire portfolio. Suppose the portfolio contained 100 patents and they would command a reasonable royalty of $700 million to a firm that licensed all 100. One patent is 1 percent of 100 patents and 1 percent of $700 million is $7 million. But according to Donohoe's declaration, the license fee for that single patent, if licensed on its own rather than as part of a package deal that comprised the entire portfolio, would be "up to" 40 to 50 percent of the royalty for the entire portfolio—that is, up to $350 million.

That "up to" covers a lot of ground. Even a royalty of only $14 million would be mathematically disproportionate (Donohoe's term is "nonlinear") for using a single patent in a portfolio of 100 patents worth in the aggregate a $700 million royalty, because $14 million is 2 percent of $700 million rather than 1 percent (1 out of 100 patents). How to pick the right nonlinear royalty? Donohoe's declaration does not answer that essential question, and there is no suggestion that any other witness can answer it. In his deposition Donohoe tried to retract the "up to" of his declaration by testifying that the royalty for a single patent in the portfolio "should be *at least* 40 to 50 percent of overall rate is my experience" (emphasis added)—still open-ended, though now on the upside. He gave no reason for his change of mind, no estimate of the shape of the nonlinear royalty function, no basis, in short, for his estimate of "at least 40 to 50 percent" of a reasonable royalty for the entire portfolio. And he admitted that he knows nothing about the portfolio that includes the '898 patent; his 40-to-50 percent figure is a statement about portfolios of standards-essential telecommunications patents in general.

It might seem that at a minimum Motorola could argue for the linear price—in my example, 1 percent of the value of the portfolio. But it does not make that fallback argument; it's going for broke. Moreover, if the proper pricing is nonlinear, Motorola would need evidence that the '898 patent is not *less* valuable than the average patent in the portfolio, for in that case it would merit less than a linear proportion of the portfolio's value. It hasn't presented any such evidence.

"Going for broke" is the inescapable characterization of Motorola's damages claim. Motorola claims to be entitled to a minimum royalty of 2.25 percent for a license for the patents in the portfolio that contains the '898. Though it's the only patent in the portfolio that remains in this suit, Motorola claims to be entitled to damages equal to (or "up to," or "at least"—it seems not to have made up its mind) 40 to 50 percent of 2.25 percent, which would be 0.9 to 1.125 percent of sales of Apple devices that infringe the '898.

At the June 7 hearing Motorola's lawyer said that in future litigation it would prove that Apple had infringed the other patents in the portfolio as well and so Motorola would prove its entitlement to 2.25 percent of all sales. In his words: "Apple is infringing *all* the standards-essential patents [this was said before I granted Apple summary judgment regarding its alleged infringement of Motorola's '559 patent] that Motorola owns by selling its cell phones that communicate on these wireless networks. As…a practical reality, we cannot sue on a hundred patents in one case, or 75…. There are other cases pending, and there are cases in various stages of development at the International Trade Commission. But the ultimate result would have to be, as a result of all the litigations, that Apple would pay Motorola whatever the standards-essential license negotiated fee would be. We say it's 2.25 percent, *but I'm not going to be able to prove to you that that's the right number today*" (emphasis added). And now it's too late.

There is another decisive objection to Motorola's damages claim. The proper method of computing a FRAND royalty starts with what the cost to the licensee would have been of obtaining, just before the patented invention was declared essential to compliance with the industry standard, a license for the function performed by the patent. That cost would be a measure of the value of the patent qua patent. But once a patent becomes essential to a standard, the patentee's bargaining power surges because a prospective licensee has no alternative to licensing the patent; he is at the patentee's mercy. The purpose of the FRAND requirements, the validity of which Motorola doesn't question, is to confine the patentee's royalty demand to the value conferred by the patent itself as distinct from the additional value—the hold-up value—conferred by the patent's being designated as standard-essential. *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 313–14 (3d Cir. 2007); Daniel G. Swanson & William J. Baumol, "Reasonable and Nondiscriminatory (RAND) Royalties, Standards Selection, and Control of Market Power," 73 *Antitrust L.J.* 1, 7–11 (2005). Motorola has provided no evidence for calculating a reasonable royalty that would be consistent with this point.

So damages are out for both parties. But a patentee can also seek injunctive relief for infringement, and both parties seek such relief, as I have already noted with respect to Apple.

Injunctive Relief. To begin with Motorola's injunctive claim, I don't see how, given FRAND, I would be justified in enjoining Apple from infringing the '898 unless Apple refuses to pay a royalty that meets the FRAND requirement. By committing to license its patents on FRAND terms, Motorola committed to license the '898 to anyone willing to pay a FRAND royalty and thus implicitly acknowledged that a royalty is adequate compensation for a license to use that patent. How could it do otherwise? How could it be permitted to enjoin Apple from using an invention that it contends Apple *must* use if it wants to make a cell phone with UMTS telecommunications capability—without which it would not be a cell *phone*.

The Federal Trade Commission recently issued a policy statement which implies that injunctive relief is indeed unavailable for infringement of a patent governed by FRAND. "Third Party United States Federal Trade Commission's Statement on the Public Interest," filed on June 6, 2012, in *In re Certain Wireless Communication Devices, Portable Music & Data Processing Devices, Computers & Components Thereof*, Inv. No. 337-TA-745, www.ftc.gov/os/2012/06/1206ftcwirelesscom.pdf (visited June 22, 2012). This was said in the context of an exclusion order by the International Trade Commission, but its logic embraces any claim to enjoin the sale of an infringing product. For the FTC says it's "explaining the potential economic and competitive impact of injunctive relief on disputes involving SEPs [standard-essential patents]." *Id.* at 2. It goes on to note that

> a royalty negotiation that occurs under threat of an exclusion order may be weighted heavily in favor of the patentee in a way that is in tension with the RAND commitment. High switching costs combined with the threat of an exclusion order could allow a patentee to obtain unreasonable licensing terms despite its RAND commitment, not because its invention is valuable, but because implementers are locked in to practicing the standard. The resulting imbalance between the value of patented technology and the rewards for innovation may be especially acute where the exclusion order is based on a patent covering a small component of a complex multicomponent product. In these ways, the threat of an exclusion order may allow the holder of a RAND-encumbered SEP to realize royalty rates that reflect patent hold-up, rather than the value of the patent relative to alternatives.

Id. at 3–4; see also (besides the *Broadcom* case and the Swanson & Baumol article) Douglas Lichtman, "Understanding the RAND Commitment," 47 *Houston L. Rev.* 1023, 1039–43 (2010); Mark A. Lemley, "Intellectual Property Rights and Standard-Setting Organizations," 90 *Cal. L. Rev.* 1889, 1916 (2002).

Motorola counters that Apple's refusal to negotiate with it after rejecting its initial offer of a 2.25 percent royalty warrants injunctive relief; by opting not to take a license ex ante, it argues, Apple should lose the FRAND safe harbor. But Apple's refusal to negotiate for a license (if it did refuse—the parties offer competing accounts, unnecessary for me to resolve, of why negotiations broke down) was not a defense to a claim by Motorola for a FRAND royalty. If Apple said no to 2.25 percent, it ran the risk of being ordered by a court to pay an equal or even higher royalty rate, but that is not the same thing as Motorola's being excused from no longer having to comply with its FRAND obligations. Motorola agreed to license its standards-essential patents on FRAND terms as a *quid pro quo* for their being declared essential to the standard. FTC Statement on the Public Interest, *supra*, at 2. It does not claim to have conditioned agreement on prospective licensees' making counteroffers in license negotiations.

Motorola argues further that deprived of the possibility of injunctive relief, it will not be able to extract a reasonable royalty from Apple. Suppose, hypothetically, that the maximum reasonable FRAND royalty would be $10 million. If Motorola therefore demanded such a royalty, Apple, knowing that litigation is costly, would refuse, and Motorola would accept a lesser amount. Of course litigation would also be costly for Apple, and this might induce it to pay the $10 million rather than fight. But the deeper objection to Motorola's argument is that the "American rule," which with immaterial exceptions makes the winning party in a litigation bear his litigation costs rather than being able to shift them to the loser, does not deem damages an inadequate remedy just because, unless backed by a threat of injunction, it may induce a settlement for less than the damages rightly sought by the plaintiff. You can't obtain an injunction for a simple breach of contract on the ground that you need the injunction to pressure the defendant to settle your damages claim on terms more advantageous to you than if there were no such pressure.

A further objection to Motorola's claim for injunctive relief applies to Apple's claim for such relief as well. The grant of an injunction is not an automatic or even a presumptive consequence of a finding of liability, either generally or in a patent case—in fact the Supreme Court has held that the standard for deciding whether to grant such relief in patent cases is the normal equity standard. *eBay Inc. v. MercExchange, L.L.C., supra*, 547 U.S. at 391–92; see also *Ecolab, Inc. v. FMC Corp.*, 569 F.3d 1335, 1351–52 (Fed. Cir. 2009). And that means, with immaterial exceptions, that the alternative of monetary relief must be inadequate. "[T]he inadequacy of one's damages remedy is normally a prerequisite to injunctive relief." *Hoard v. Reddy*, 175 F.3d 531, 533 (7th Cir. 1999); see also *Walgreen Co. v. Sara Creek Property Co.*, 966 F.2d 273, 274 (7th Cir. 1992). "[A] plaintiff seeking an injunction is quite often successful precisely because he cannot calculate the damages he suffers." *Pelletier v. Stuart-James Co.*, 863 F.2d 1550, 1558 n. 15 (11th Cir. 1989). A FRAND royalty would provide all the relief to which Motorola would be entitled if it proved infringement of the '898 patent, and thus it is not entitled to an injunction.

In fact neither party is entitled to an injunction. Neither has shown that damages would not be an adequate remedy. True, neither has presented sufficient evidence of damages to withstand summary judgment—but that is not because damages are impossible to calculate with reasonable certainty and are therefore an inadequate remedy; it's because the parties have failed to present enough evidence to create a triable issue. They had an adequate legal remedy but failed to make a prima facie case of how much money, by way of such remedy, they are entitled to. That was a simple failure of proof.

The monetary remedy in patent cases is measured as I have already noted either by the patentee's loss or by the value of the infringement to the infringer. The premise of the alternative measure—value to the infringer—is that had the infringer negotiated for a license rather than infringing, that value would have been transmuted into a license fee paid to the patentee, and the loss of that fee constitutes damages suffered by the patentee. "Restitution measured by the market value of an unauthorized use appeared at an early date as a remedy for patent infringement, in cases where the patentee was unable to prove either his own damages or the infringer's profits. (Although such an award has always been denominated 'damages' in the context of patent infringement, it is more accurately described as a species of restitution for the value of a benefit wrongly obtained.) Unlike the accounting for the infringer's profits, restitution measured by use value survives in the current Patent Act." *Restatement (Third) of Restitution and Unjust Enrichment* § 42, comments c and f (2011); see also George E. Palmer, *The Law of Restitution* § 2.7, pp. 93–94 (1978); Roger D. Blair & Thomas F. Cotter, "An Economic Analysis of Damages Rules in Intellectual Property Law," 39 *William & Mary L. Rev.* 1585, 1650 (1998).

There is no question of collectability in this case, a common reason why a damages remedy is inadequate. Both parties have deep pockets. And neither has acknowledged that damages for the infringement of its patents could not be estimated with tolerable certainty. On the contrary, each insists not only that damages are calculable but that it has calculated them. The problem is not that damages cannot be calculated, but that on the eve of trial, with the record closed, it became apparent that the parties had failed to make a responsible calculation.

Apple claims that Motorola profited from infringement by incorporating the desirable features of Apple's patented technology into its own devices without either paying a royalty for a license to use the patents or incurring the cost of inventing around them. Apple has never contended that these benefits to Motorola of infringement cannot be quantified. It merely has failed, despite its vast resources and superb legal team, to do so in a minimally acceptable manner—failed whether because of mistakes in trial preparation (which even the best lawyers can make), or because too many cooks spoil the stew (Apple is represented by three law firms in this litigation), or maybe because the infringements did not deprive Apple of any profits (I'll come back to this counterintuitive point).

Apple also contends that it's losing market share (which could happen though its sales were growing—as they have been—because a competitor, namely Motorola, was growing faster) to Motorola, and also losing future customers to Motorola because of infringement, and requests an injunction to limit Motorola's penetration of the market and preserve Apple's own customer base. But it has not laid a foundation for such relief.

To begin with, as far as the record shows, an injunction would not avert such losses, because of the ease of designing around the patent claims at issue. The costs of designing around the '647 patent (structure detection and linking) would be similar to the costs of designing around the '002 (unblockable taskbar); both invent-arounds would just require reprogramming Motorola's smartphones to avoid at least one claim limitation. (A claim is not infringed if at least one "limitation" (element) of the claim is not present in the allegedly infringing device. *Catalina Marketing Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 812 (Fed. Cir. 2002); *Lemelson v. United States*, 752 F.2d 1538, 1551 (Fed. Cir. 1985).) Given my claims construction of the '647 patent, Motorola could design around simply by creating copies of the code that performs structure detection and linking for each particular program rather than by using a common-code module for all programs; for without a common code there is no "analyzer *server*," as required by the patent claim. Motorola could similarly include programs that occasionally block the taskbar to avoid '002. As far as the '263 patent (realtime) is concerned, there is no evidence of the cost of inventing around the surviving claims in it, and for all the records shows the cost may be slight. And finally I noted in my May 22 opinion how easy and cheap it would be for Motorola to avoid infringing the finger-gesture claim in the '949 patent.

If, then, Apple couldn't exclude Motorola from the market with an injunction because of the ease of inventing around, the only thing Apple lost as a result of the alleged infringements was royalties capped at the minimum design-around cost. Its alleged loss of market share because Motorola's smartphones do the same thing (either via license or design-around) would have occurred with or without an injunction, and so doesn't establish the inadequacy of damages.

Thus, while difficulty of quantifying loss of goodwill or of market share might justify injunctive relief in some cases, in this case an injunction would in all likelihood be ineffectual in preventing such loss. (No damages are sought for past such loss.) Unsurprisingly, there's no evidence of loss of market share or customer goodwill by Apple, and no basis for expecting such loss in the future. The price differences between the iPhone, which is Apple's smartphone, and Motorola smartphones suggest that the markets for the two classes of product are not perfectly overlapping, and so a small improvement in a Motorola smartphone attributable to infringement may not take significant sales from Apple. And while the patents themselves (or some of them at least) may well have considerable value, after the claims constructions by Judge Crabb and myself and after my grants of partial summary judgment only a handful of the original patent claims remain in the case; infringement of that handful may not be a source of significant injury past, present, or future. For a variety of reasons patents in the field of information technology often have little if any value except defensively. See Alan Devlin, "Systemic Bias in Patent Law," 61 *DePaul L. Rev.* 57, 77–80 (2011), and references cited there.

A related reason for withholding injunctive relief in this case is that it would be likely to impose costs on the alleged infringer disproportionate both to the benefits to it of having infringed and to the harm to the victim of infringement, and would thus be a windfall to the patentee and a form of punitive rather than compensatory damages imposed on the infringer. Not only is there no evidence of gain to Motorola or loss to Apple even though if there were gain or loss Apple should have been able to quantify it, but in addition an injunction could force Motorola to remove lucrative products from the market for as long as it took to remove the infringing features—minor features in complex devices most features of which are not alleged to infringe—from its products, or to invent around the infringing features.

This point about potential harm to the infringer from an injunction may seem to imply that had Motorola refrained from infringing Apple's patents (supposing it did infringe, an unanswered question, obviously), it would have had to pay a very large license fee to Apple as the alternative to a costly invent around. And such an implication might seem inconsistent with my determination that Apple has failed to show that Motorola derived significant benefits from the alleged infringements; for if there are no big benefits from infringing, there would be no big license fee for being allowed to continue to use the patents infringed on. But this ignores the fact that the market for smartphones (the kind of advanced cell phones sold by Apple and Motorola) has grown rapidly since Motorola's alleged infringements began three years ago. Sales of smartphones grew by almost two-thirds last year alone. An injunction issued today might do much greater harm to Motorola than the license fee that Apple would have charged had Motorola sought one when the alleged infringements began.

Apple could have sought, in lieu of an injunction against the sale of Motorola's devices, an order that Motorola pay a reasonable royalty for continued use of the inventions covered by the Apple patents. Such an order would impose a compulsory license on Apple in exchange for its receiving a perpetual royalty. (The Federal Circuit prefers the term "ongoing royalty," *Paice LLC v. Toyota Motor Corp.*, 504 F.3d 1293, 1313 n. 13 (Fed. Cir. 2007).) It would be an equitable remedy imposed as a substitute for an injunction against infringement. *Bard Peripheral Vascular, Inc. v. W.L. Gore & Associates, Inc.*, 670 F.3d 1171, 1192 (Fed. Cir. 2012), vacated in part on other grounds, 2012 WL 2149764 (Fed. Cir. June 14, 2012). (Equitable remedies, contrary to the familiar dichotomy between monetary and equitable relief, are often monetary. E.g., *McReynolds v. Merrill Lynch*, 672 F.3d 482, 483 (7th Cir. 2012); *Hoelzer v. City of Stamford*, 972 F.2d 495, 498 (2d Cir. 1992).)

A compulsory license with ongoing royalty is likely to be a superior remedy in a case like this because of the frequent disproportion between harm to the patentee from infringement and harm to the infringer and to the public from an injunction, a factor emphasized in Justice Kennedy's concurring opinion in *eBay Inc. v. MercExchange, L.L.C.*, *supra*, 547 U.S. at 396–97, in which he pointed out that "when the patented invention is but a small component of the product the companies seek to produce and the threat of an injunction is employed simply for undue leverage in negotiations, legal damages may well be sufficient to compensate for the infringement and an injunction may not serve the public interest." He could have been describing this case. Three Justices joined his opinion, and no Justice expressed disagreement with it.

The ongoing royalty will usually be the reasonable royalty as of the time of first infringement. If the infringement occurred in 1999, say, the royalty would be a percentage of the sale price of the infringing product and would continue as long as the licensee continued to sell the product, as in *Shatterproof Glass Corp. v. Libbey-Owens Ford Co.,* 758 F.2d 613, 628 (Fed. Cir. 1985). Ms. Mulhern, the Motorola damages expert whom I excluded, thought that Apple should have paid Motorola $298 million for the right to use the '898. That would not have been for a perpetual license. It was simply the product of multiplying Apple's sales revenues, during the period from the beginning of the alleged infringement to the present, from devices allegedly infringing the '898, by a percentage (we haven't been able to figure out precisely what percentage) in Donohoe's 40 to 50 percent range (actually, since his range actually was "up to 40 to 50 percent," the lower end was not 40 percent but zero percent) of 2.25 percent. The reasonable royalty going forward would be the product of multiplying by the same percentage the estimated future sales by Apple of infringing devices. The failure to justify the percentage leaves Motorola without a basis for calculating a going-forward royalty, as it has proposed no alternative to the method just suggested.

Apple's damages case consisted of an attempt to calculate the reasonable royalty for the period up to trial—the money that Motorola owed it for past infringement. Had Apple been able to prove its damages case (as well as establish liability for infringement of its patents), those damages (that is, the reasonable royalty, looking backwards) would have been the basis for fixing a reasonable royalty to be paid for each future sale in lieu of an injunction, that is, the per-unit royalty going forward, or as it is sometimes called the "running royalty." Damages are designed to place the patentee in the position it would have occupied had the patent not been infringed; had the patent not been infringed the royalty would have been an estimate of the future as well as the present value of being allowed to practice the patent. An alternative to the running royalty would be a lump-sum royalty representing the present value of the expected future royalties, by analogy to a lump-sum damages award for lost future earnings in a tort case.

An award of damages could have given Apple damages in the form both of restitution of any past gains by Motorola from the infringements and of the present value of a reasonable royalty for future use by Motorola of the patented inventions. Although an order to pay a royalty in the future certainly sounds like an equitable order (a mandatory injunction) and can be one as we noted earlier, the Federal Circuit in *Telcordia Technologies, Inc. v. Cisco Systems, Inc.*, 612 F.3d 1365, 1378–79 (Fed. Cir. 2010), indicated that alternatively it could be part of a jury's verdict on damages. If past damages are awarded along with future damages either calculated as a lump sum or as a nonequity running-royalty order, there would be no occasion to order equitable relief.

I am mindful that *Amado v. Microsoft Corp.*, 517 F.3d 1353, 1361–62 (Fed. Cir. 2008), holds that the retrospective reasonable royalty (damages "going backward") should be lower than the prospective royalty ("going forward") to reflect the parties' greater certainty in the latter case—infringement having been determined by a court and not merely claimed by the patentee—that the device really does infringe a valid patent. See also *Bard Peripheral Vascular, Inc. v. W.L. Gore & Associates, Inc., supra*, 670 F.3d at 1193. This is consistent with the proposition that the forward royalty is an injunction substitute, so not really damages, so not really based on what the parties might have negotiated years earlier. Fair enough. But nothing in the record of this case—a record now closed—enables me to calculate the adjustment necessary to determine either a running royalty or a lump-sum royalty.

Although both parties asked for injunctive relief, neither named an expert witness who would testify about such relief—either about an injunction or about the equitable substitute of a compulsory license at a reasonable royalty were an injunction denied. Neither party suggested that any of its damages experts had an opinion about such a royalty, except that one of them, Professor Dennis Carlton, properly challenged Motorola's claim to be entitled to what in effect would be a hold-up royalty for standards-essential patents.

The reports of the damages experts no more provide a rational basis for computing royalties going forward than for computing royalties going backward, even if they are different rates. Damages experts in a patent case would be expected to estimate running royalties as well as past damages, but none has done so in this case.

But all this is an aside because in the brief Apple filed on June 18 in response to my order of June 13 it states that it cannot compute a prospective royalty (either a running or a lump-sum royalty) because that computation would depend on expert evidence that I struck. Instead it argues that it is entitled to an injunction because it has no adequate damages remedy for future losses attributable to continuing infringement by Motorola.

A patentee cannot base a claim to an injunction on a self-inflicted wound, such as sponsoring a damages expert who prepares a demonstrably inadequate report. What is true, but a different point, is that the fact that a patentee seeks and even obtains damages for past harm from infringement does not disable it from obtaining injunctive relief. *Acumed LLC v. Stryker Corp.*, 551 F.3d 1323, 1328 (Fed. Cir. 2008). It might have been able to quantify only a small part of the harm that it had incurred, and similarly might be able to quantify only a small part of the future harm it would incur if the infringement continued. And then it might well be entitled to an injunction, as well as to (only partially adequate) damages for past infringement.

Apple in conjuring loss of consumer goodwill and of market share tries to make the kind of case for an injunction that was made successfully by the plaintiff in *i4i Ltd. Partnership v. Microsoft Corp.*, 598 F.3d 831, 862 (Fed. Cir. 2010), where the court concluded that "a small company was practicing its patent, only to suffer a loss of market share, brand recognition, and customer goodwill as the result of the defendant's infringing acts. Such losses may frequently defy attempts at valuation, particularly when the infringing acts significantly change the relevant market, as occurred here." Apple is not a "small company"; its market capitalization exceeds that of Google and Microsoft combined. To suggest that it has suffered loss of market share, brand recognition, or customer goodwill as a result of Motorola's alleged infringement of the patent claims still in play in this case is wild conjecture. And until about a week ago Apple had not suggested in this litigation that the losses it allegedly suffered or will suffer from the alleged infringement "defy attempts at valuation."

In its latest written and oral submissions Apple attempts what I told its legal team at a pretrial conference I would not let it do in the liability trials then envisaged: turn the case into an Apple versus Motorola popularity contest. Apple wanted me to allow into evidence media reports attesting to what a terrific product the iPhone is. I said I would not permit this because the quality of the iPhone (and of related Apple products, primarily the iPad) and consumers' regard for it have, so far as the record shows, nothing to do with the handful of patent claims that I had ruled presented triable issues of infringement. Apple's "feel good" theory does not indicate that infringement of *these* claims (if they were infringed) reduced Apple's sales or market share, or impaired consumer goodwill toward Apple products. Typical is the statement in Apple's brief of June 18 that "an Apple survey identified watching streaming videos from YouTube among the top ten planned activities for consumers using iPads in the

United States." The '263 patent in issue in this litigation is not a claim to a monopoly of streaming video!

Apple is complaining that Motorola's phones *as a whole* ripped off the iPhone *as a whole*. But Motorola's desire to sell products that compete with the iPhone is a separate harm—and a perfectly legal one—from any harm caused by patent infringement.

Because there are such substantial grounds for skepticism concerning the harm that Apple is likely to incur from continued infringement, cf. *Lucent Technologies, Inc. v. Gateway, Inc.*, *supra*, 580 F.3d at 1333, it would not be proper even to consider ordering an injunction without evidence that would enable me to compare the costs and benefits of an injunction with the costs and benefits of the substitute equitable remedy of a compulsory license with a reasonable royalty, that is, a running (ongoing) royalty. Apple, as noted earlier, has acknowledged that it can't estimate a royalty substitute for an injunction—not because such an estimate is inherently infeasible but because I struck the proposed testimony of its indispensable damages witness, Mr. Napper. While such a royalty may perhaps, as held or assumed in the *Telcordia* case, be part of a damages remedy (the remedy "at law" as distinct from an equitable remedy), it certainly can be a substitute equitable remedy for an injunction. This possibility is germane to the "balance of hardships" component of *eBay*'s test for whether to grant an injunction in a patent case. 547 U.S. at 391.

Apple tries to elide the issue of a royalty substitute for an injunction by trivializing the costs of an injunction to Motorola. It says it has no objection to delaying the effective date of the injunction for a period of three months to allow Motorola to try to invent around the Apple patents. If Motorola succeeded during that period in inventing around—that is, in duplicating the functionality of Apple's patents without infringing them—the cost of the injunction to Motorola would be no greater than if

Motorola had invented around in the first place rather than infringing.

I am not persuaded by Apple's soothing reassurance that a tailored injunction would avert significant hardship to Motorola. Apple ignores the following possibilities: that a non-infringing invent-around cannot be completed, installed, and tested within three months (Motorola might therefore return to court seeking a modification of the injunction); that the cost to Motorola of retooling its production lines to make the redesigned devices would be considerable and a further source of delay in completing the invent-around in three months; that Motorola might have to destroy (if it is not feasible to rebuild) the smartphones that are in its inventory or in the inventories of distributors and can be refitted with the invent-around only at a cost so stiff as to make the devices unsalable at a competitive price; and, perhaps most ominous, that Apple will sue Motorola alleging that the redesigned phones still infringe its patents, just as it is challenging HTC's design-around of the '647 in current proceedings before the International Trade Commission.

Also ignored are the harm that an injunction might cause to consumers who can no longer buy preferred products because their sales have been enjoined, and the cost to the judiciary as well as to the parties of administering an injunction—which under the rubric of "public interest" is another factor that *eBay* requires me to weigh in deciding whether to grant injunctive relief. 547 U.S. at 391. The danger that Apple's goal in obtaining an injunction is harassment of its bitter rival, requiring particularly watchful supervision by the court should it issue the injunction, is suggested by the fact that while a delayed injunction would in principle render no benefit to Apple besides harming its competitor by forcing it to waste time and money finding a new way of performing the functions now performed in an allegedly infringing manner, an ongoing royalty would yield significant income to Apple—yet which it wants to forgo in favor of imposing costs and litigation burdens on its adversary.

Because of the potential costs to Motorola and the federal judiciary I could not responsibly order injunctive relief in favor of Apple without knowing whether the lower cost of a compulsory license at a reasonable royalty would produce a better balance of hardships. I note, amplifying earlier points, the absence of evidence that if Motorola is infringing the patent claims at issue, it is imposing a significant cost on Apple. Consider the '002, which Apple charges is infringed by Motorola's preventing partial obstruction of its smartphones' notification windows. There is no evidence, and it seems more than unlikely, that occasional partial obstruction would appreciably reduce the value of Motorola's smartphones to consumers—Apple didn't even bother to install a notification window on its devices until last year. Consider next the '949, which Apple contends is infringed by Motorola's enabling customers who buy a Motorola smartphone with a Kindle reader pre-installed to turn pages by tapping on the screen rather than by swiping a finger across it (which actually is more like turning pages than tapping is). Consider the '263, the realtime patent, alleged to be infringed by Motorola's adopting a method for avoiding glitches in "real time" communications (such as movies) that has not been shown to provide a superior experience to consumers than alternative, noninfringing realtime software or hardware or otherwise drive consumer demand for the iPhone. And consider the '647 (structural linking and detection), which also provides unproved consumer benefits.

The notion that these minor-seeming infringements have cost Apple market share and consumer goodwill is implausible, has virtually no support in the record, and so fails to indicate that the benefits to Apple from an injunction would exceed the costs to Motorola. An injunction that imposes greater costs on the defendant than it confers benefits on the plaintiff reduces net social welfare. That is the insight behind the "balance of hardships" component of the *eBay* standard for injunctive relief in patent cases.

And I must not lose sight of the basic principle that injunctive relief is available only when the remedy at law is inadequate—that is, only when damages would not provide complete relief. As noted in *Stickle v. Heublein, Inc.*, 716 F.2d 1550, 1563 (Fed. Cir. 1983)—though the point is too obvious to require a citation—a patentee can't obtain an injunction (and, by parity of reasoning, an ongoing royalty in lieu of an injunction) if either damages or an equitable substitute such as a running royalty would provide complete relief. Ordinarily a running royalty, combined with the damages remedy for past sales, should provide full compensation to the patentee, thus obviating injunctive relief.

Apple could have sought such a remedy, but did not. It bases its claim for injunctive relief on future harms that it claims cannot be quantified for purposes of a monetary remedy, namely loss of consumer goodwill and of market share. In fact such losses are conventional items of damages. But assume they can't be quantified in this case. An injunction would not prevent these losses, as I have explained, given the feasibility of avoiding the effect of the injunction by either doing without a functionality that may be worth very little (such as the functionality that prevents application programs from ever partially, though not entirely blocking, a notification window, in the '002, or that enables pages in a Kindle application to be turned by tapping rather than swiping, in the '949), or by inventing around, such as inventing around the '263, which, because of the deficiencies of Napper's expert report, I cannot conclude would be expensive, or inventing around the '647 patent by reprogramming Motorola's smartphones to avoid at least one claim limitation, for example by simply creating copies of the code that performs structure detection and linking for each particular program rather than using a common code module for all programs, because if there is no common code there is no "analyzer *server*," as required by the patent claim.

By failing to present a minimally adequate damages case, Apple has disabled itself from arguing that damages would not provide a complete remedy, going forward in the form of running royalties, as well as backward. It harps on loss of consumer goodwill and market share, as a ground for an injunction, but not only has no real evidence of such loss, but, given the nature of the patent claims, it is not a loss that an injunction would avert. Apple's case for injunctive relief flunks the irreparable injury, balance of hardships, and public interest standards of *eBay*.

The deadline for discovery was April 23, 2012, and for expert reports March 20, and supplementation of expert reports continued through late April. The expert and the other witnesses have been deposed. The parties do not claim to have been rushed unduly by Judge Crabb (who presided over the litigation before the case was assigned to me) or by me. They are proud, as they should be, of their ability to provide superb service to their clients under time pressure that would crush less skilled and resourced firms and clients. There is no question of surprise, or haste in ruling on the issues of relief. The parties have had a full opportunity to present all evidence germane to summary judgment proceedings on relief. Apple describes the brief that it filed on June 18 as its offer of the evidence it would present at a full evidentiary hearing on relief, and does not evince a desire, or claim a right, to present additional evidence. It turns out that despite the parties' best efforts, they do not have evidence to withstand summary judgment on damages and injunctive relief.

Declaratory Relief. The parties seek declaratory judgments of invalidity and noninfringement of their opponents' patents. Motorola concedes, as I said at the outset of this opinion, that once damages and injunctive relief drop out, it has no basis for seeking declaratory relief. Apple, however, argues (or argued, for it may have dropped its request for declaratory relief) that with the case ready for trial after an extensive and very costly pretrial period (it made this argument at the June 7 hearing, held just four days before the trials had been scheduled to begin), it is a waste of resources to abort the trials. It is true that any continued sale of Motorola products, including the products involved in this case that are alleged to violate Apple's patents would be a fresh act of alleged infringement and Apple could bring a new suit just like this one, though it would have to contend with a possible defense of collateral estoppel to some or many of its claims and contentions. But as Motorola points out, if a plaintiff fails to establish any basis for an award of relief, the defendant is entitled to a judgment dismissing the case with prejudice even if a future lawsuit between the parties, continuing their dispute, can be anticipated. "[A]n actual controversy cannot be based on a fear of litigation over future products." *Amana Refrigeration, Inc. v. Quadlux, Inc.*, 172 F.3d 852, 855–56 (Fed. Cir. 1999); cf. *ATA Airlines, Inc. v. Federal Express Corp.*, 665 F.3d 882, 896 (7th Cir. 2011).

A party may sue for declaratory relief in federal court only if either it or its opponent could bring a federal suit for injunctive or monetary relief. See *Franchise Tax Board v. Construction Laborers Vacation Trust*, 463 U.S. 1, 19 and n. 19 (1983); *Skelly Oil Co. v. Phillips Petroleum Co.*, 339 U.S. 667, 671–74 (1950). An insurance company that denies coverage can seek a declaratory judgment against its insured, because the insured could sue the company for having broken the insurance contract by denying coverage. And a firm alleged to have infringed a patent can seek a declaratory judgment of noninfringement against the patentee because the latter could sue the former for infringement. But when the court has determined that neither party could obtain monetary or injunctive relief against the other, as in this case, a declaratory judgment in favor of either party would confer no tangible benefit on the victor and so there would be no federal subject-matter jurisdiction. *Jordan v. Sosa*, 654 F.3d 1012, 1026–27 (10th Cir. 2011); *Hickman v. State of Missouri*, 144 F.3d 1141, 1142 (8th Cir. 1998).

In any event the decision whether to grant declaratory relief is discretionary, 28 U.S.C. § 2201(a) (courts "may"—not "must"—issue declaratory judgments); *MedImmune, Inc. v. Genentech, Inc.*, 549 U.S. 118, 136 (2007); *Wilton v. Seven Falls Co.*, 515 U.S. 277, 286–89 (1995), and Apple concedes that "[t]here is no controlling case law that prevents that exercise of discretion [over whether to exercise declaratory judgment authority] in this case." Even if I could grant a declaratory judgment in this case, I would not do so, because the issuance of such a judgment would have no practical effect.

Form of Dismissal. It remains only to consider the appropriate form of the judgment of dismissal (actually dismissal*s*, because there are two suits—Apple's and Motorola's—which were consolidated for the sake of judicial economy). It might seem that the case has become moot, because the parties cannot obtain any benefit from further proceedings. But that is not correct. They can't obtain any benefit from further proceedings in this case but they can appeal its dismissal. And even if no appeal were planned, the case would not be moot, because a failure of proof, whether with respect to liability or to remedy, while it ends a case does not make the case moot. A dismissal for mootness ordinarily (though with exceptions, for example because of voluntary cessation by the defendant of his alleged misconduct, or because the case is capable of repetition but evades review) is without prejudice. Fed. R. Civ. P. 41(b); *University of Pittsburgh v. Varian Medical Systems, Inc.*, 569 F.3d 1328, 1332–33 (Fed. Cir. 2009); *Brereton v. Bountiful City Corp.*, 434 F.3d 1213, 1216–17 (10th Cir. 2006). And when a suit is dismissed without prejudice, so that the dismissal is not res judicata, the loser can (again with exceptions) refile it. *In re IFC Credit Corp.*, 663 F.3d 315, 320

(7th Cir. 2011); *Robinson v. Sherrod*, 631 F.3d 839, 843 (7th Cir. 2011). It would be ridiculous to dismiss a suit for failure to prove damages and allow the plaintiff to refile the suit so that he could have a second chance to prove damages. This case is therefore dismissed with prejudice; a separate order to that effect is being entered today.

JUDGMENT

DATED JUNE 22, 2012

AO 450 (Rev. 11/11) Judgment in a Civil Action

UNITED STATES DISTRICT COURT

for the

Northern District of Illinois

Apple, Inc. and NeXT Software Inc.,	)	
Plaintiff	)	
v.	)	Civil Action No. 1:11-cv-08540
Motorola, Inc. and Motorola Mobility, Inc.,	)	
Defendant	)	

JUDGMENT IN A CIVIL ACTION

The court has ordered that *(check one)*:

☐ the plaintiff *(name)* ______________________ recover from the defendant *(name)* ______________________ the amount of ______________________ dollars ($ ________), which includes prejudgment interest at the rate of ________ %, plus post judgment interest at the rate of ________ % per annum, along with costs.

☐ the plaintiff recover nothing, the action be dismissed on the merits, and the defendant *(name)* ______________________ recover costs from the plaintiff *(name)* ______________________ .

☑ other: The case, including all claims and counterclaims, is dismissed with prejudice.

This action was *(check one)*:

☐ tried by a jury with Judge ______________________ presiding, and the jury has rendered a verdict.

☐ tried by Judge ______________________ without a jury and the above decision was reached.

☑ decided by Judge Richard A. Posner on ~~a motion~~ motions for summary judgment.

Date: June 22, 2012

CLERK OF COURT, Thomas G. Bruton

Signature of Clerk or Deputy Clerk

Alyce Mobley Morris, Deputy Clerk

PATENT NO. 5,946,647
DATED AUGUST 31, 1999

PATENT NO. 6,343,263
DATED JANUARY 29, 2002

A185

PATENT NO. 7,479,949

DATED JANUARY 20, 2009

US007479949B2

(12) **United States Patent**
Jobs et al.

(10) **Patent No.: US 7,479,949 B2**
(45) **Date of Patent: *Jan. 20, 2009**

(54) **TOUCH SCREEN DEVICE, METHOD, AND GRAPHICAL USER INTERFACE FOR DETERMINING COMMANDS BY APPLYING HEURISTICS**

(75) Inventors: **Steven P. Jobs**, Palo Alto, CA (US); **Scott Forstall**, Mountain View, CA (US); **Greg Christie**, San Jose, CA (US); **Stephen O. Lemay**, San Francisco, CA (US); **Scott Herz**, San Jose, CA (US); **Marcel van Os**, San Francisco, CA (US); **Bas Ording**, San Francisco, CA (US); **Gregory Novick**, Santa Clara, CA (US); **Wayne C. Westerman**, San Francisco, CA (US); **Imran Chaudhri**, San Francisco, CA (US); **Patrick Lee Coffman**, Menlo Park, CA (US); **Kenneth Kocienda**, Sunnyvale, CA (US); **Nitin K. Ganatra**, San Jose, CA (US); **Freddy Allen Anzures**, San Francisco, CA (US); **Jeremy A. Wyld**, San Jose, CA (US); **Jeffrey Bush**, San Jose, CA (US); **Michael Matas**, San Francisco, CA (US); **Paul D. Marcos**, Los Altos, CA (US); **Charles J. Pisula**, San Jose, CA (US); **Virgil Scott King**, Mountain View, CA (US); **Chris Blumenberg**, San Francisco, CA (US); **Francisco Ryan Tolmasky**, Cupertino, CA (US); **Richard Williamson**, Los Gatos, CA (US); **Andre M. J. Boule**, Sunnyvale, CA (US); **Henri C. Lamiraux**, San Carlos, CA (US)

(73) Assignee: **Apple Inc.**, Cupertino, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/101,832**

(22) Filed: **Apr. 11, 2008**

(65) **Prior Publication Data**

US 2008/0174570 A1 Jul. 24, 2008

Related U.S. Application Data

(63) Continuation of application No. 11/850,635, filed on Sep. 5, 2007.

(60) Provisional application No. 60/937,993, filed on Jun. 29, 2007, provisional application No. 60/937,991, filed on Jun. 29, 2007, provisional application No. 60/879,469, filed on Jan. 8, 2007, provisional application No. 60/879,253, filed on Jan. 7, 2007, provisional application No. 60/824,769, filed on Sep. 6, 2006.

(51) **Int. Cl.**
G09G 5/00 (2006.01)
G06F 3/048 (2006.01)

(52) **U.S. Cl.** **345/173**; 345/169; 715/786; 715/784

(58) **Field of Classification Search** 345/156, 345/157, 173–181
See application file for complete search history.

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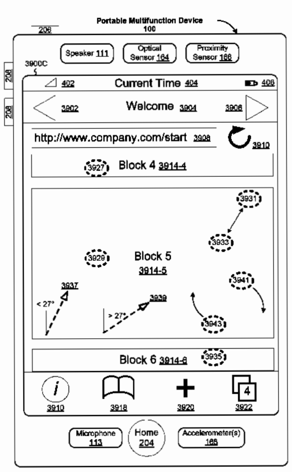

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Primary Examiner—Duc Q Dinh
(74) *Attorney, Agent, or Firm*—Morgan, Lewis & Bockius LLP

(57) **ABSTRACT**

A computer-implemented method for use in conjunction with a computing device with a touch screen display comprises: detecting one or more finger contacts with the touch screen display, applying one or more heuristics to the one or more finger contacts to determine a command for the device, and processing the command. The one or more heuristics comprise: a heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command, a heuristic for determining that the one or more finger contacts correspond to a two-dimensional screen translation command, and a heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.

20 Claims, 293 Drawing Sheets

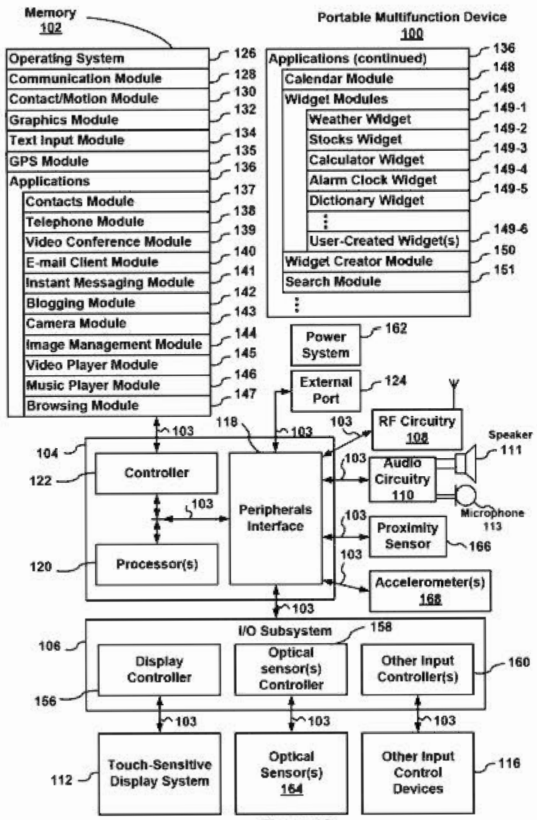


Figure 1A

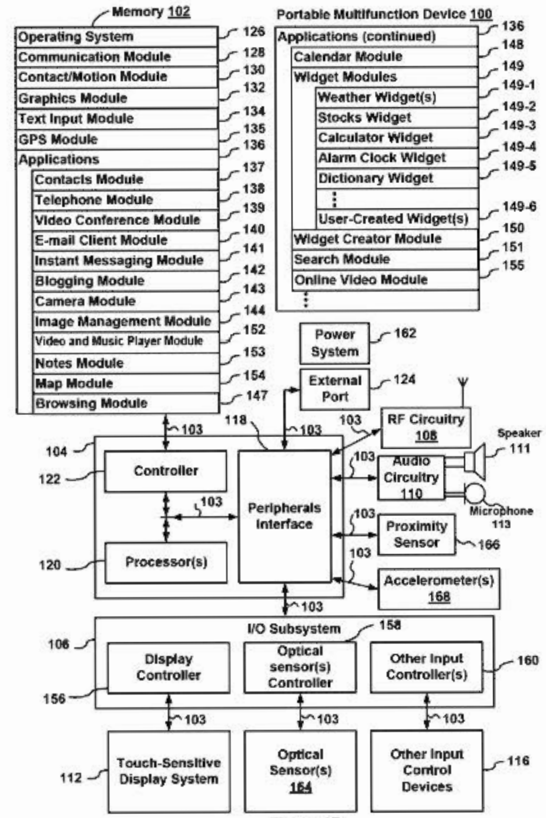


Figure 1B

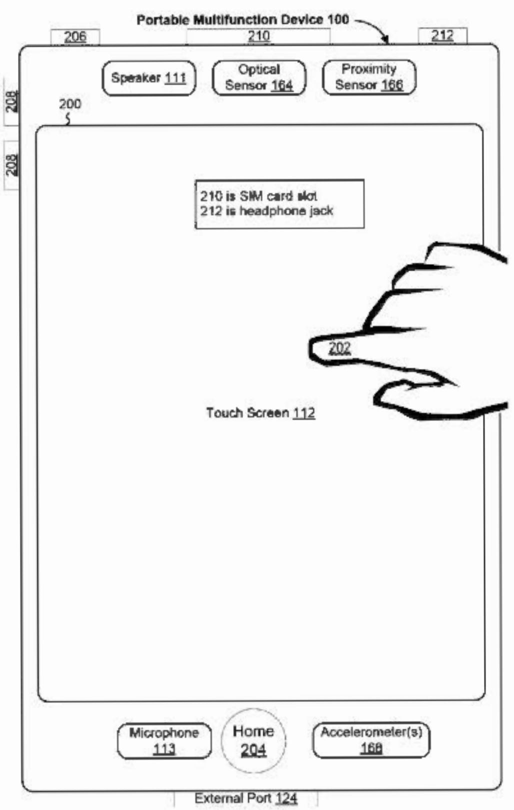


Figure 2

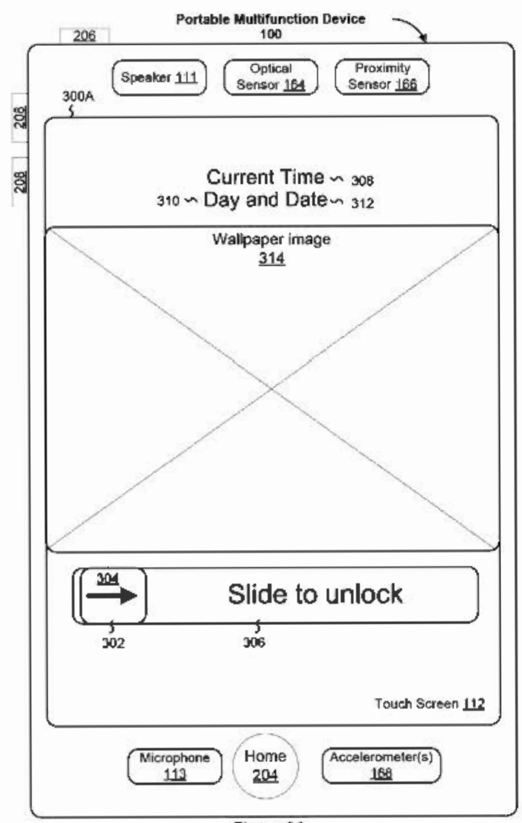


Figure 3A

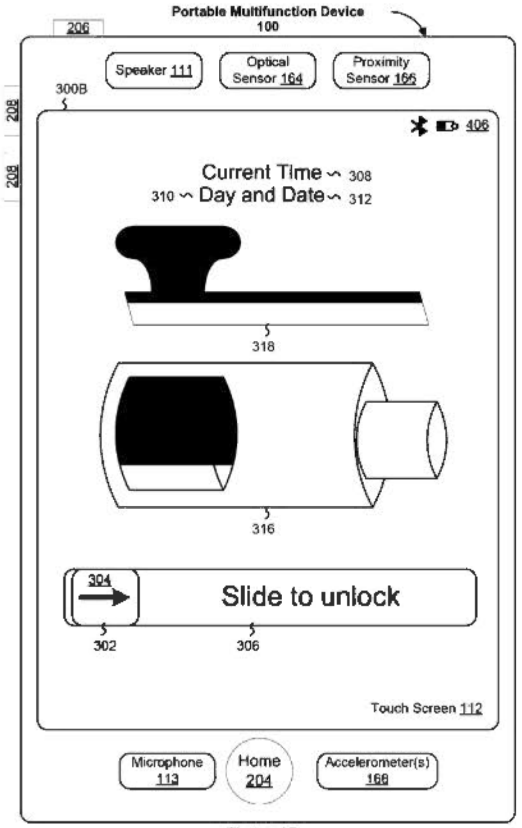


Figure 3B

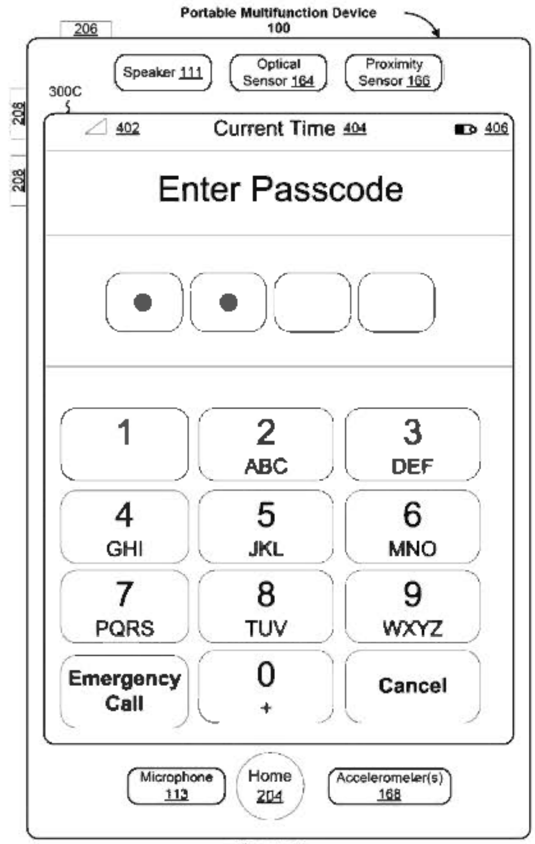


Figure 3C

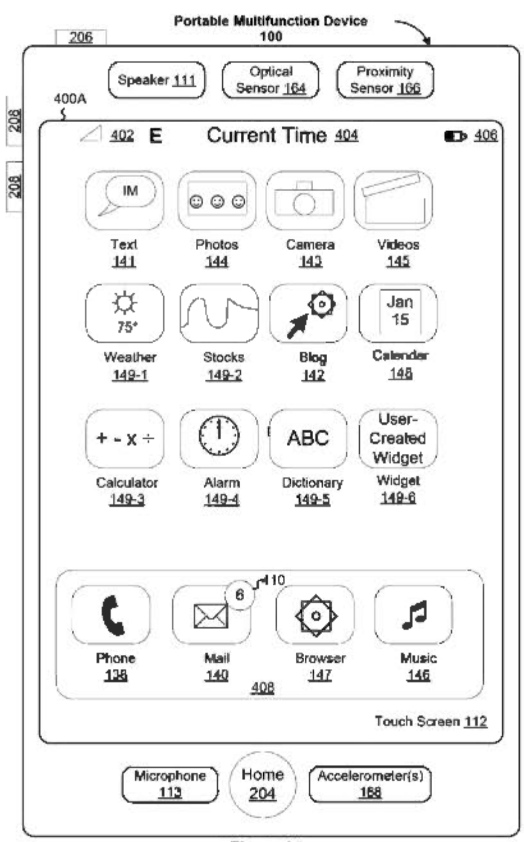


Figure 4A

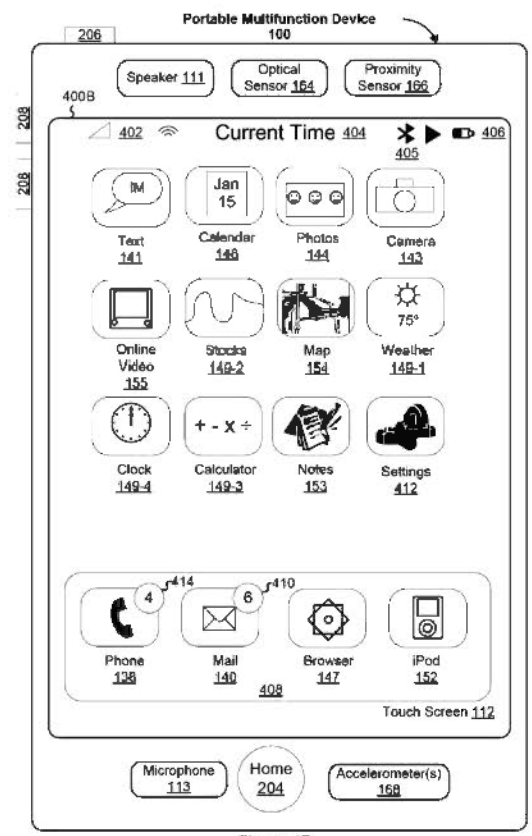


Figure 4B

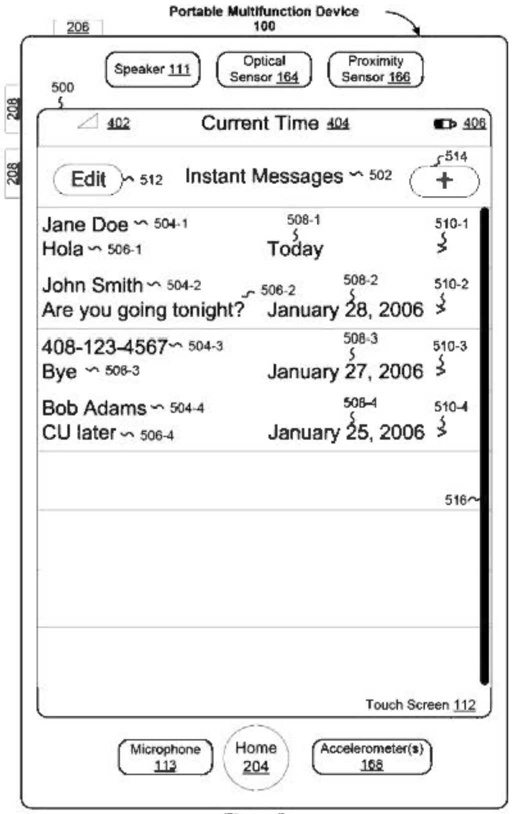


Figure 5

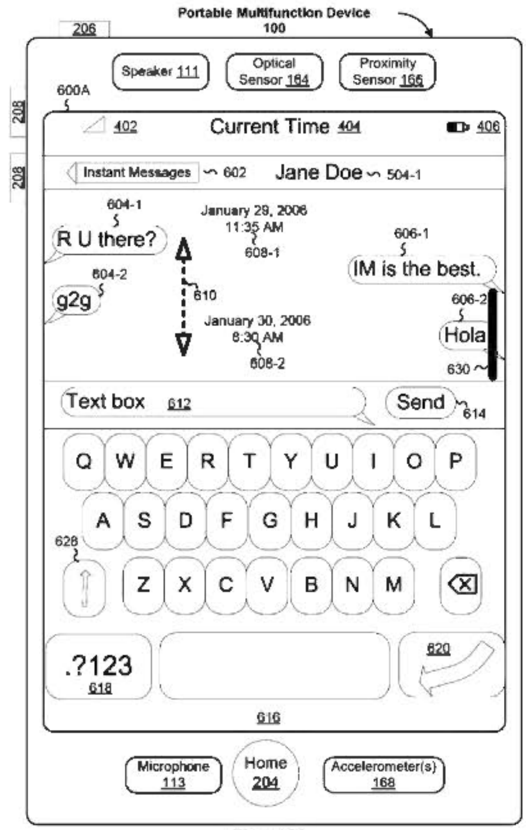


Figure 6A

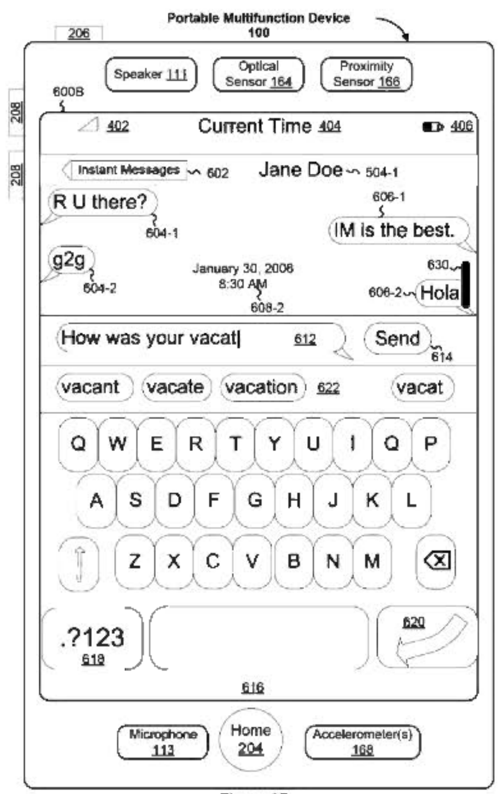


Figure 6B

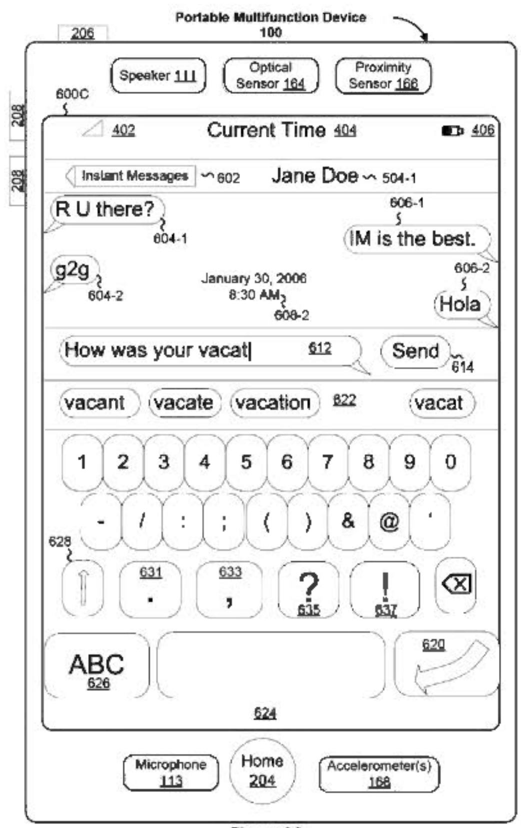


Figure 6C

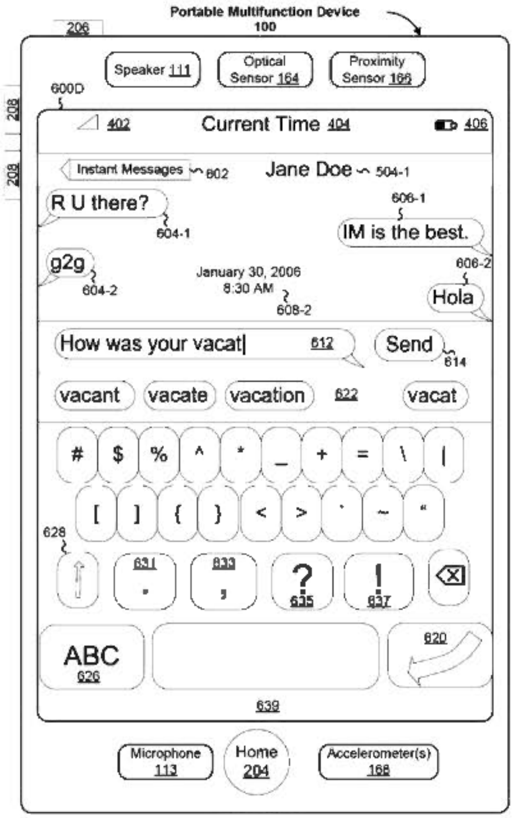


Figure 6D

Figure 6E

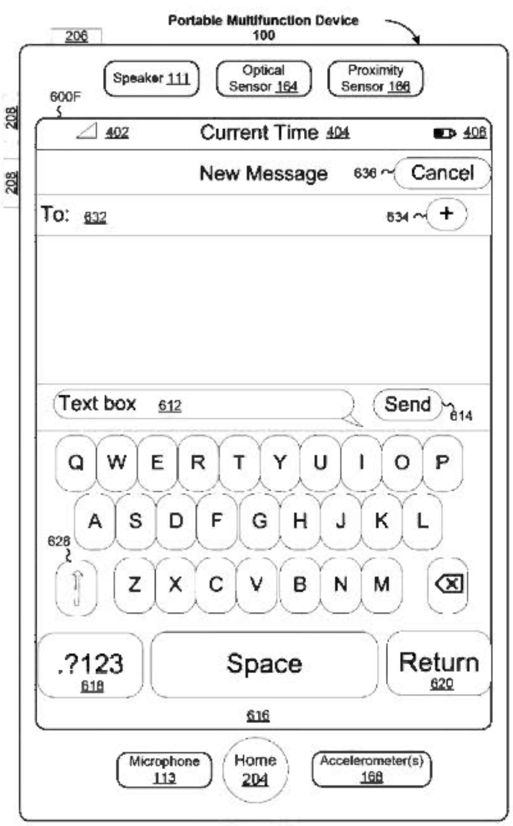


Figure 6F

Figure 6G

Figure 6H

Figure 6I

Figure 6J

Figure 6K

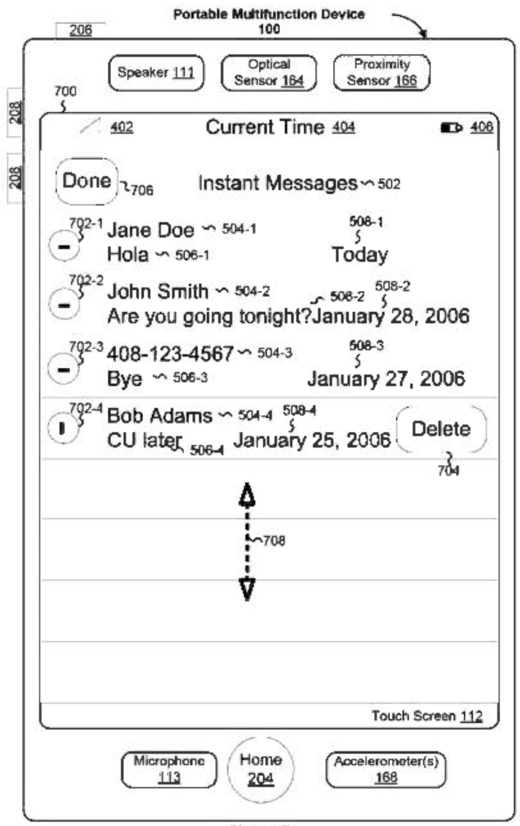


Figure 7

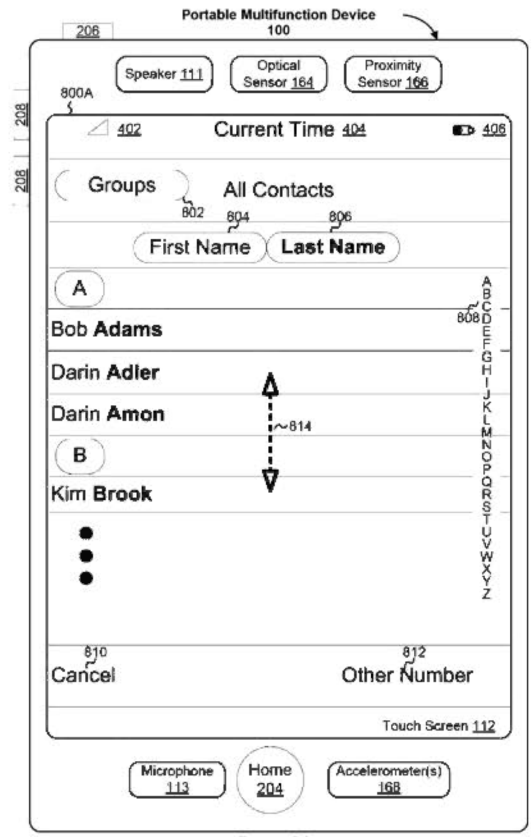


Figure 8A

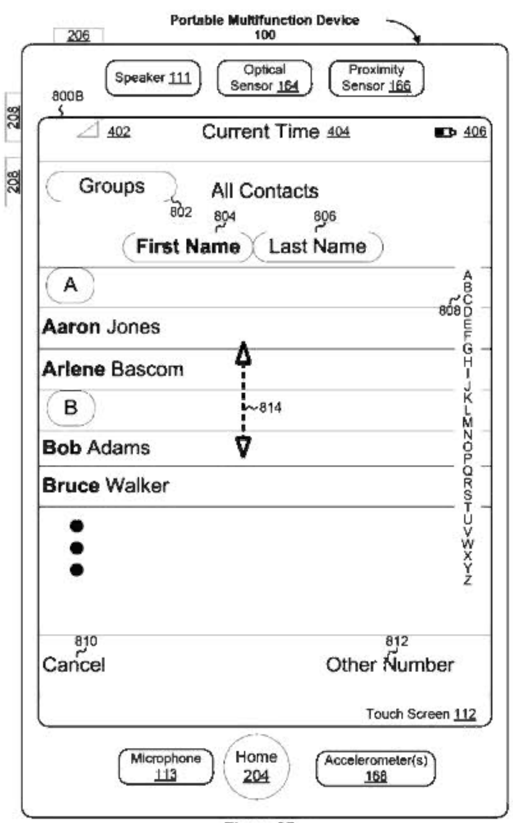


Figure 8B

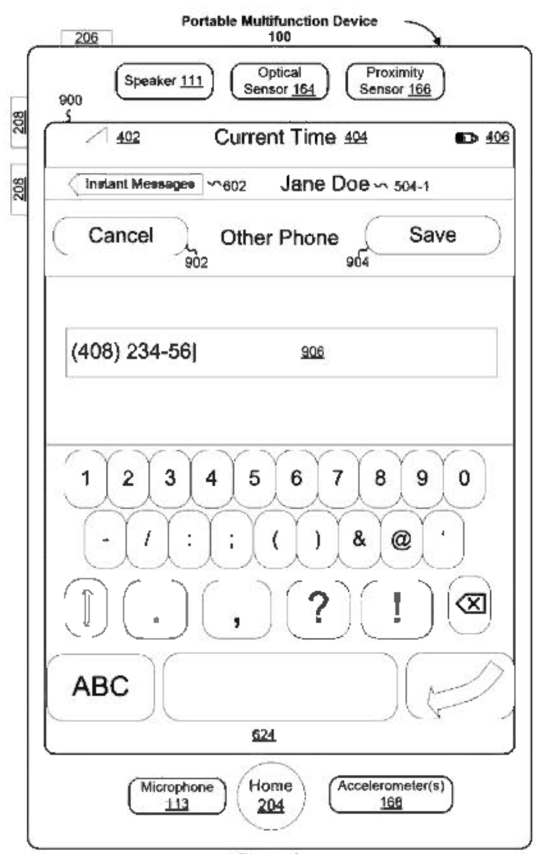


Figure 9

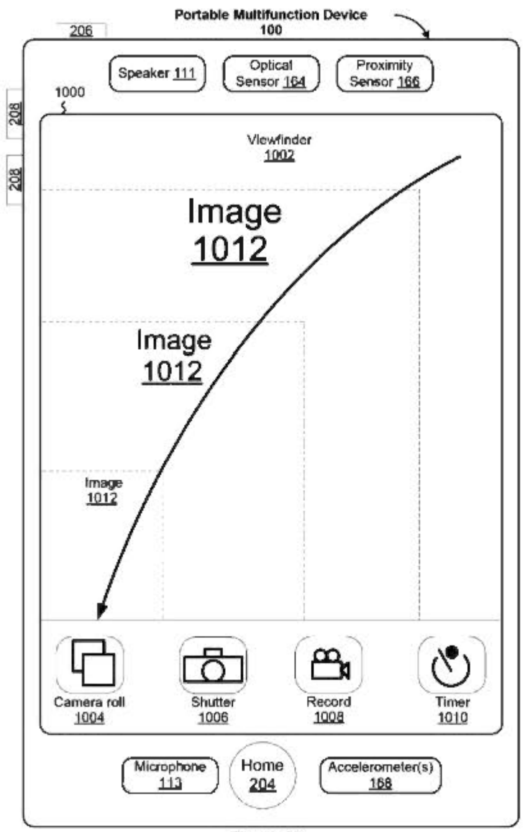


Figure 10

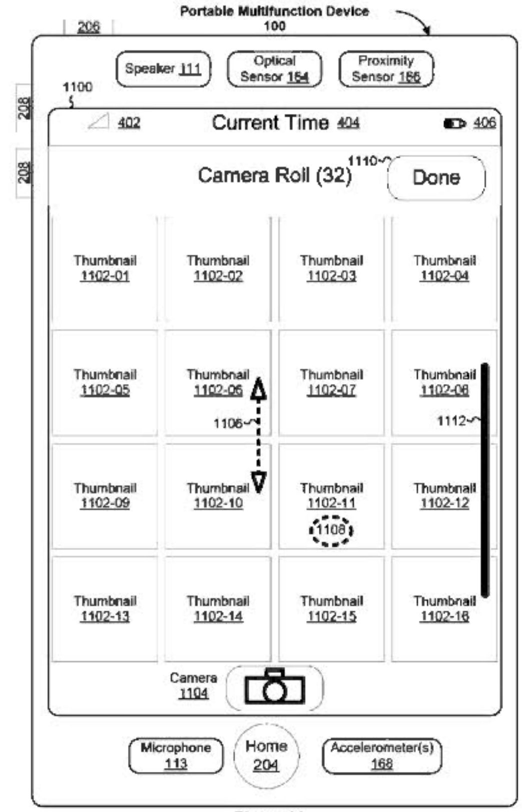
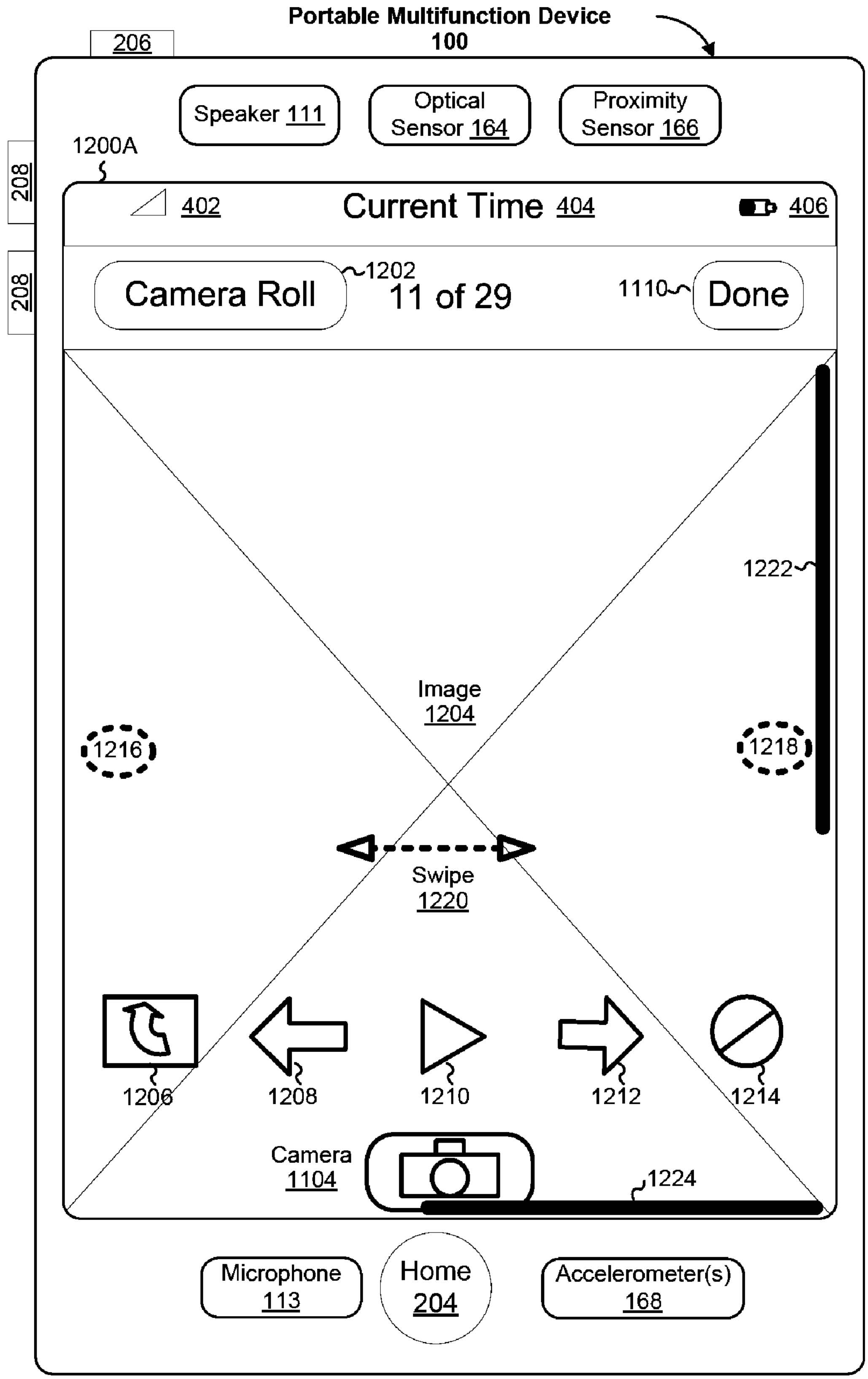


Figure 11



Portable Multifunction Device
100
206
208
208
Speaker 111
Optical Sensor 164
Proximity Sensor 166
1200A
402
Current Time 404
406
Camera Roll
1202
11 of 29
1110
Done
1222
Image
1204
1216
1218
Swipe
1220
1206
1208
1210
1212
1214
Camera
1104
1224
Microphone
113
Home
204
Accelerometer(s)
168

Figure 12A

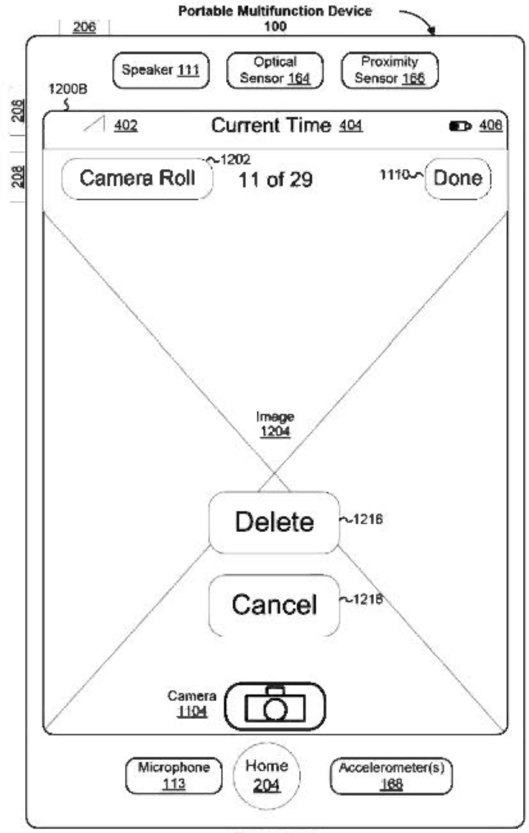


Figure 12B

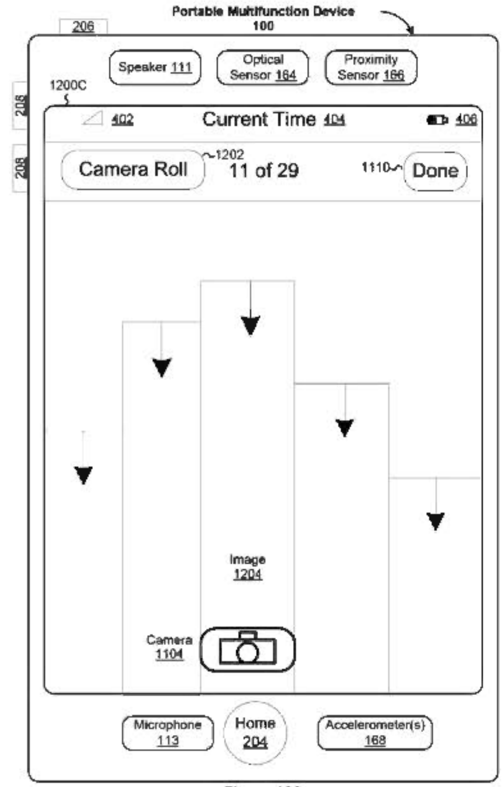


Figure 12C

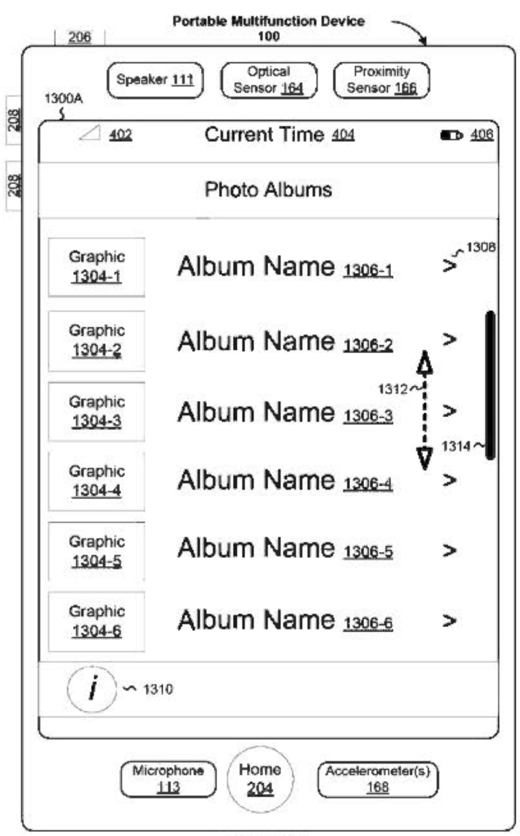


Figure 13A

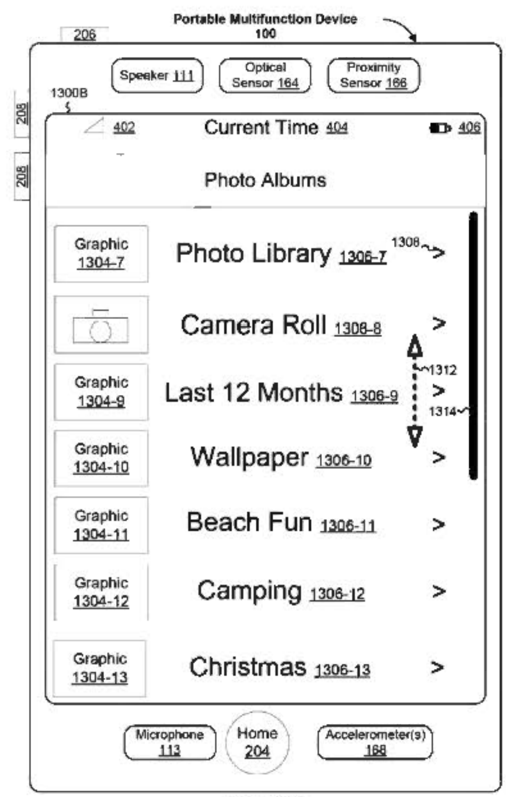


Figure 13B

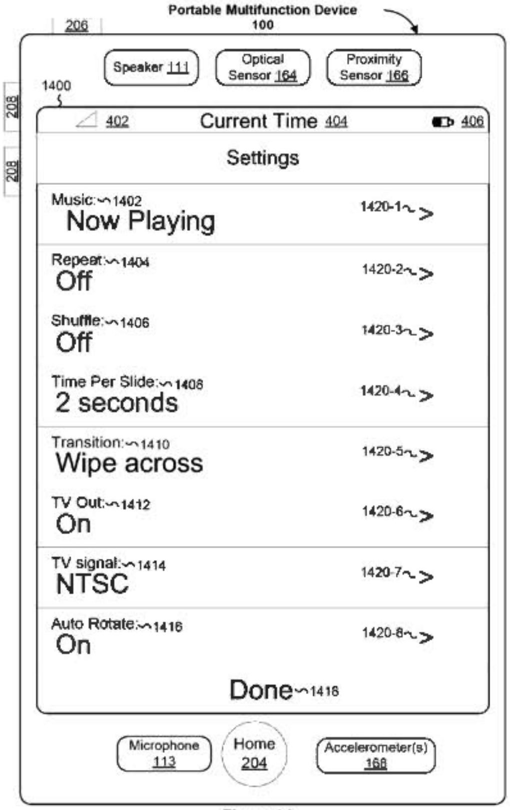


Figure 14

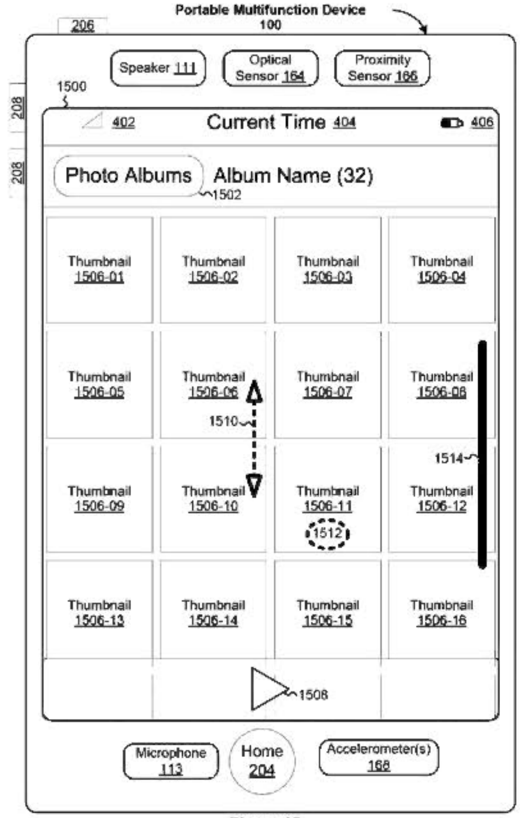
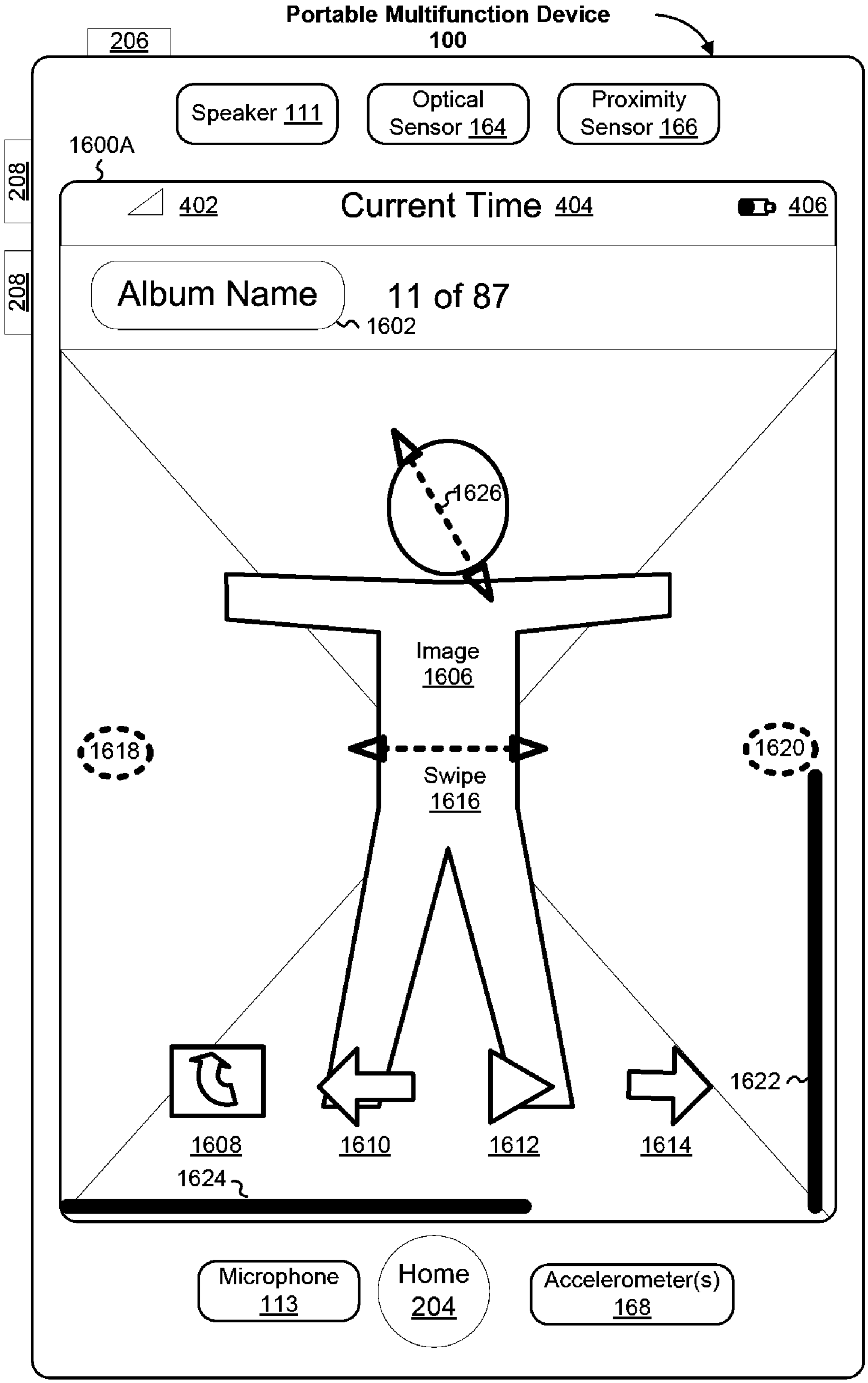
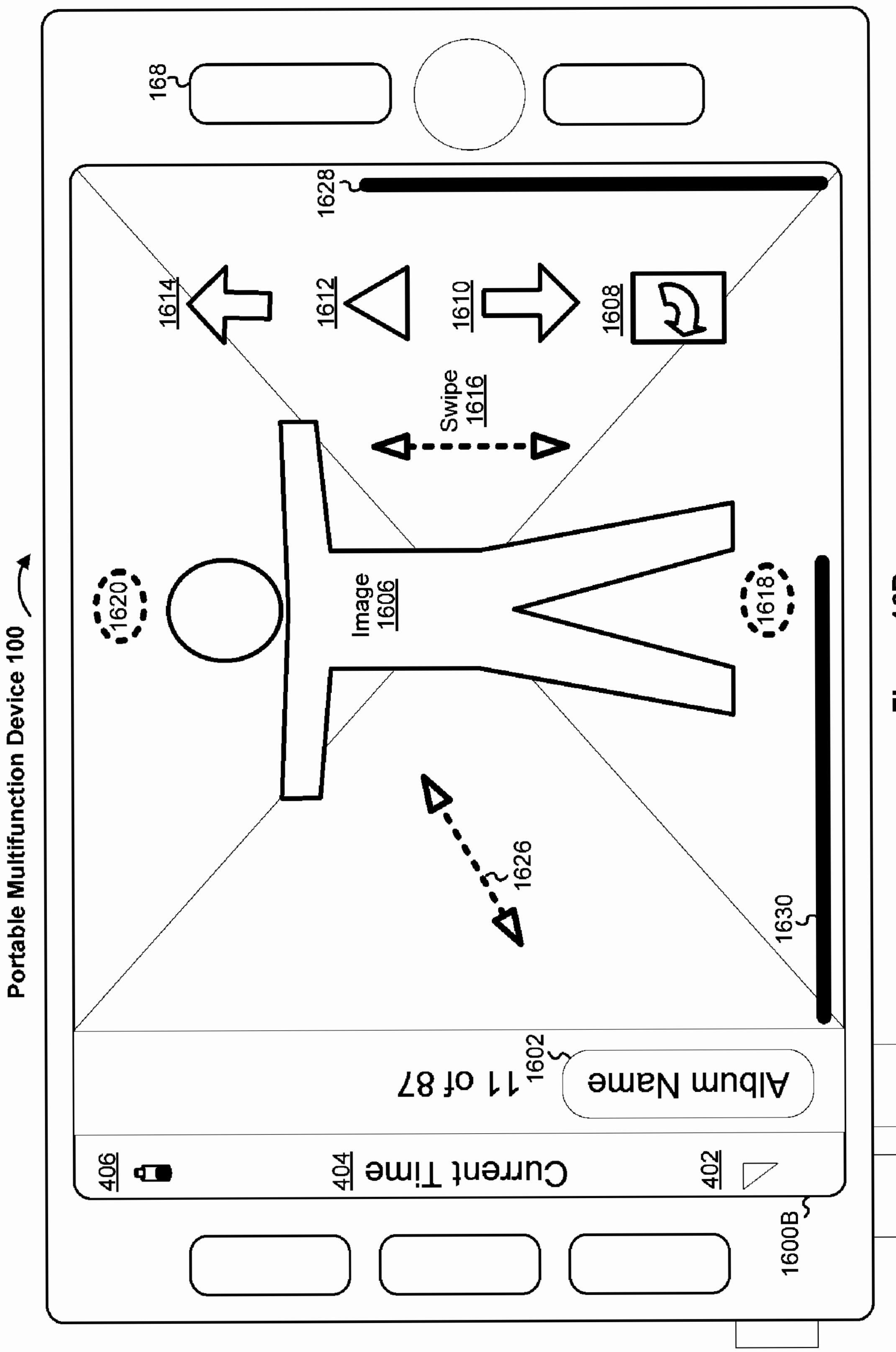


Figure 15



Portable Multifunction Device
100
206
208
208
Speaker 111
Optical Sensor 164
Proximity Sensor 166
1600A
402
Current Time 404
406
Album Name
11 of 87
1602
1626
Image
1606
1618
1620
Swipe
1616
1622
1608
1610
1612
1614
1624
Microphone 113
Home 204
Accelerometer(s) 168

Figure 16A


Portable Multifunction Device 100
168
1628
1614
1612
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1608
Swipe
1616
Image
1606
1620
1618
1626
1630
1602
11 of 87
Album Name
406
404
Current Time
402
1600B

Figure 16B

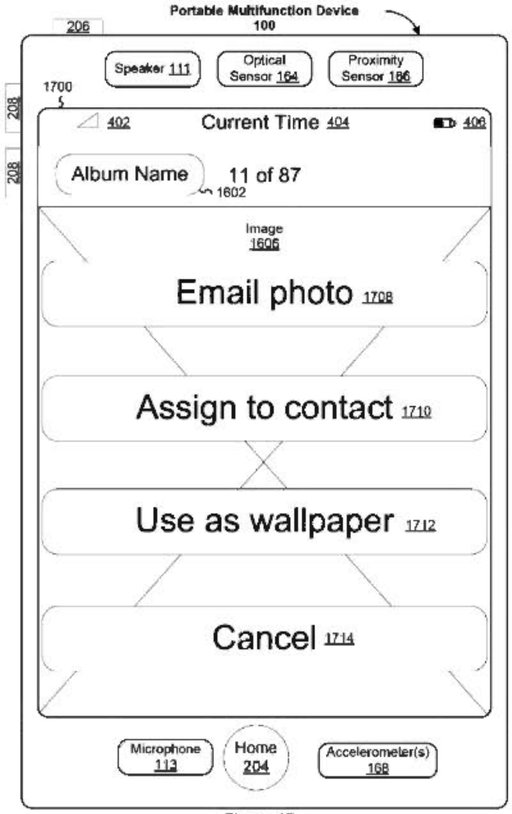


Figure 17

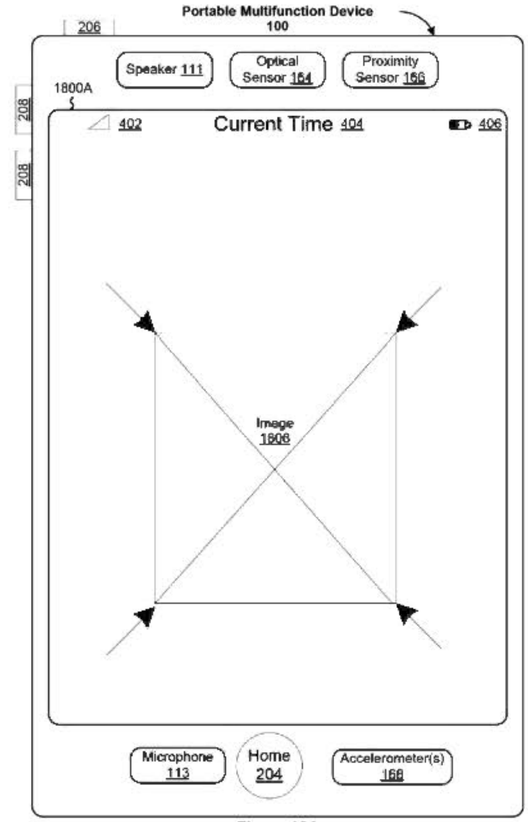


Figure 18A

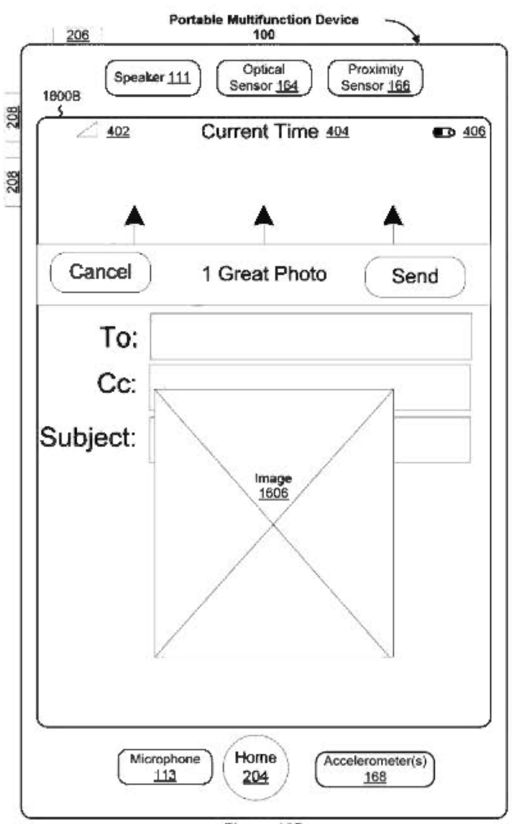


Figure 18B

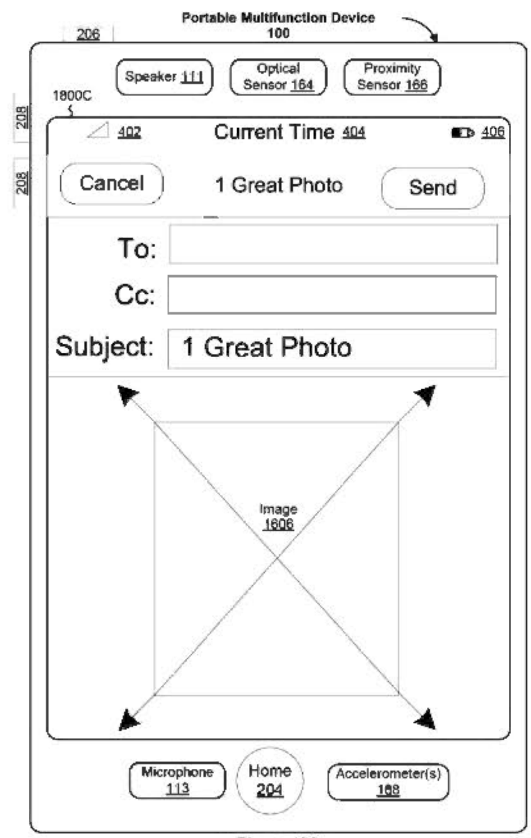


Figure 18C

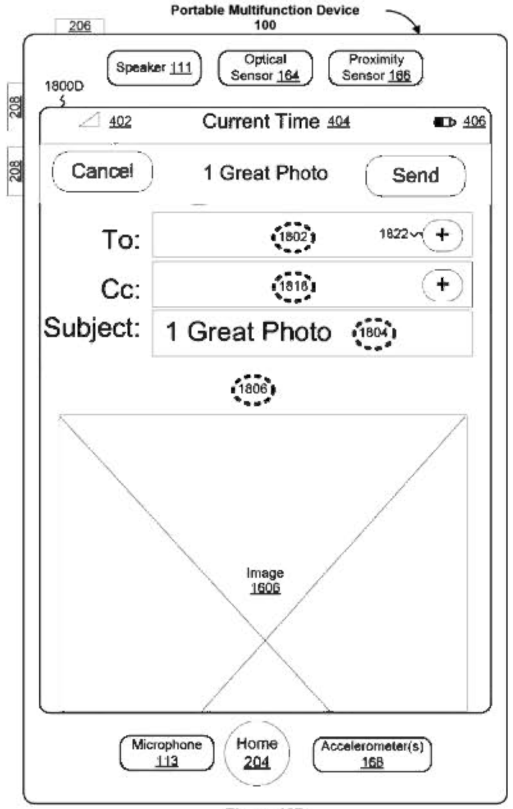


Figure 18D

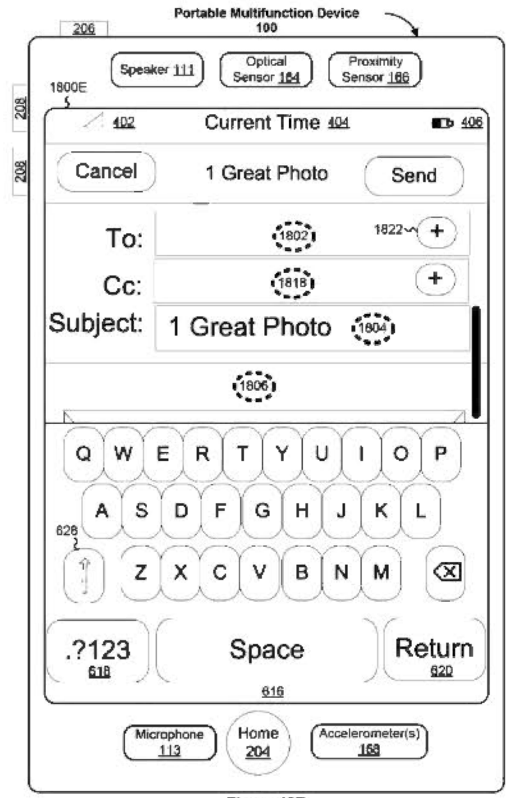


Figure 18E

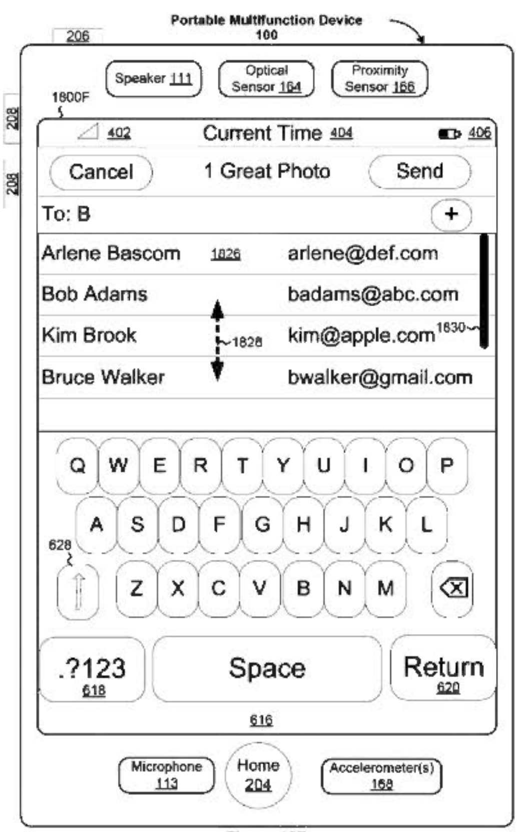


Figure 18F

Figure 18G

Figure 18H

Figure 18I

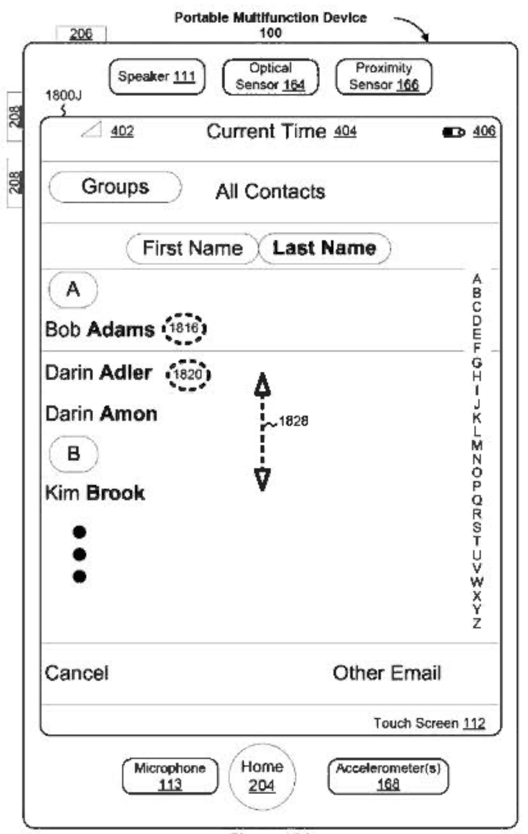


Figure 18J

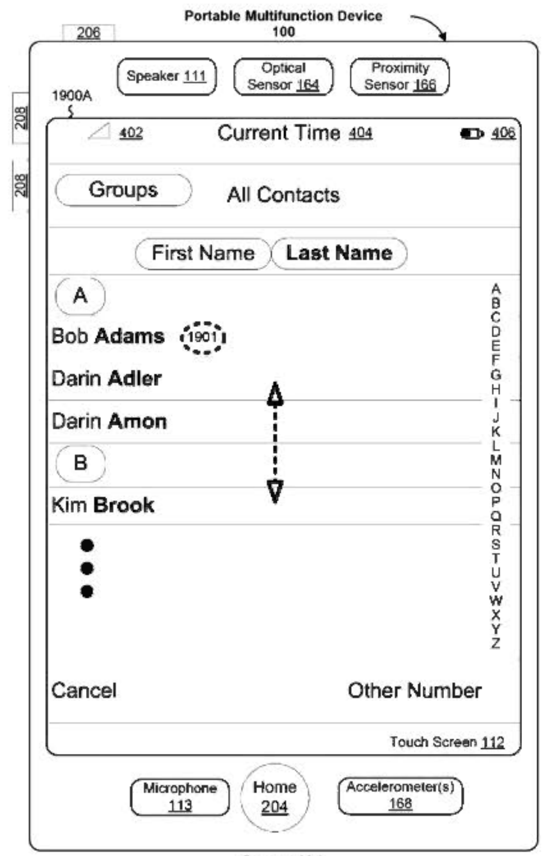


Figure 19A

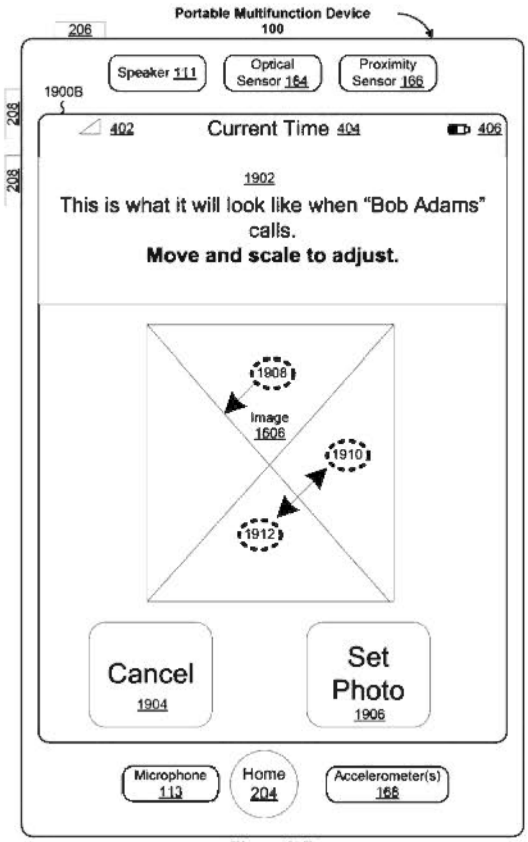


Figure 19B

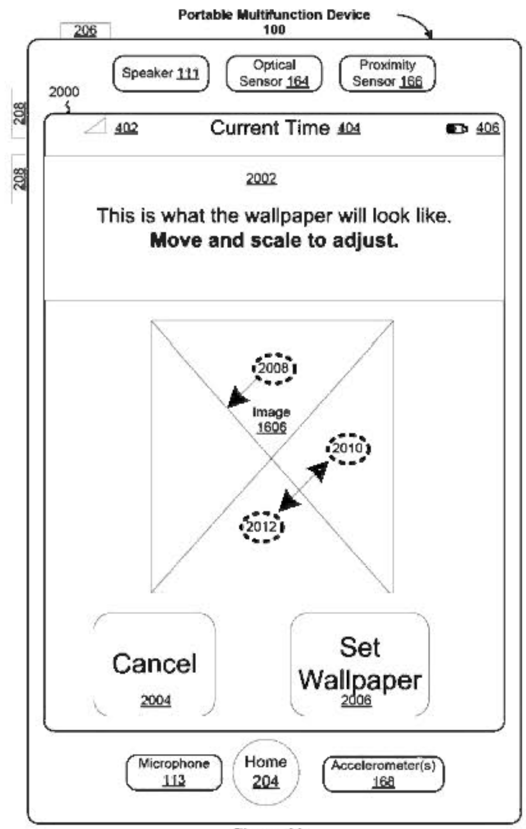


Figure 20

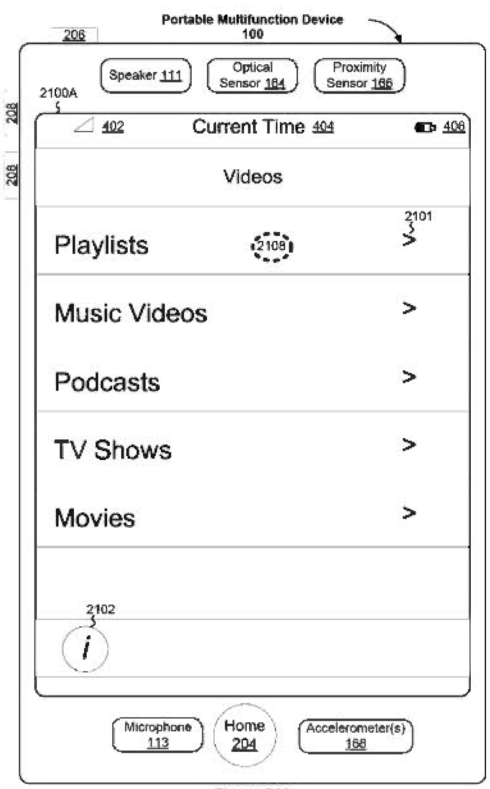


Figure 21A

Figure 21B

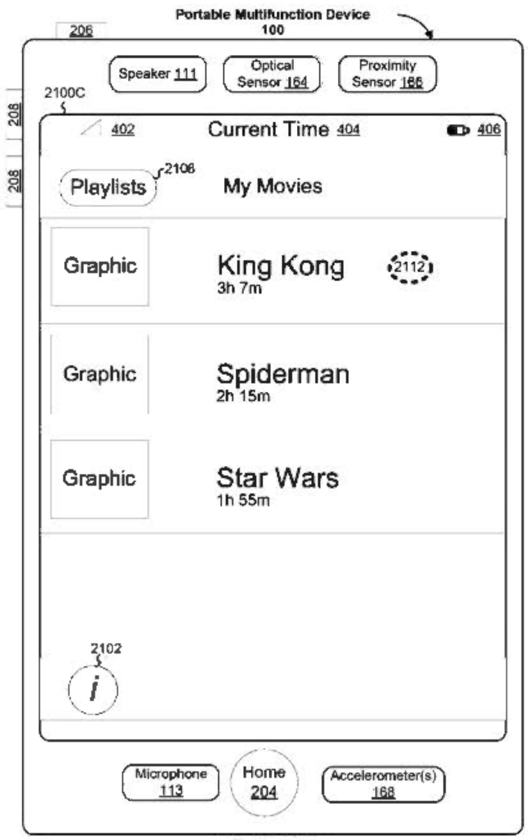


Figure 21C

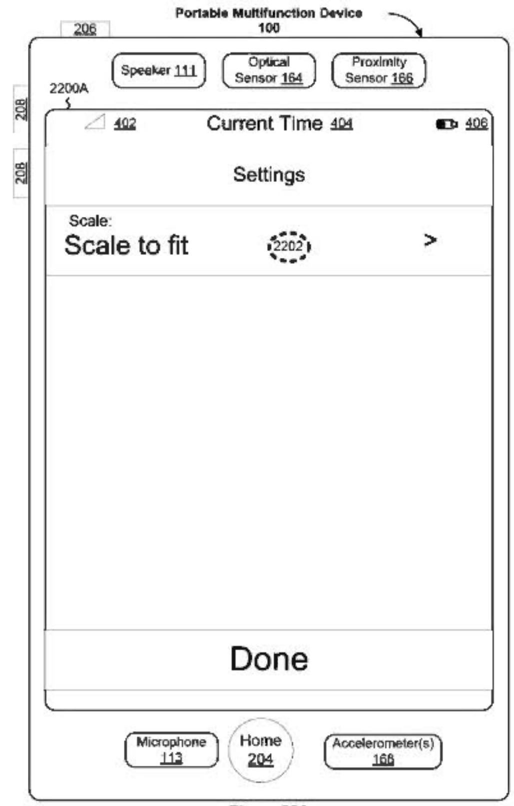


Figure 22A

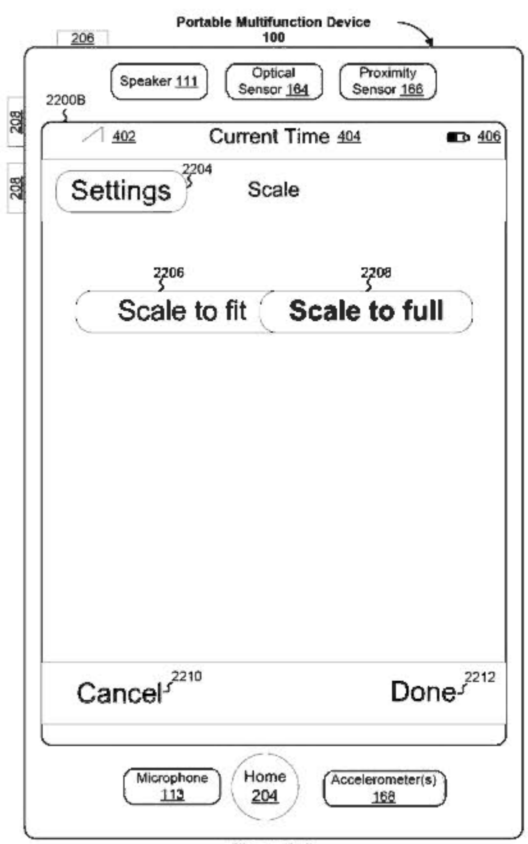


Figure 22B

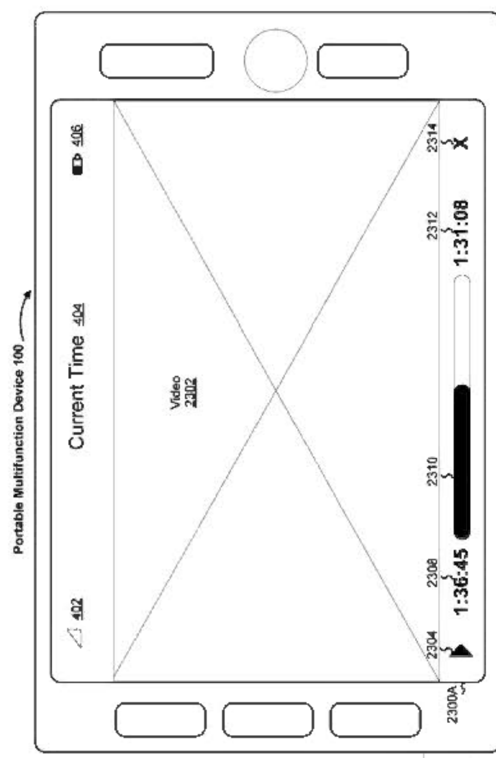


Figure 23A

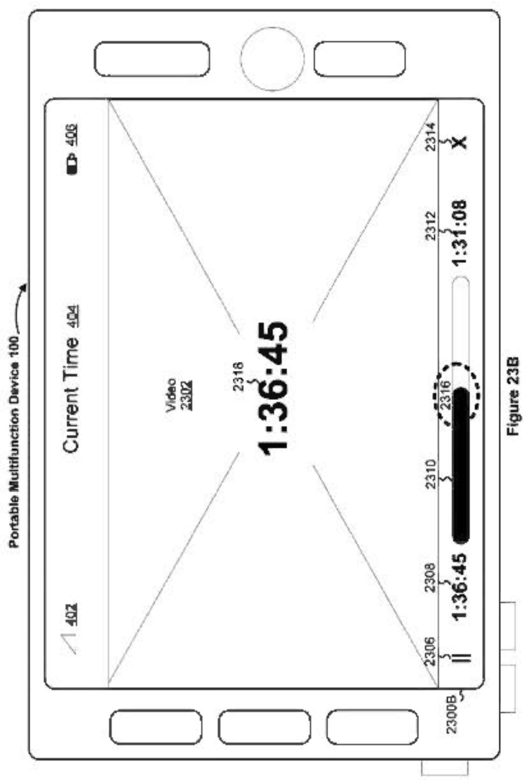


Figure 23B

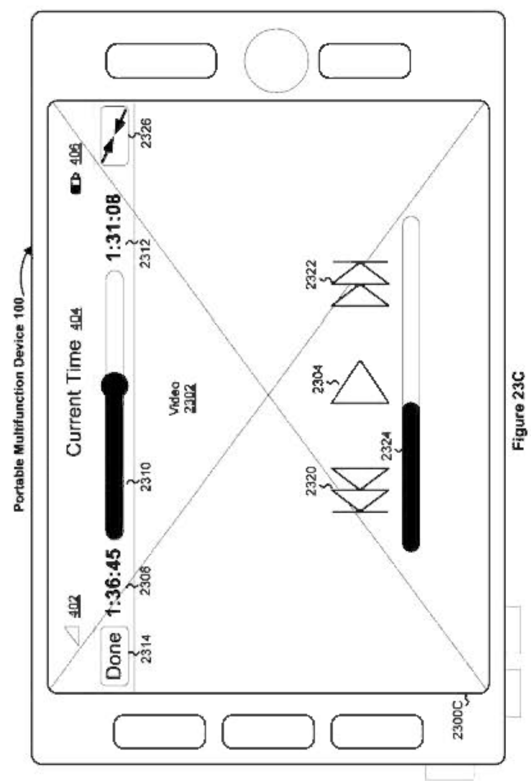


Figure 23C

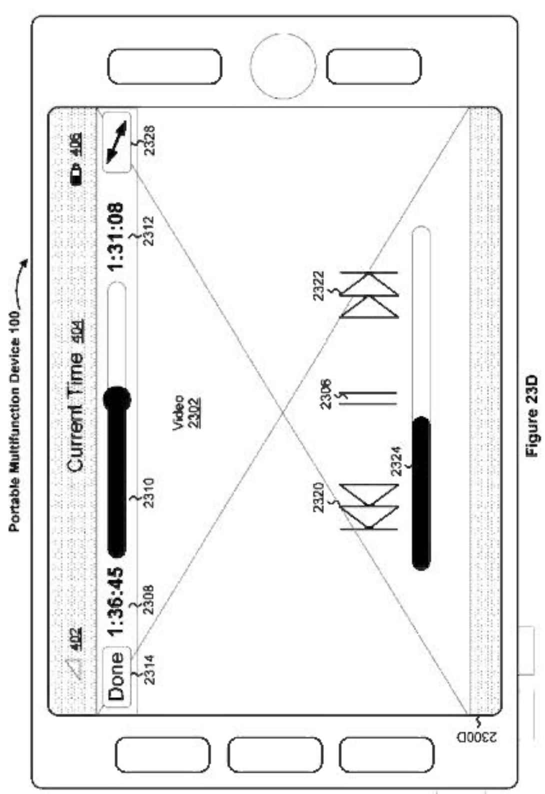


Figure 23D

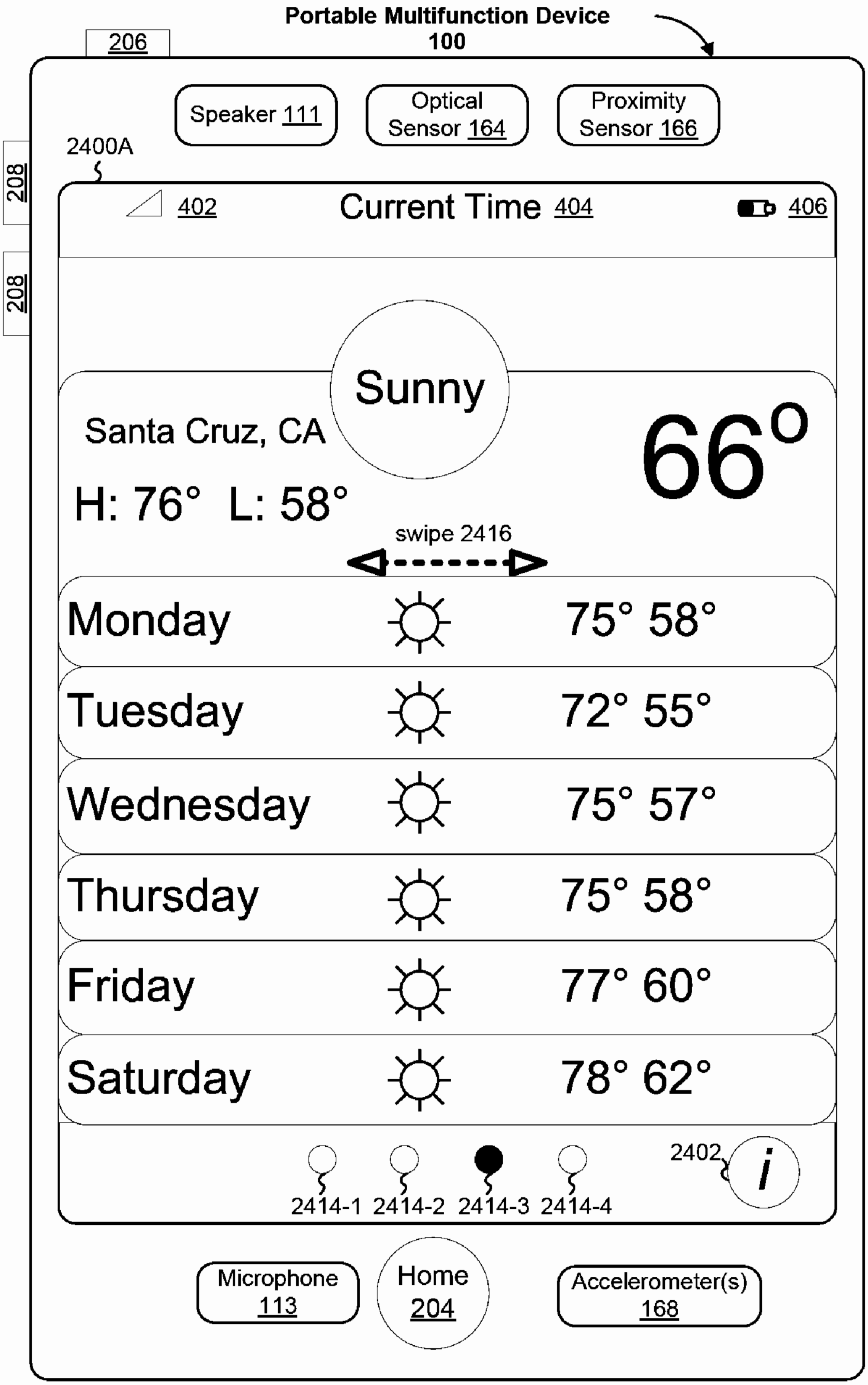

Portable Multifunction Device
100
206
Speaker 111
Optical Sensor 164
Proximity Sensor 166
2400A
208
208
402
Current Time 404
406
Sunny
Santa Cruz, CA
66°
H: 76° L: 58°
swipe 2416
Monday 75° 58°
Tuesday 72° 55°
Wednesday 75° 57°
Thursday 75° 58°
Friday 77° 60°
Saturday 78° 62°
2402
i
2414-1 2414-2 2414-3 2414-4
Microphone 113
Home 204
Accelerometer(s) 168

Figure 24A

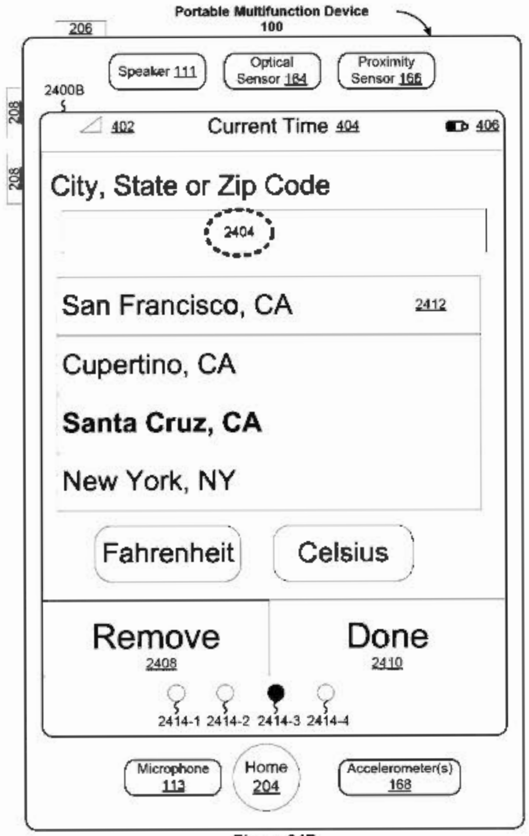


Figure 24B

A255

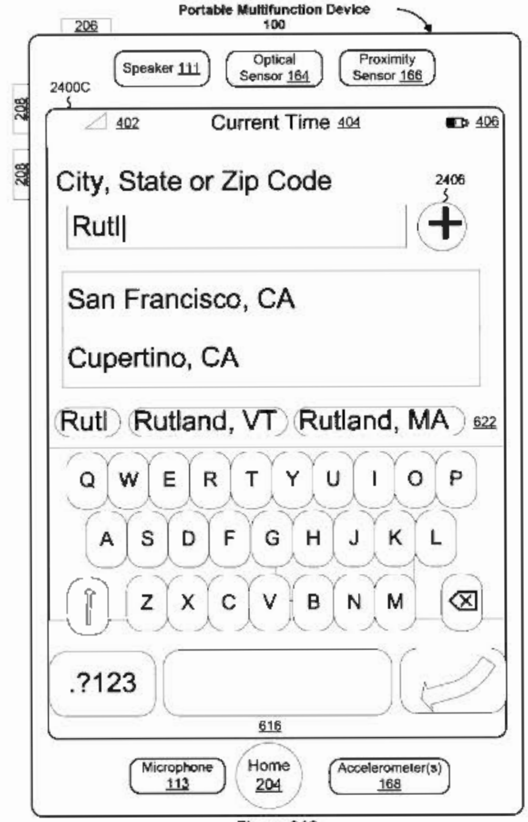


Figure 24C

A256

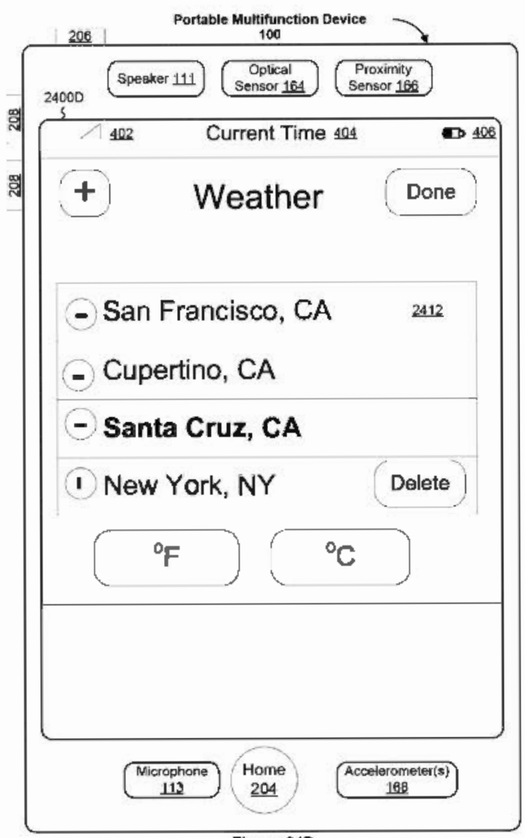
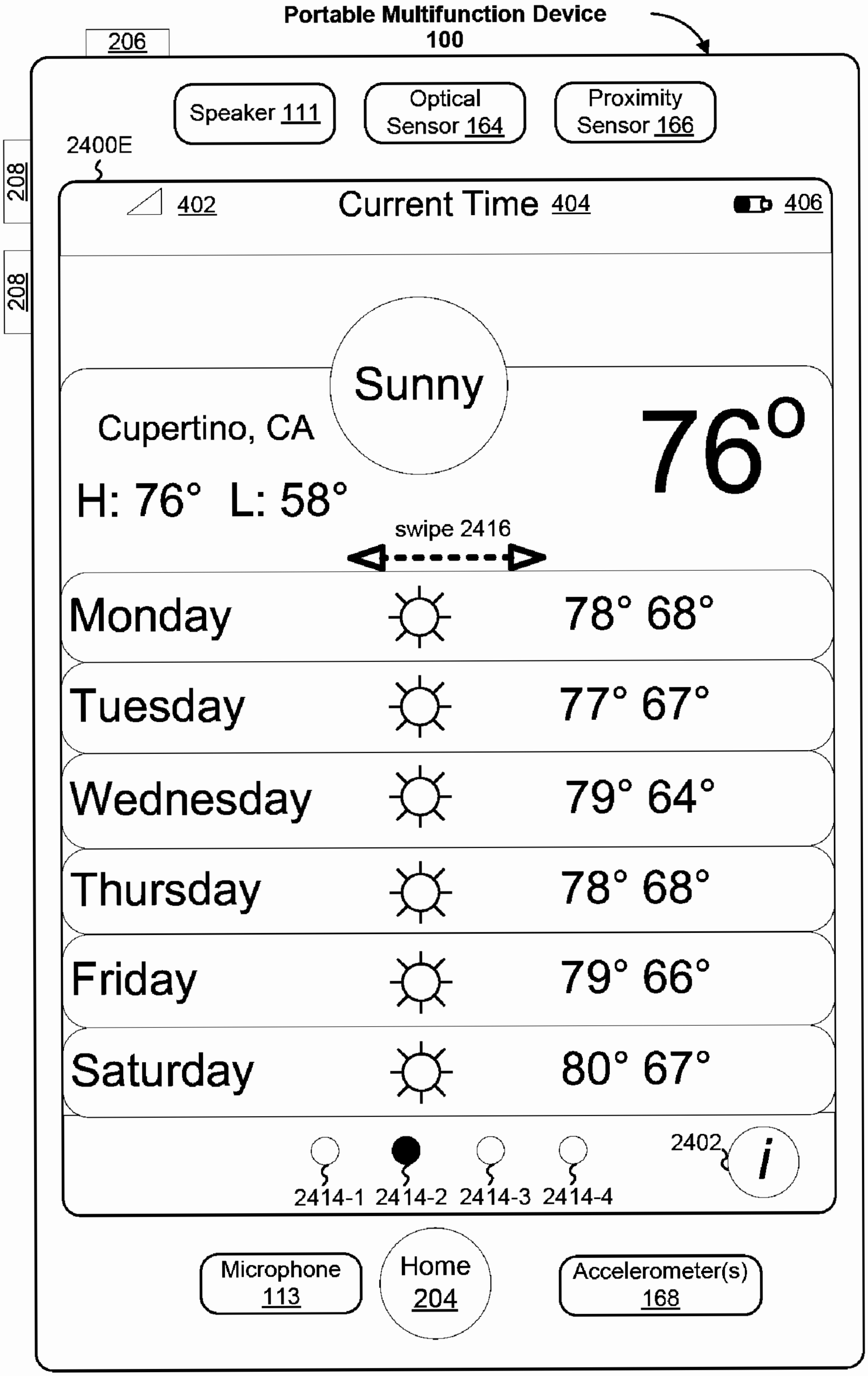


Figure 24D

A257



Portable Multifunction Device
100
206
Speaker 111
Optical Sensor 164
Proximity Sensor 166
2400E
208
208
402
Current Time 404
406
Sunny
Cupertino, CA
76°
H: 76° L: 58°
swipe 2416
Monday 78° 68°
Tuesday 77° 67°
Wednesday 79° 64°
Thursday 78° 68°
Friday 79° 66°
Saturday 80° 67°
2402
i
2414-1 2414-2 2414-3 2414-4
Microphone 113
Home 204
Accelerometer(s) 168

Figure 24E

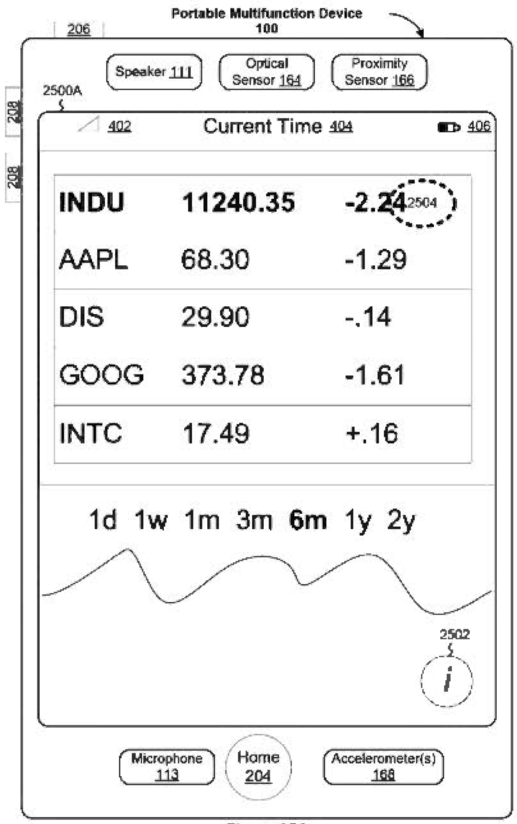


Figure 25A

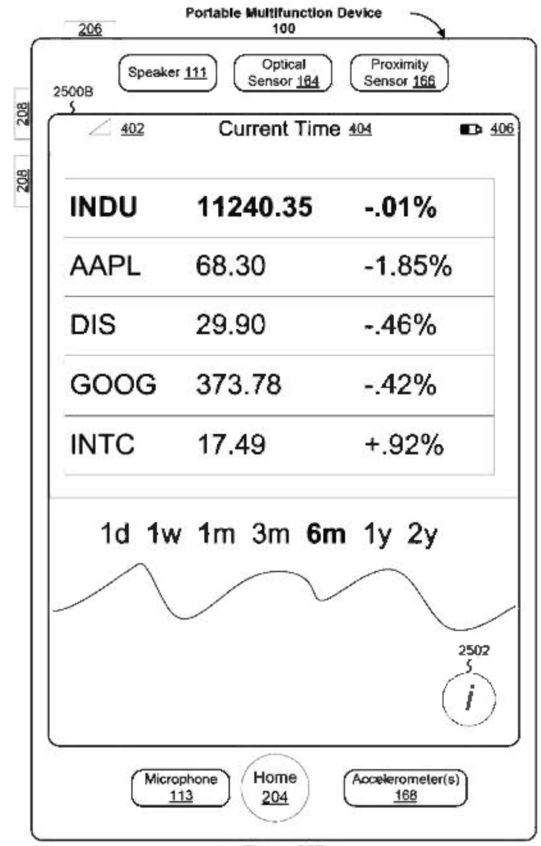


Figure 25B

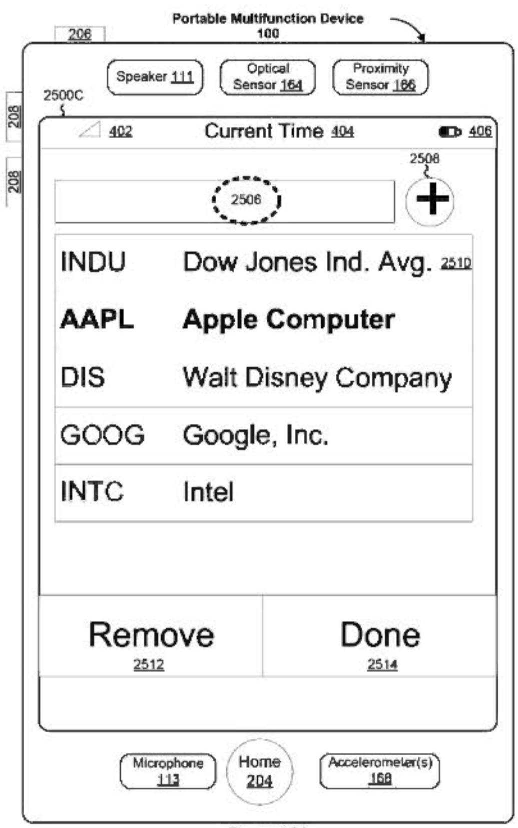


Figure 25C

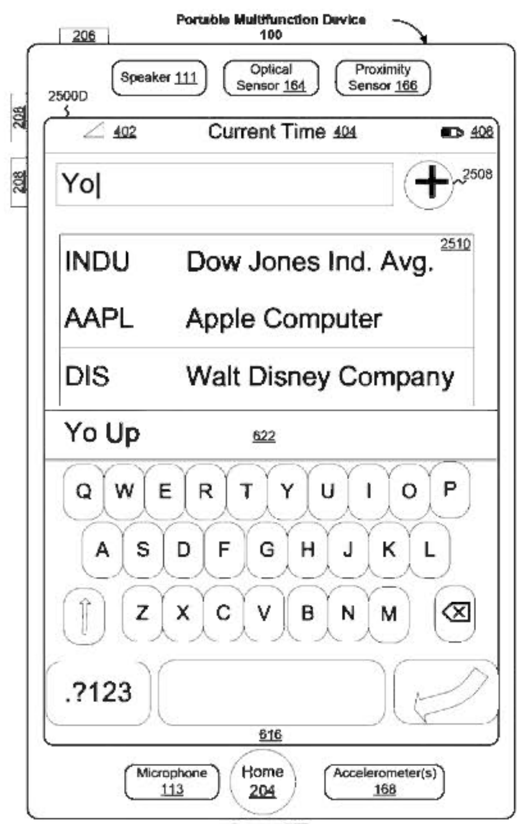


Figure 25D

Figure 25E

A263

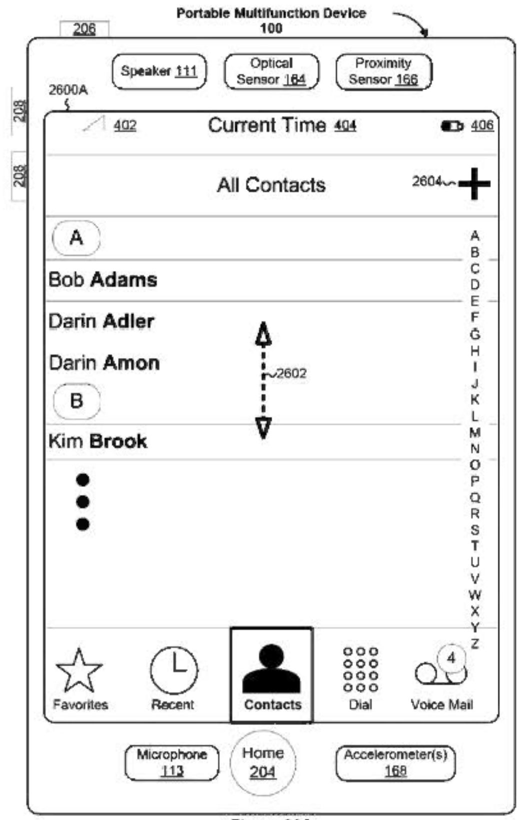


Figure 26A

A264

Figure 26B

A265

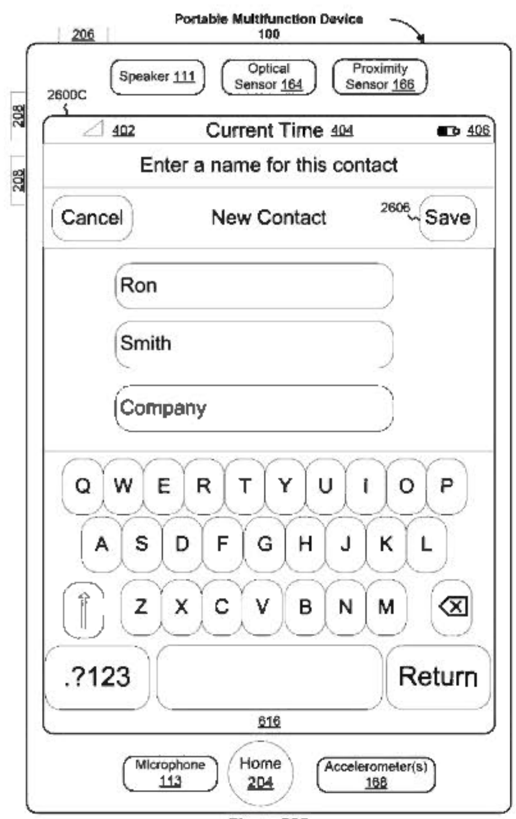


Figure 26C

A266

Figure 26D

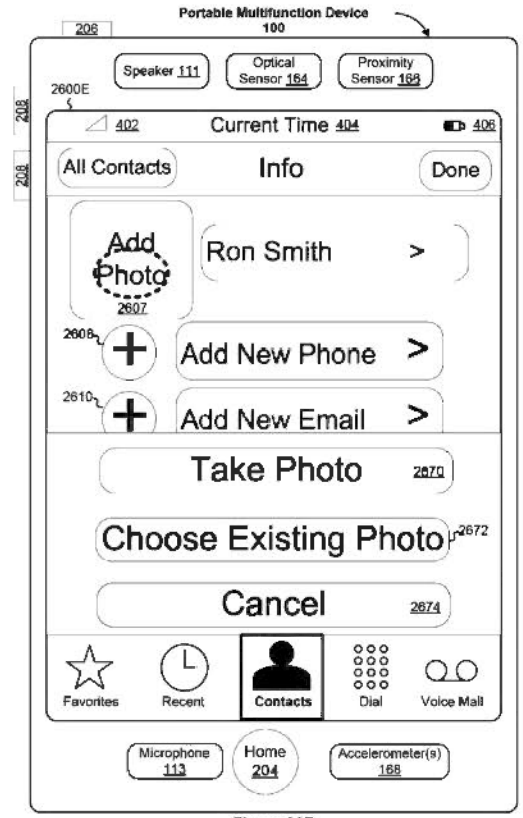


Figure 26E

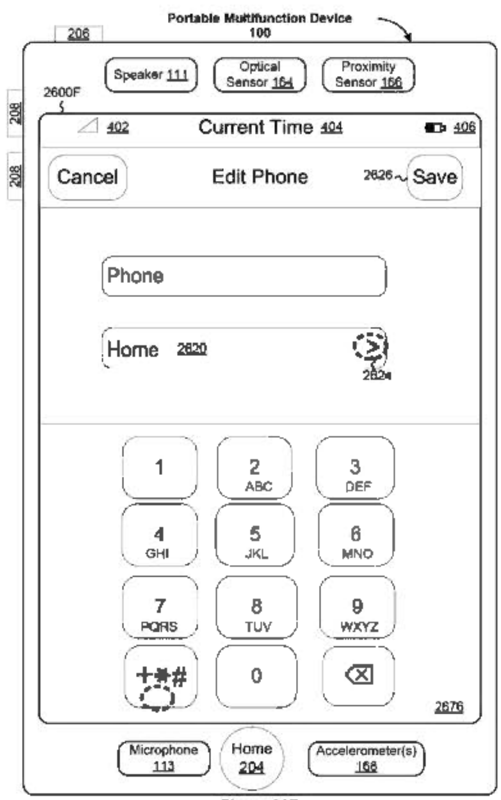


Figure 26F

Figure 26G

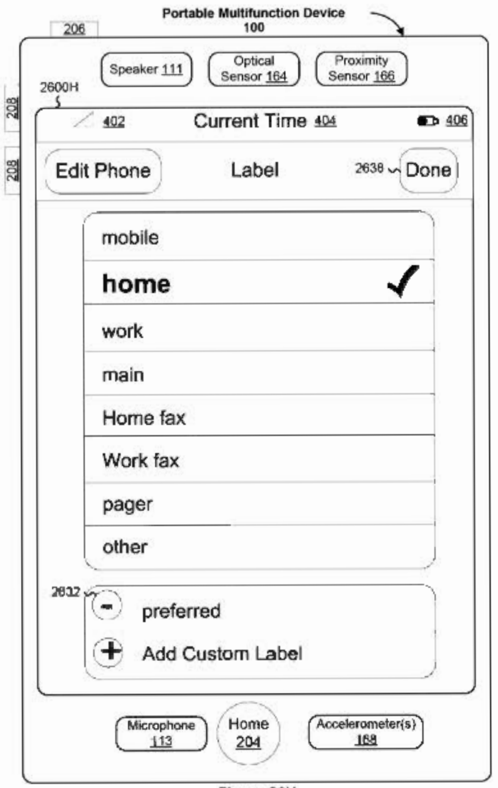


Figure 26H

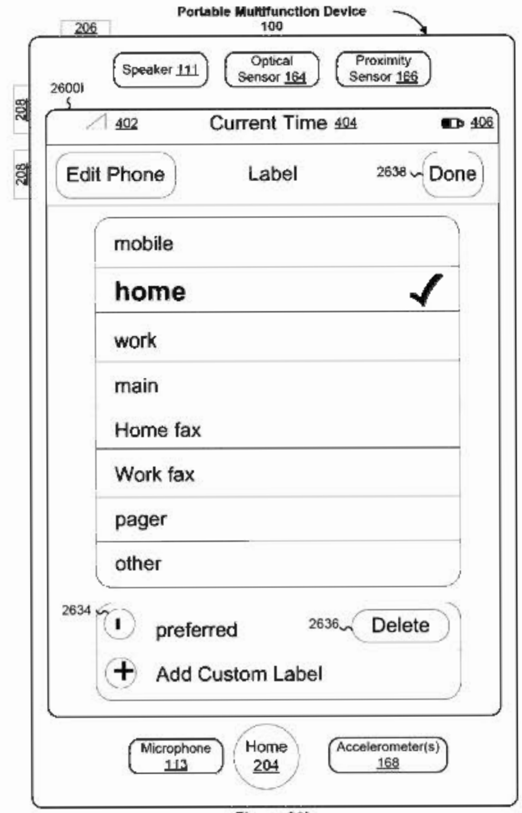


Figure 26I

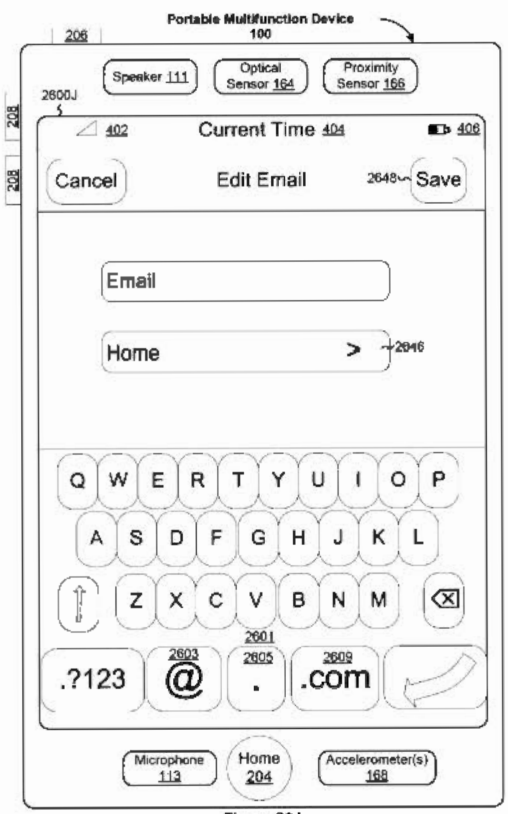


Figure 26J

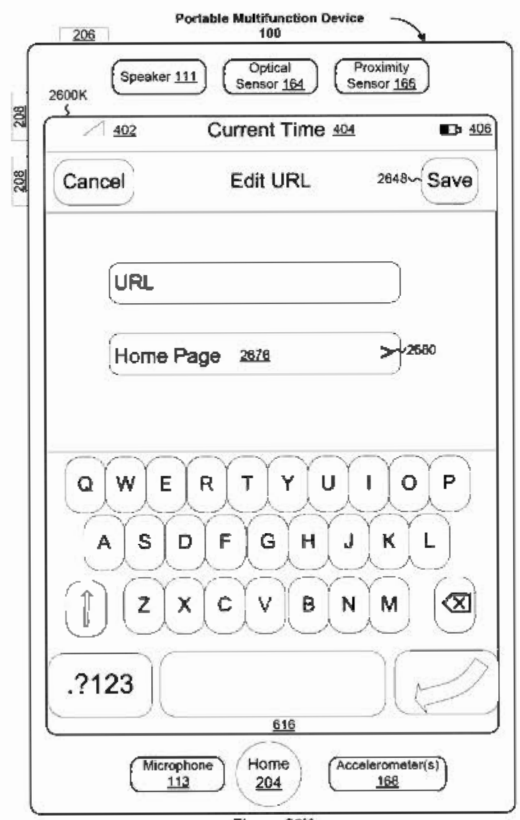


Figure 26K

Figure 26L

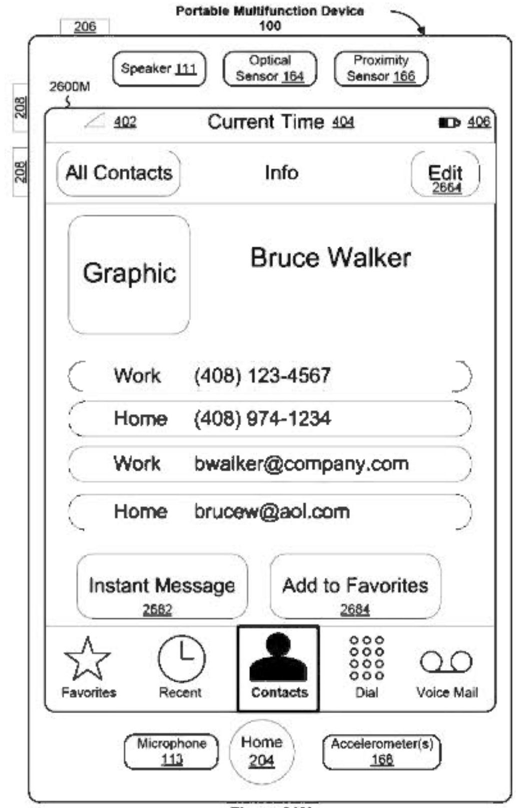


Figure 26M

Figure 26N

Figure 26O

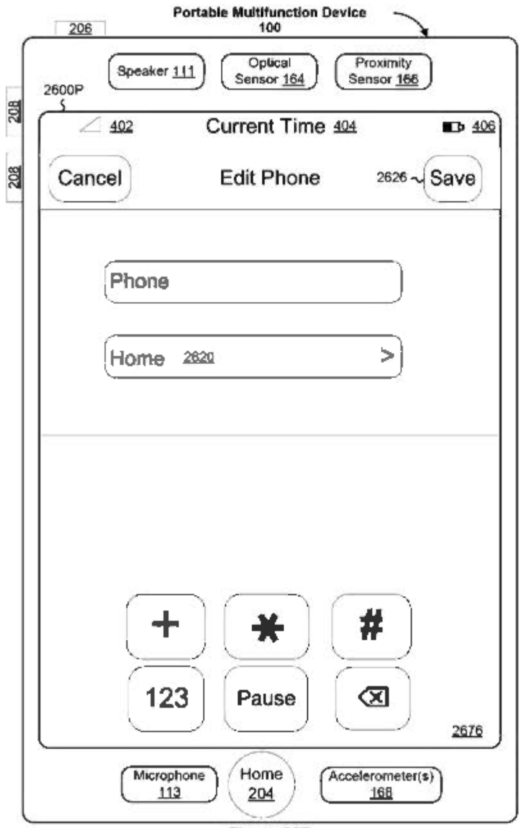


Figure 26P

Figure 27A

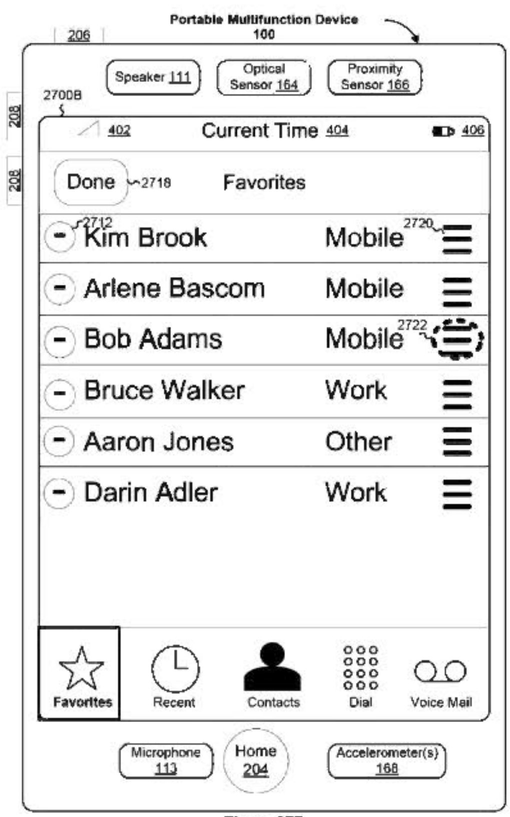


Figure 27B

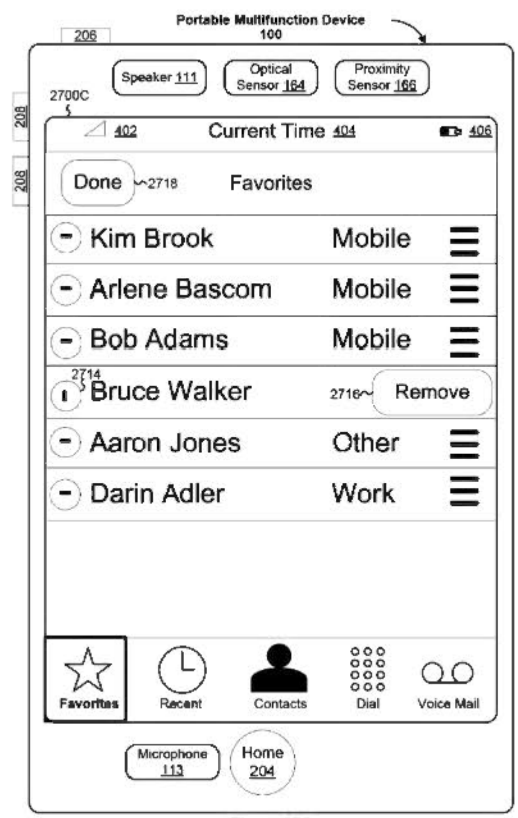


Figure 27C

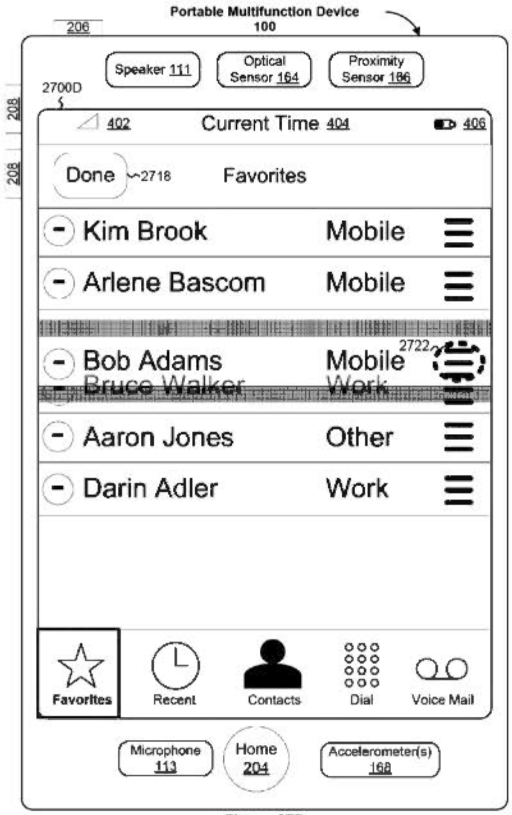


Figure 27D

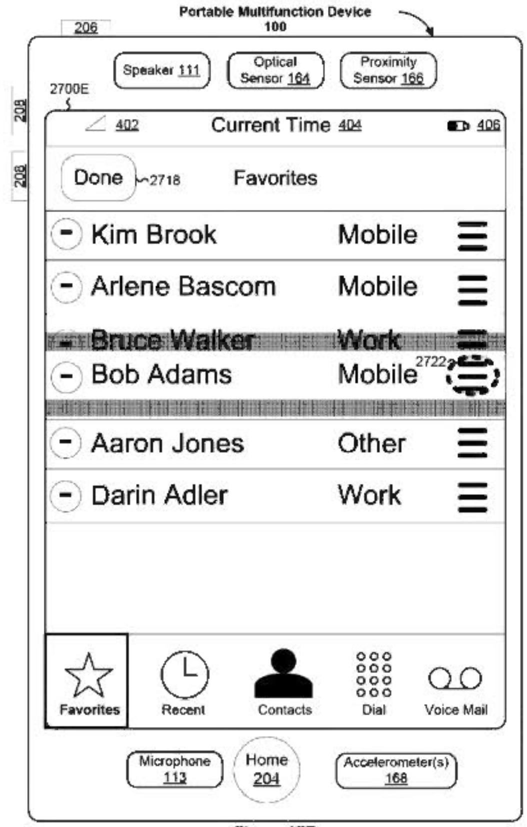


Figure 27E

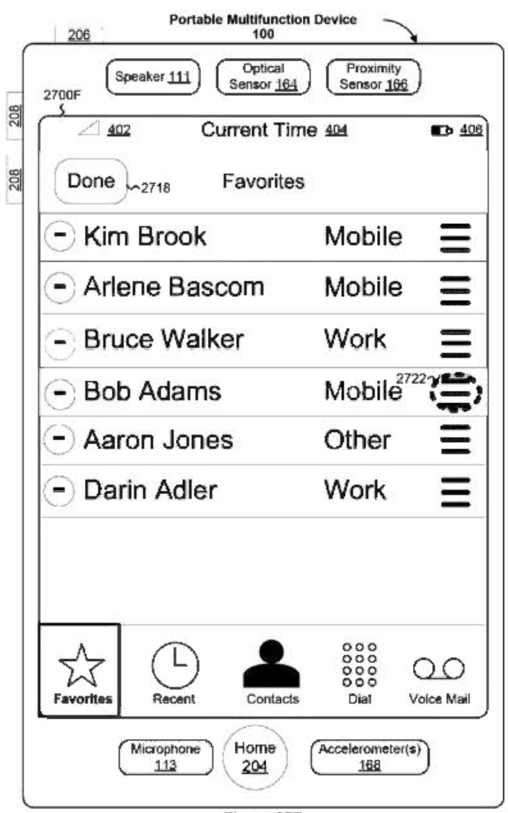


Figure 27F

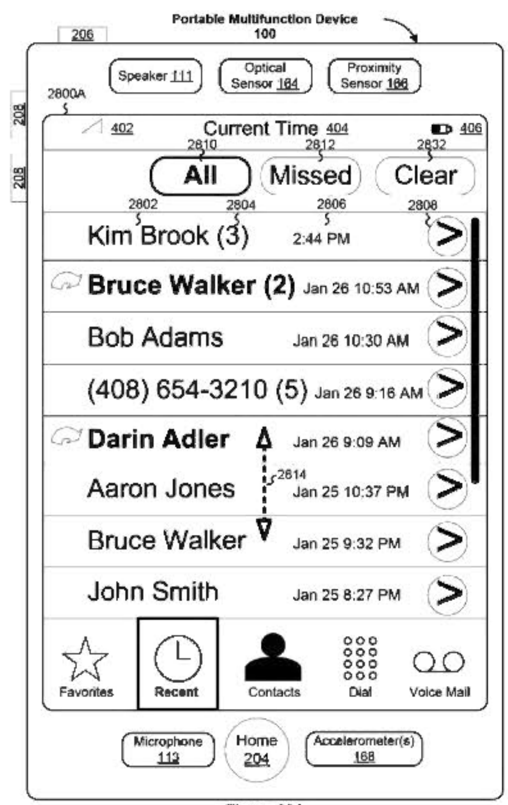


Figure 28A

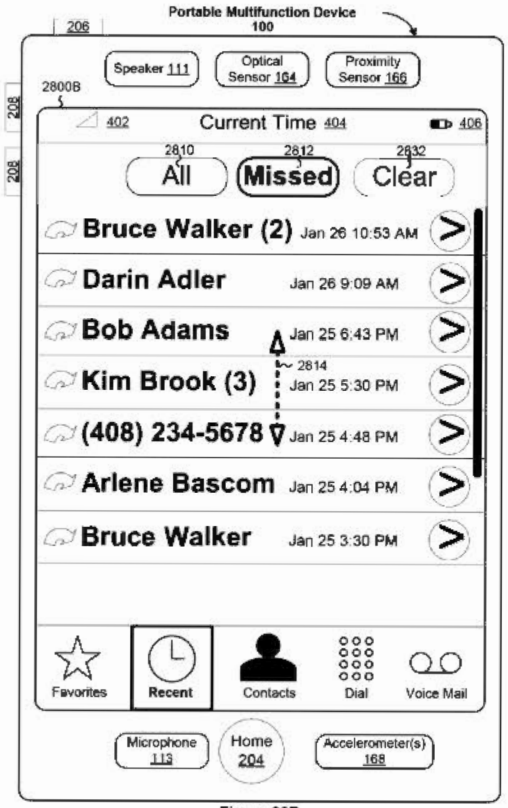


Figure 28B

Figure 28C

Figure 28D

Figure 29

Figure 30A

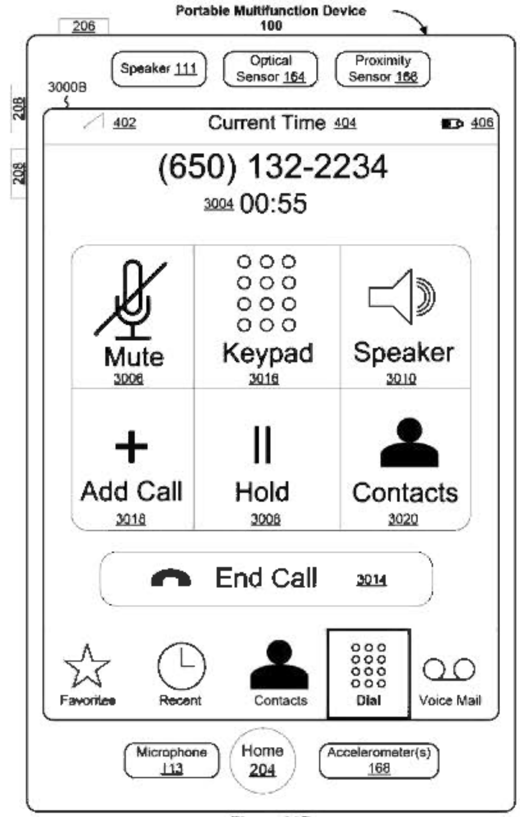


Figure 30B

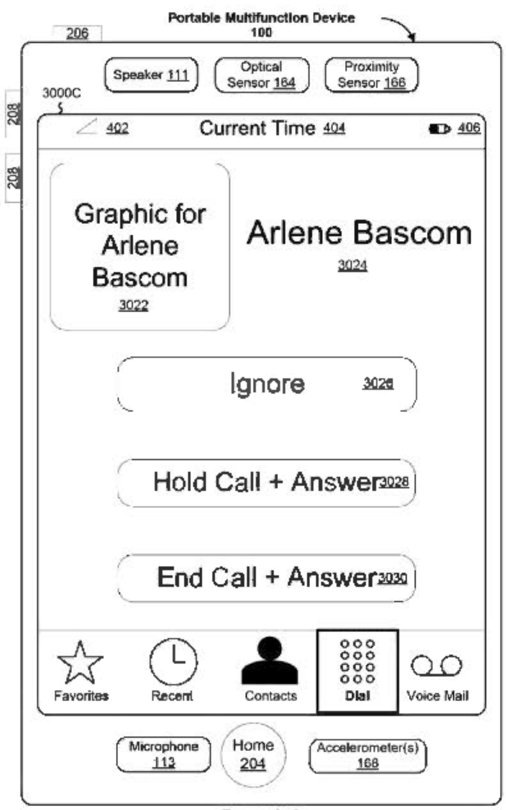


Figure 30C

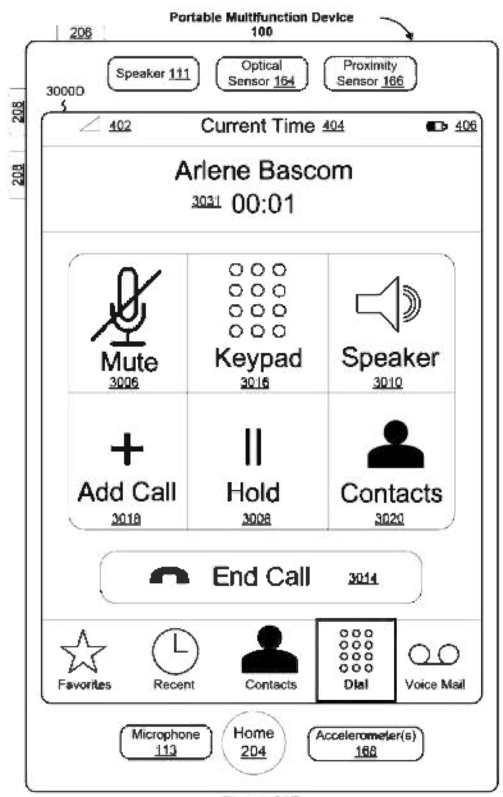


Figure 30D

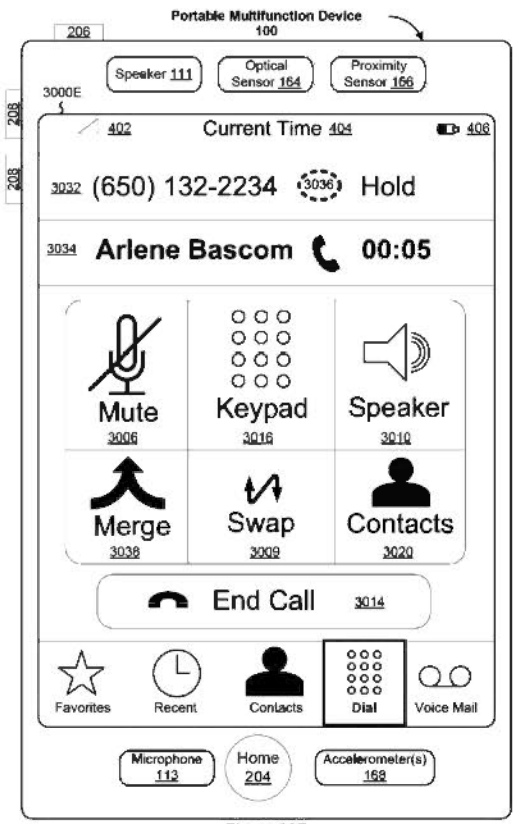


Figure 30E

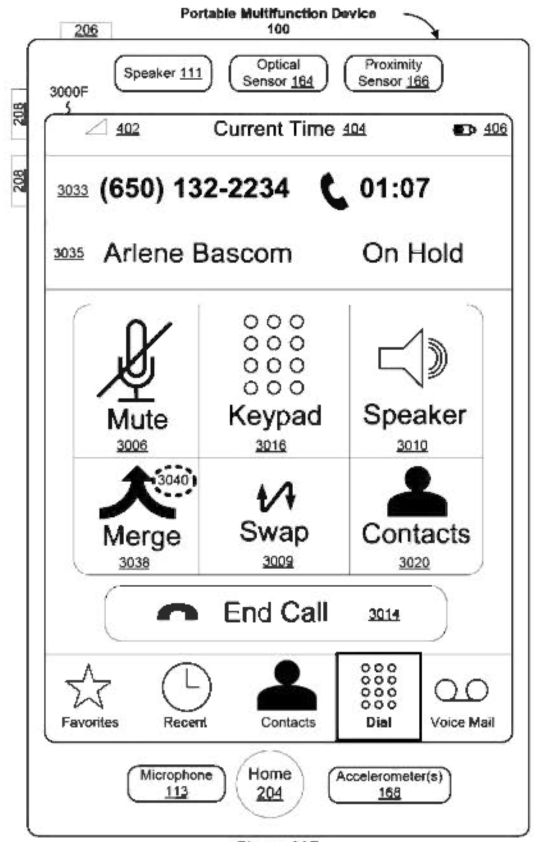


Figure 30F

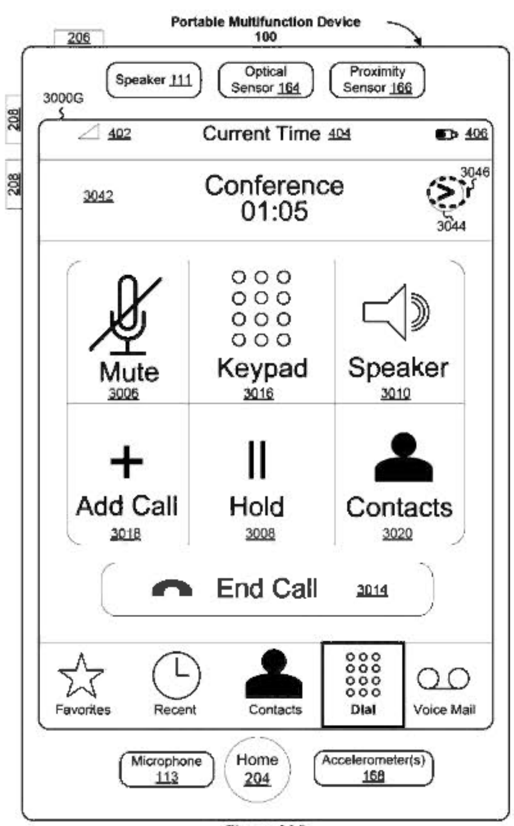


Figure 30G

Figure 30H

Figure 30I

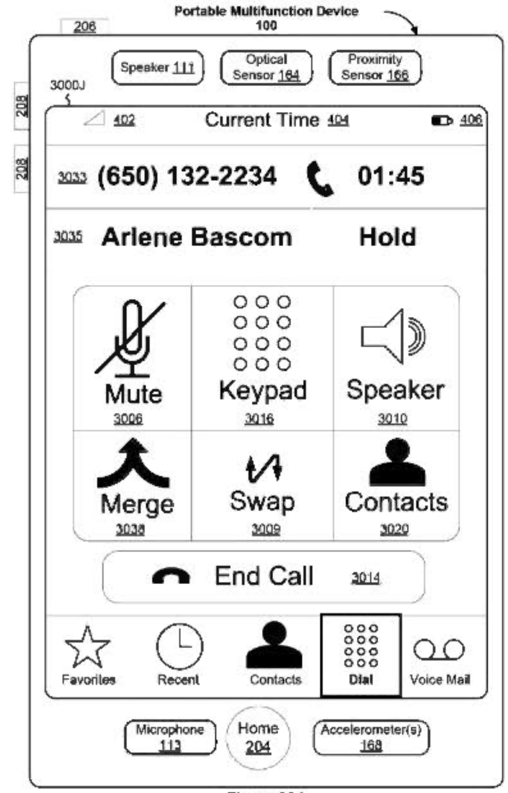


Figure 30J

Figure 30K

Figure 30L

Figure 30M

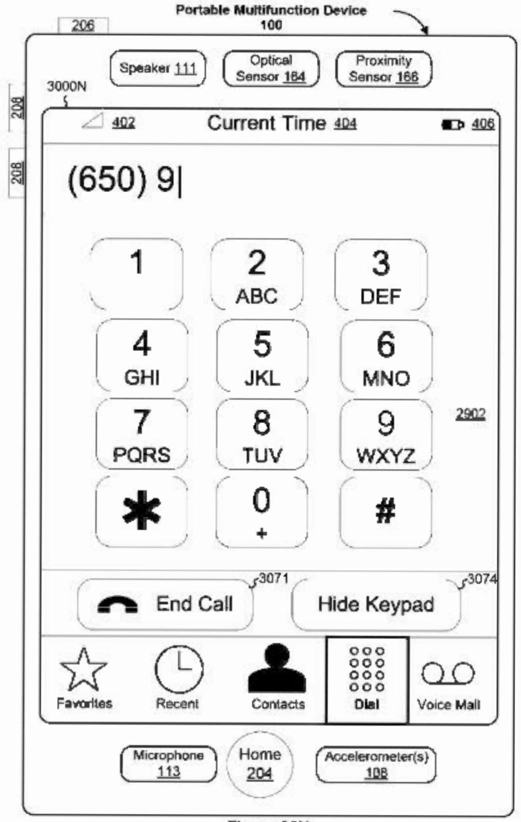


Figure 30N

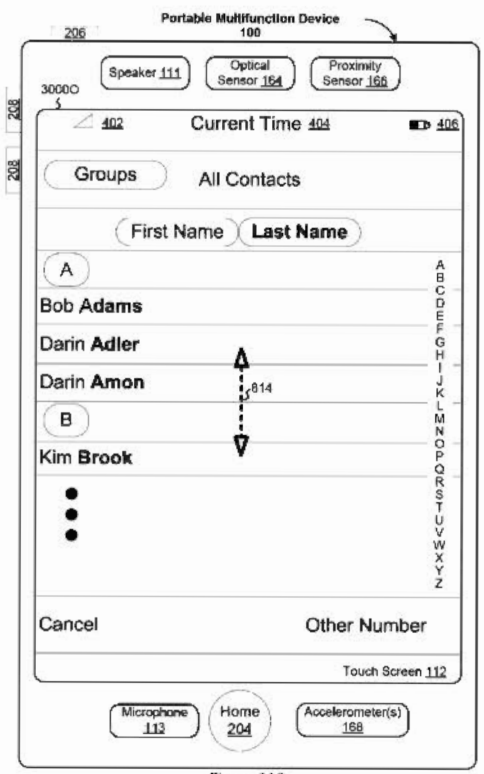


Figure 30O

Figure 30P

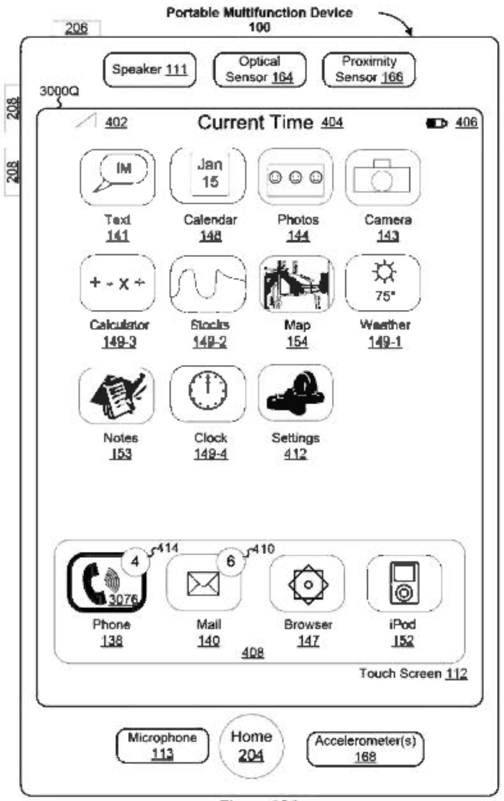


Figure 30Q

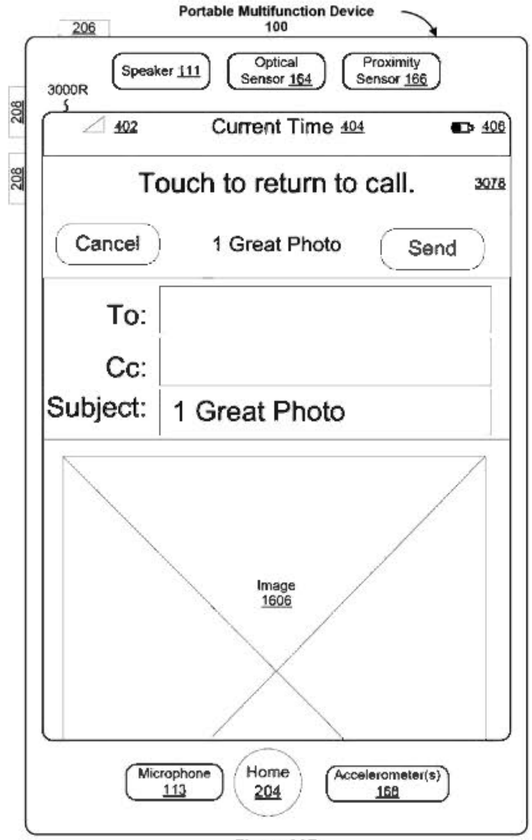


Figure 30R

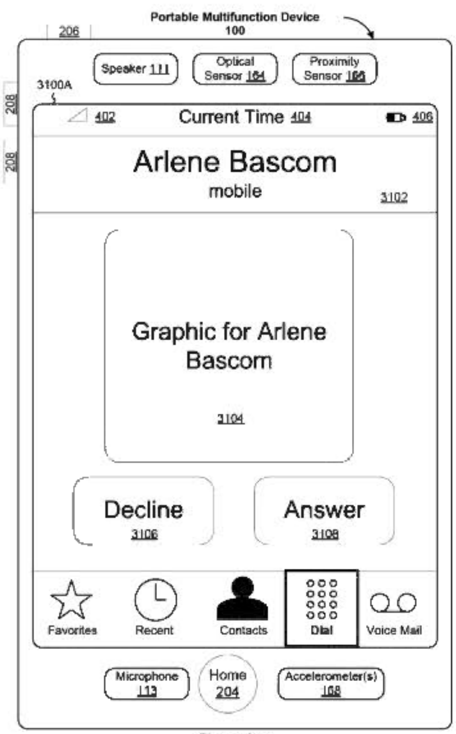


Figure 31A

Figure 31B

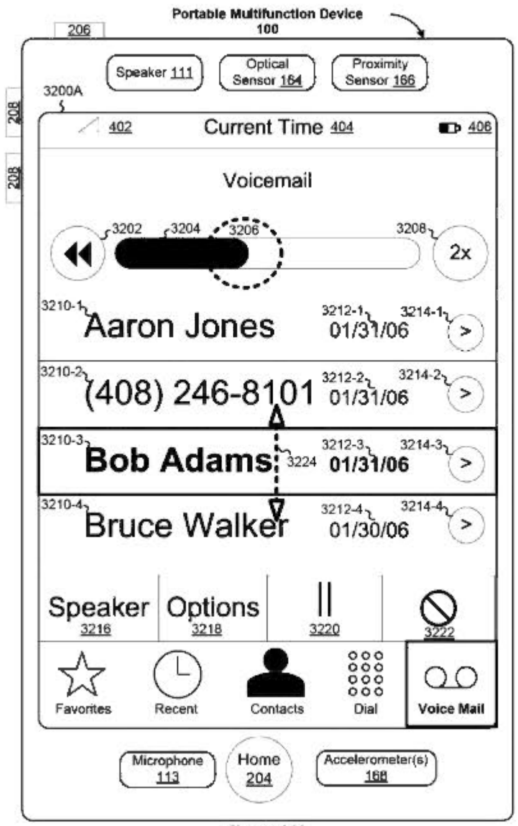


Figure 32A

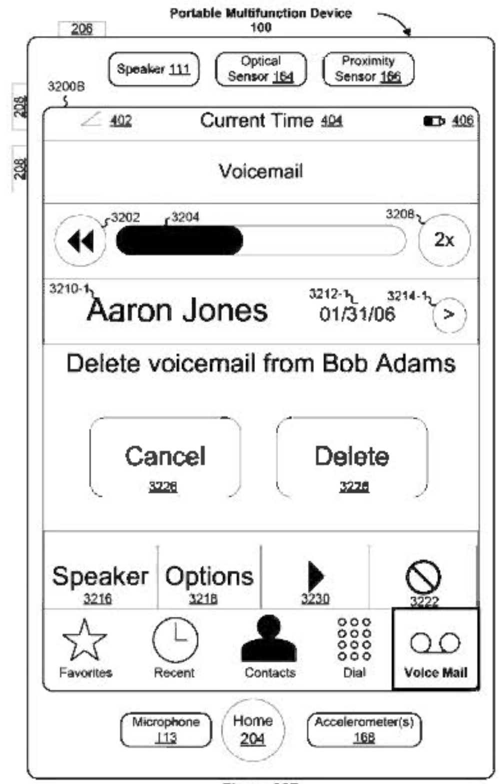


Figure 32B

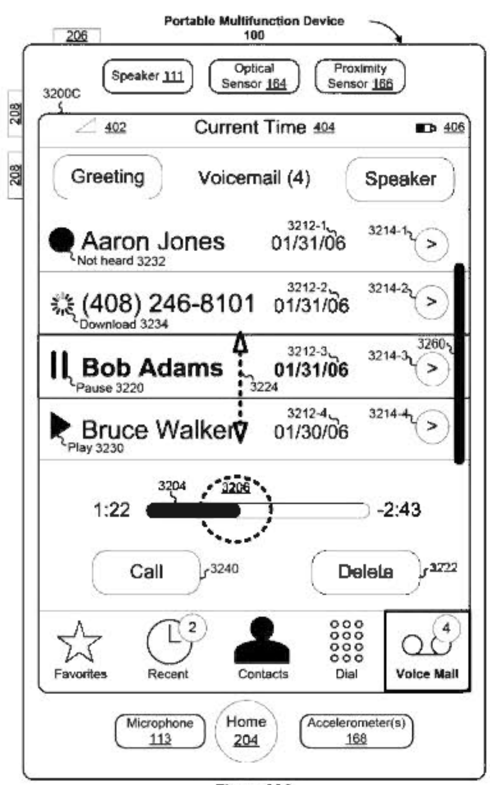


Figure 32C

Figure 32D

Figure 32E

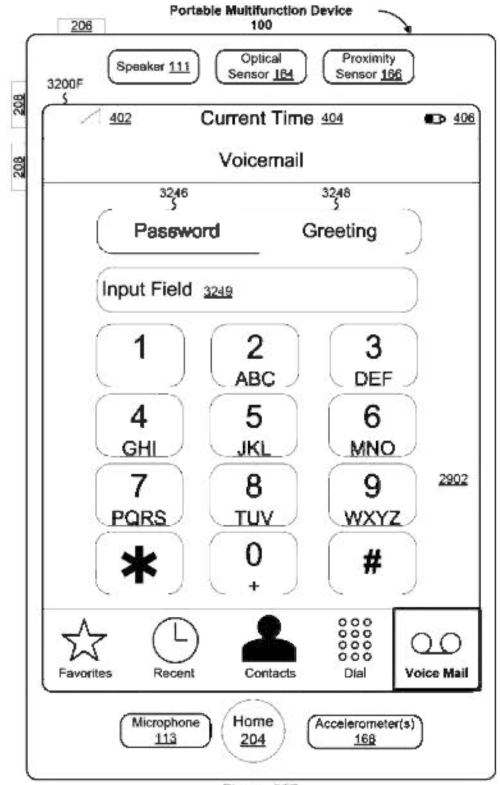


Figure 32F

Figure 32G

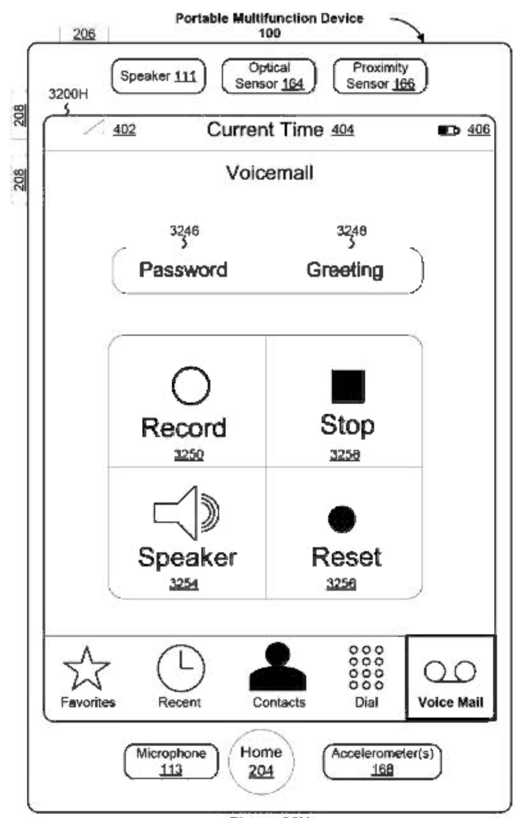
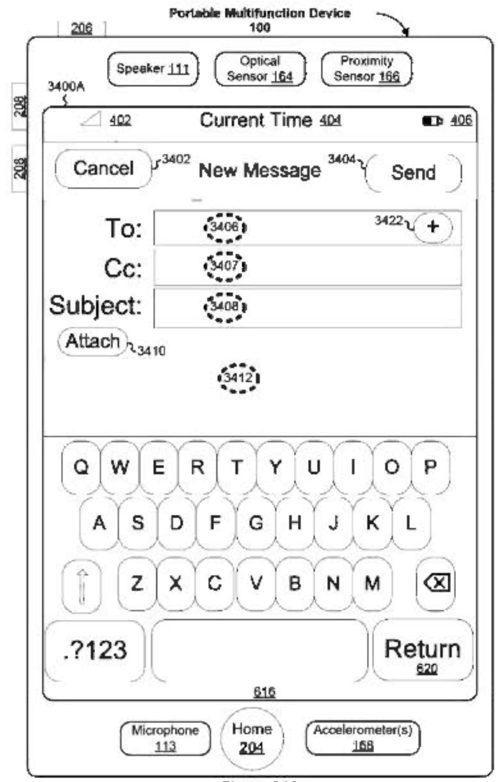


Figure 32H

Figure 33



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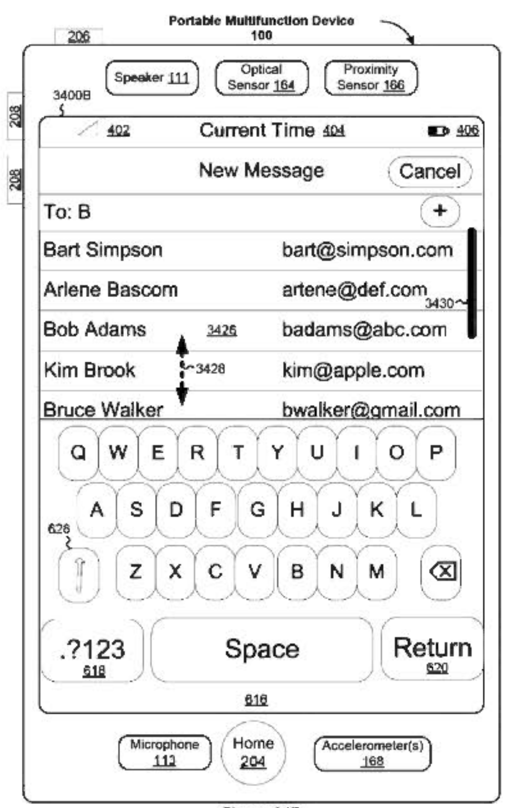
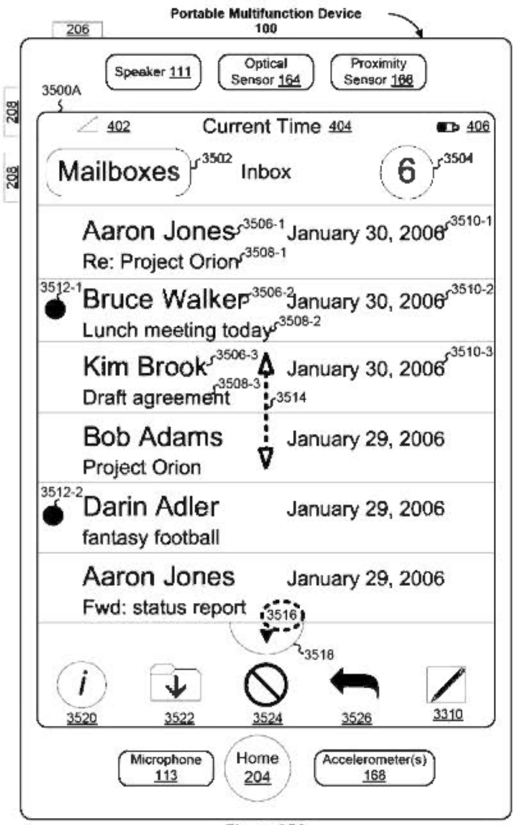


Figure 34B

Figure 34C



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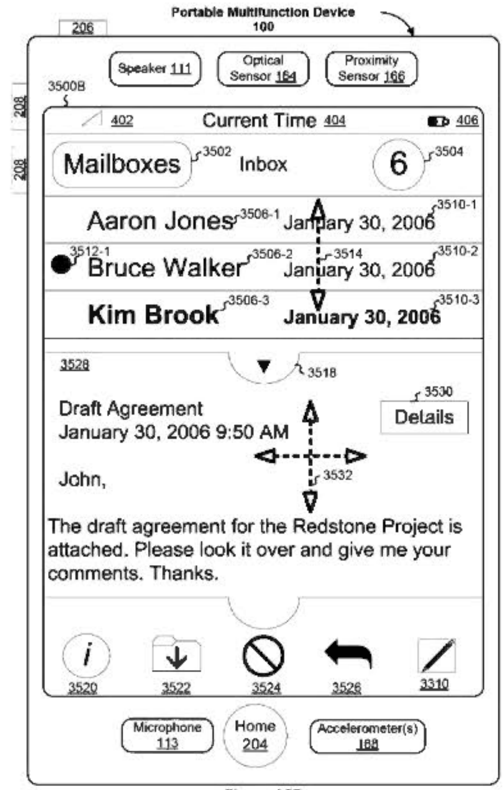


Figure 35B

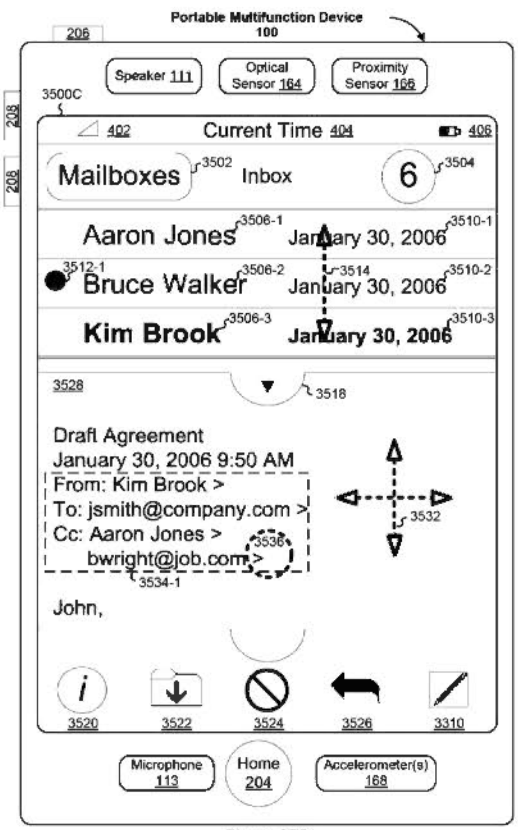


Figure 35C

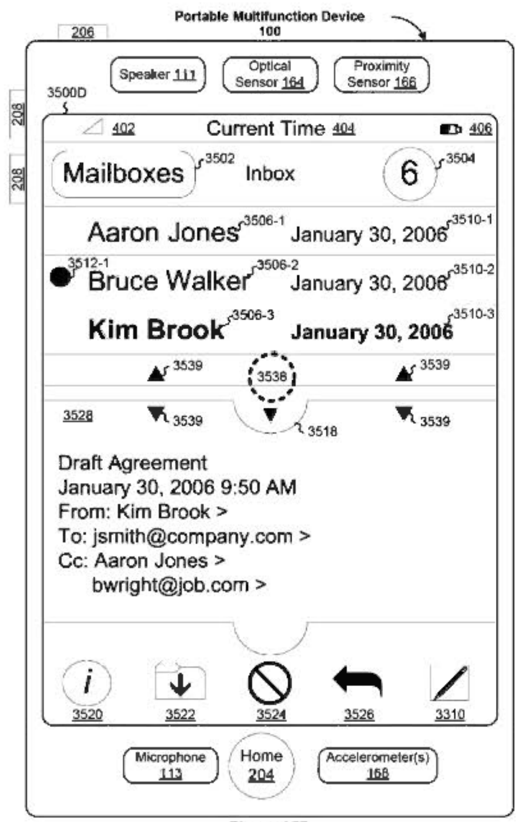


Figure 35D

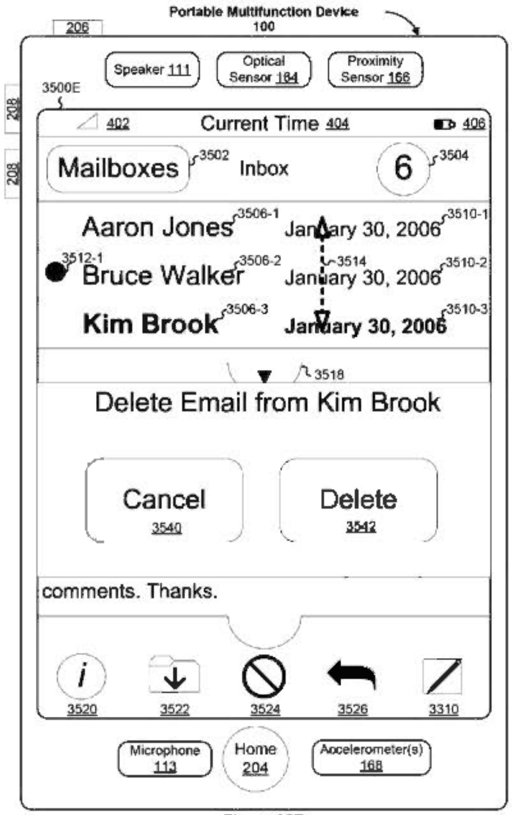


Figure 35E

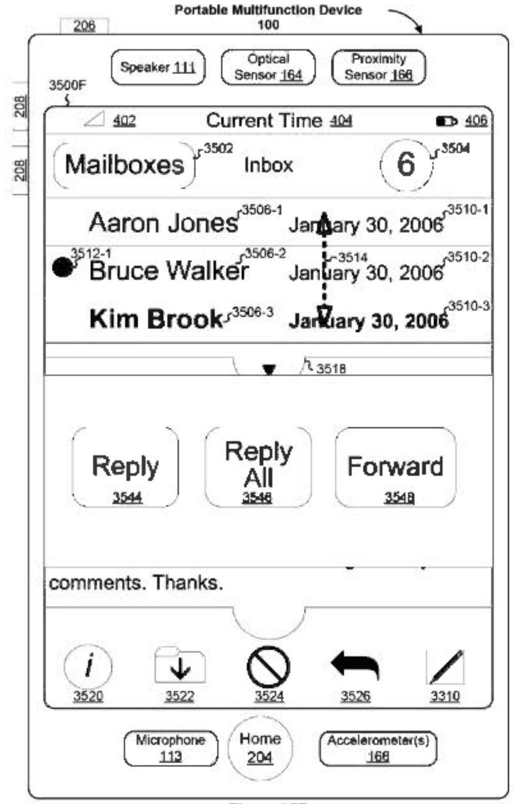


Figure 35F

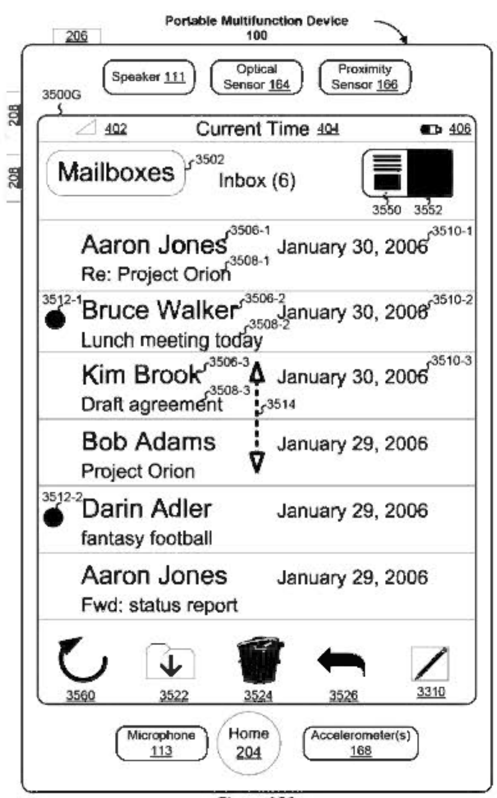


Figure 35G

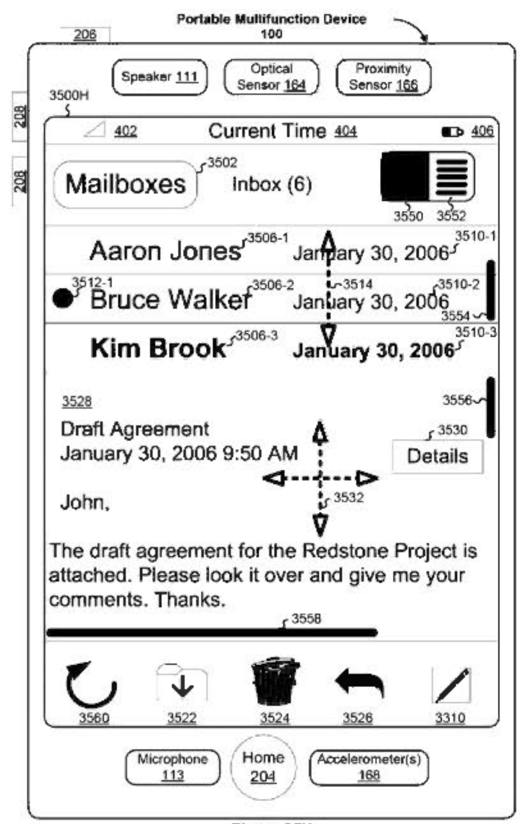


Figure 35H

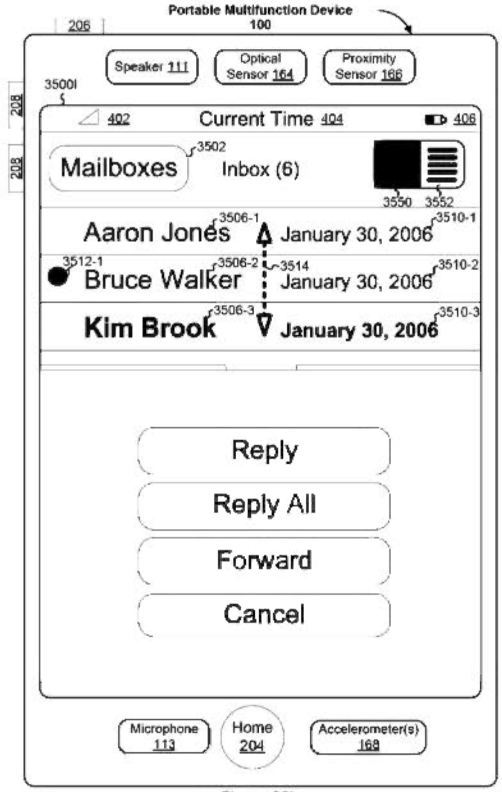


Figure 35I

Figure 35J

Figure 35K

Figure 35L

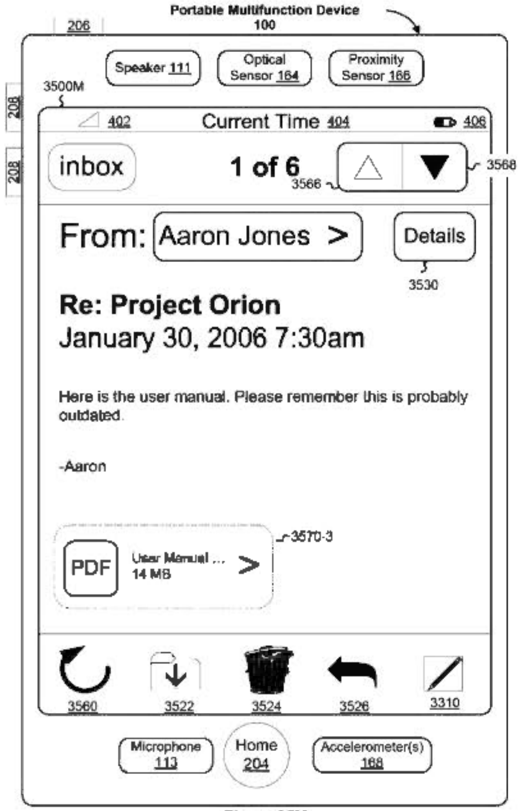


Figure 35M

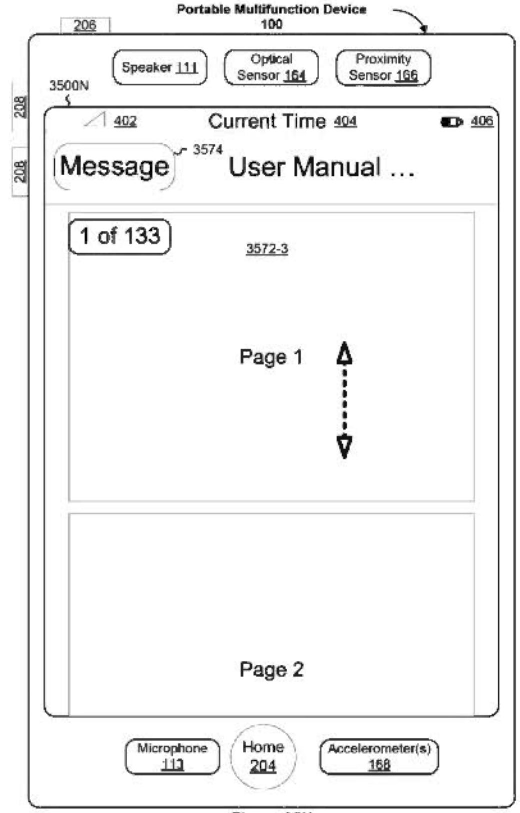


Figure 35N

Figure 35O

Figure 36

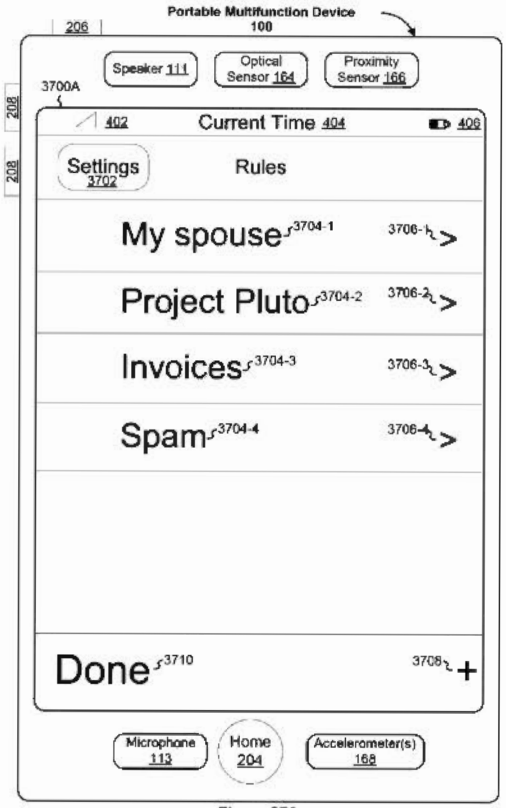
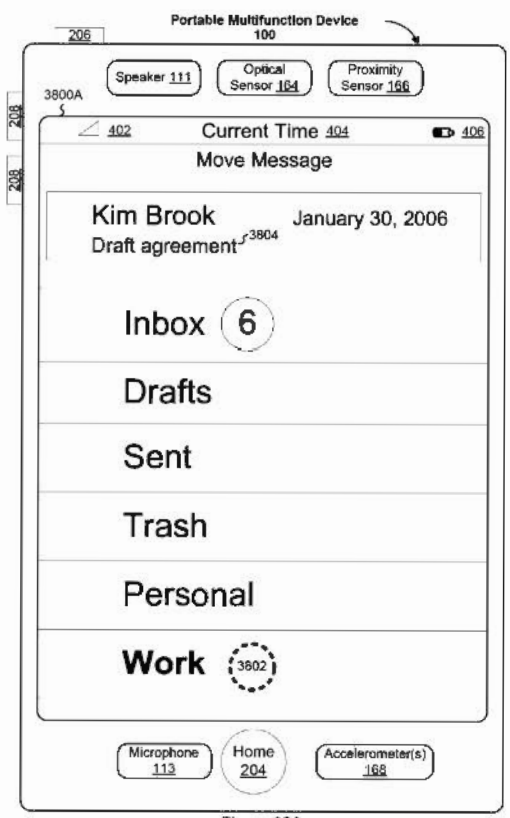


Figure 37A

Figure 37B



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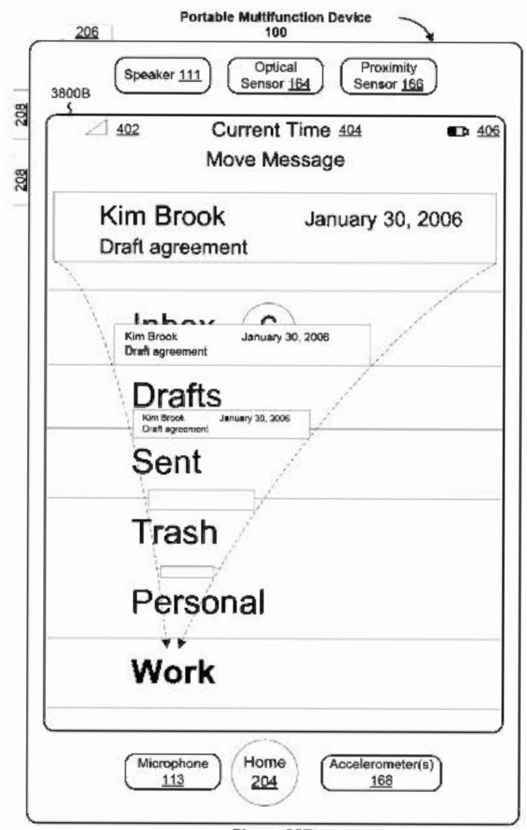

Figure 38B

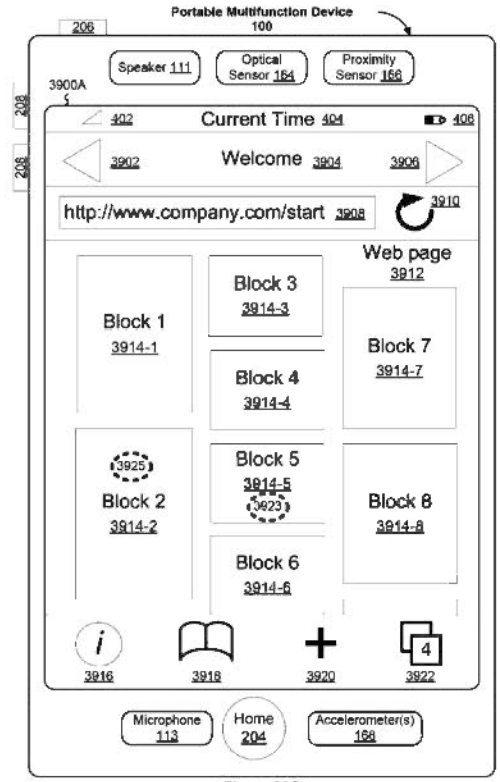

Figure 39A

Figure 39B

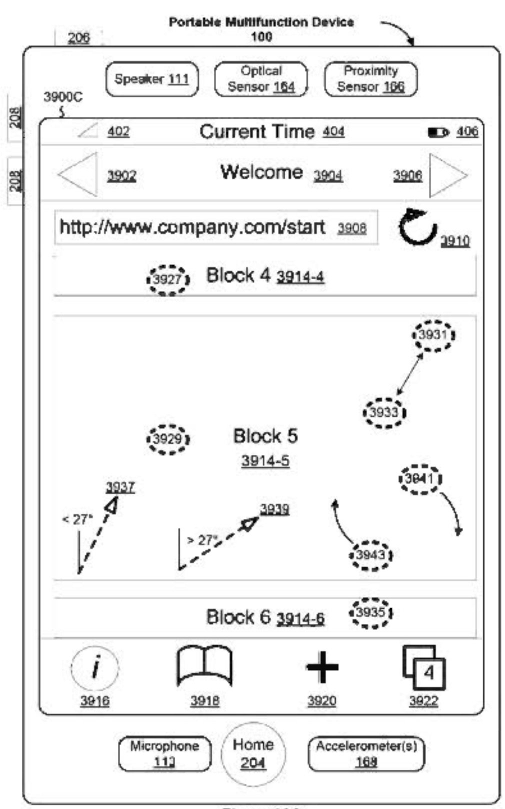

Figure 39C

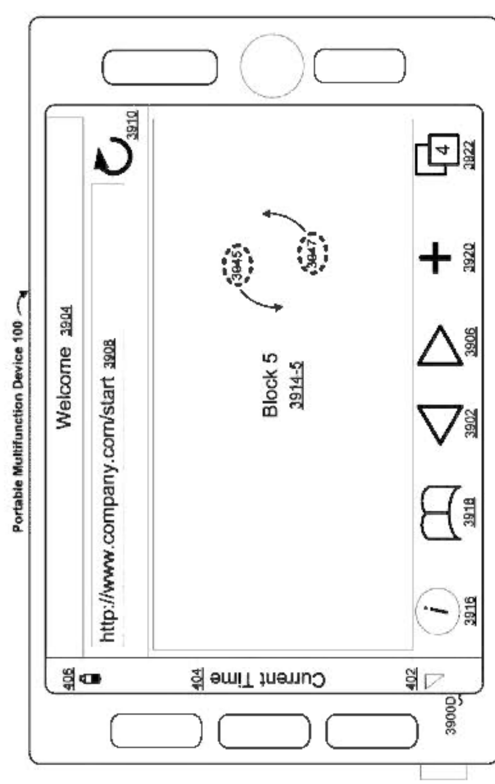

Figure 39D

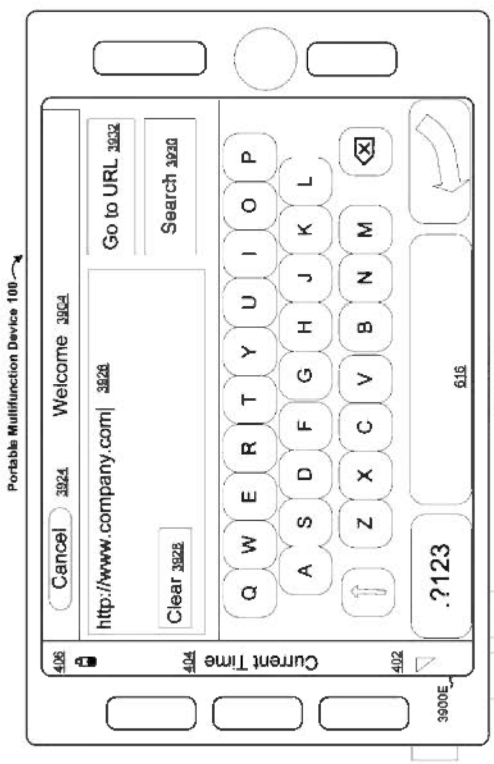

Figure 39E

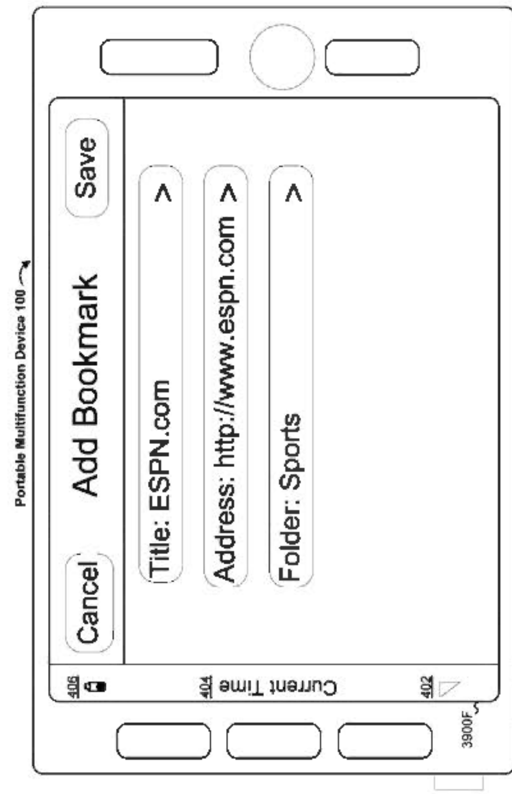

Figure 39F

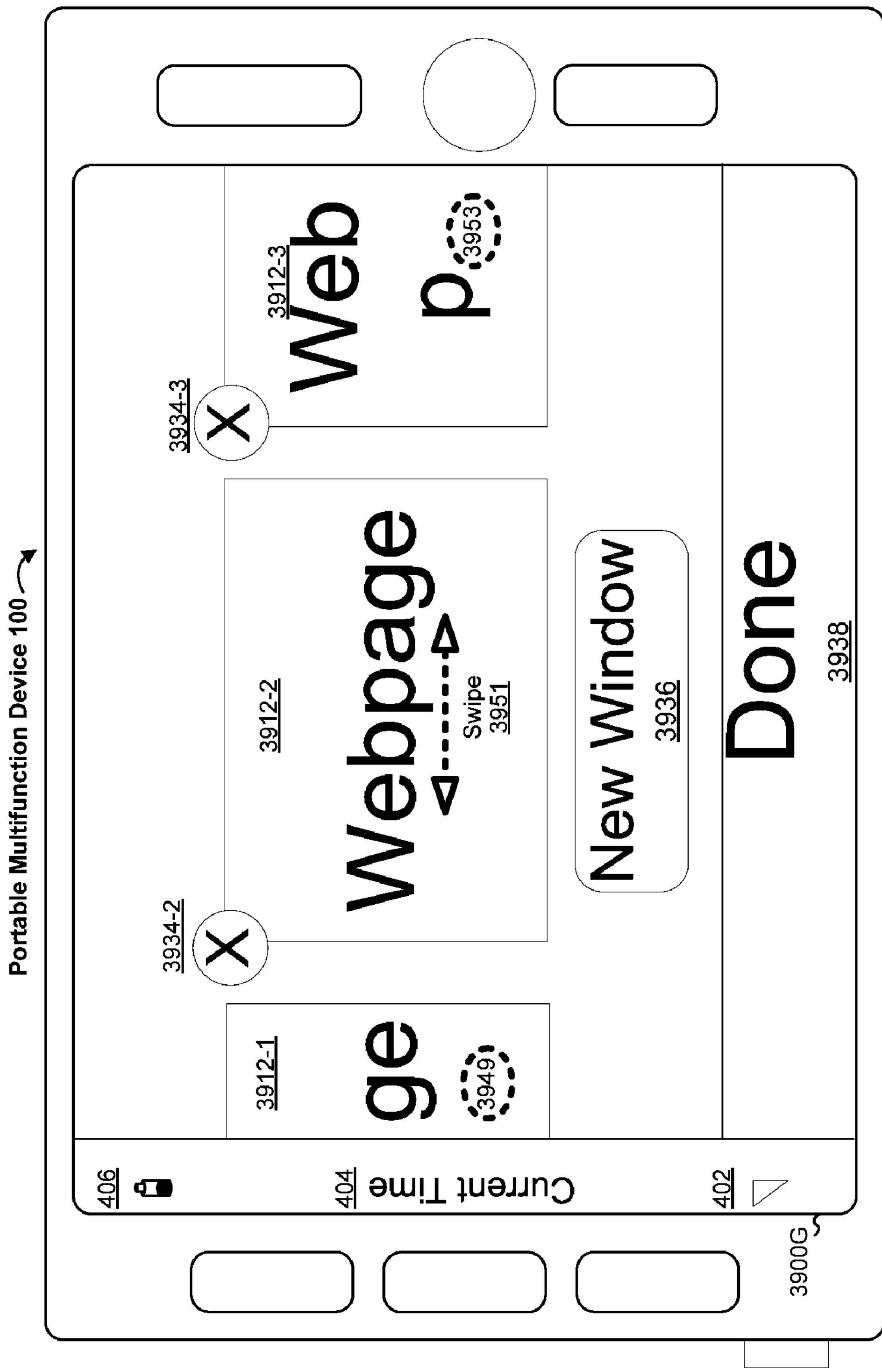
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Figure 39G

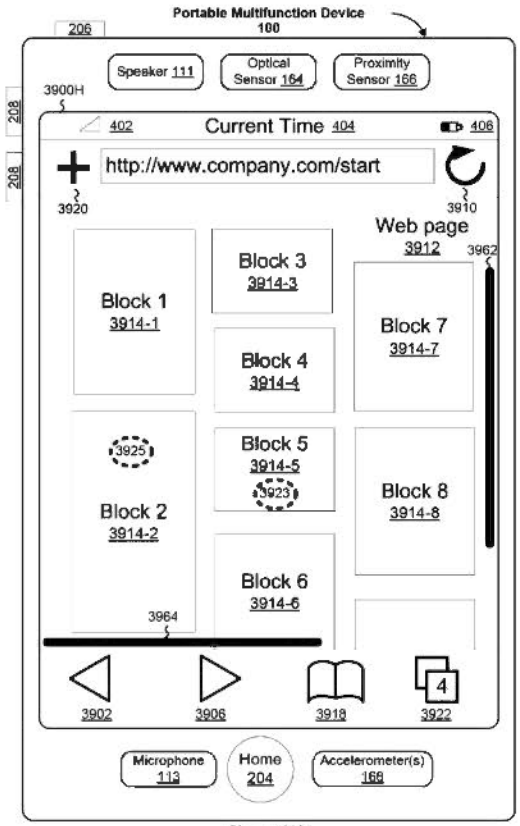


Figure 39H

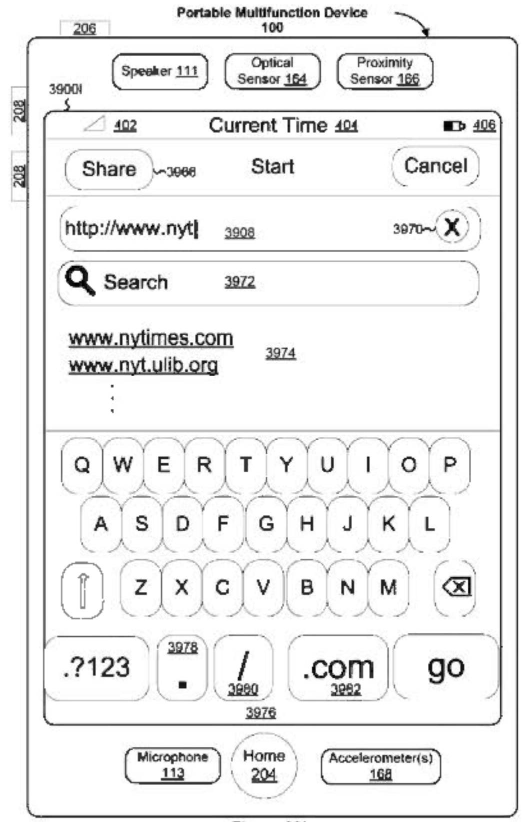


Figure 39I

Figure 39J

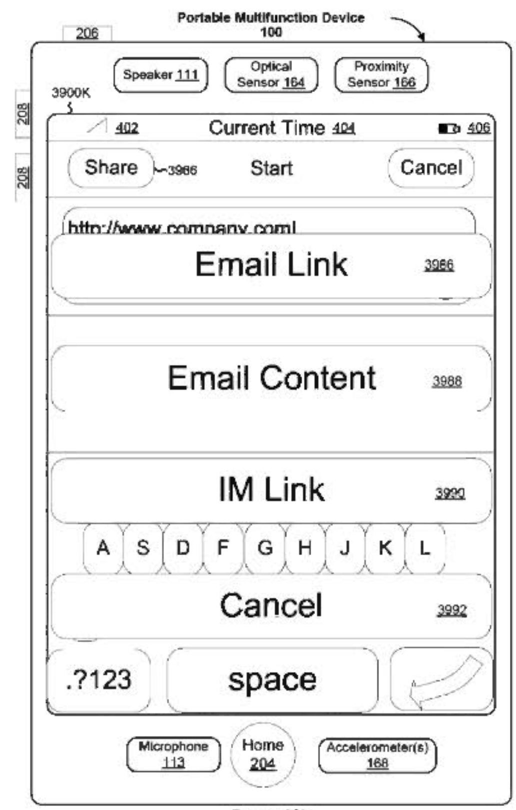


Figure 39K

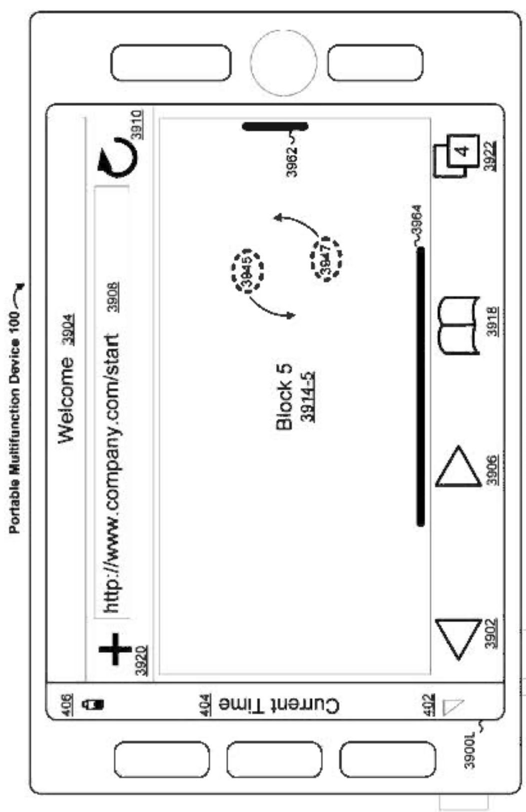


Figure 39L

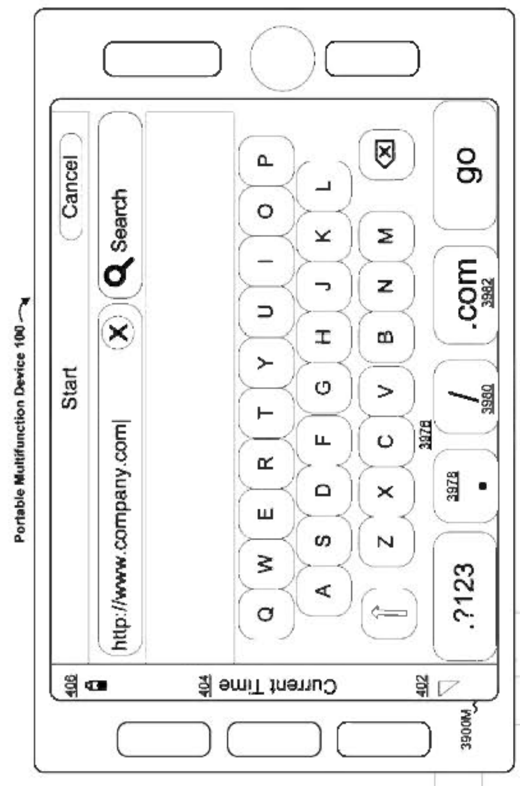


Figure 39M

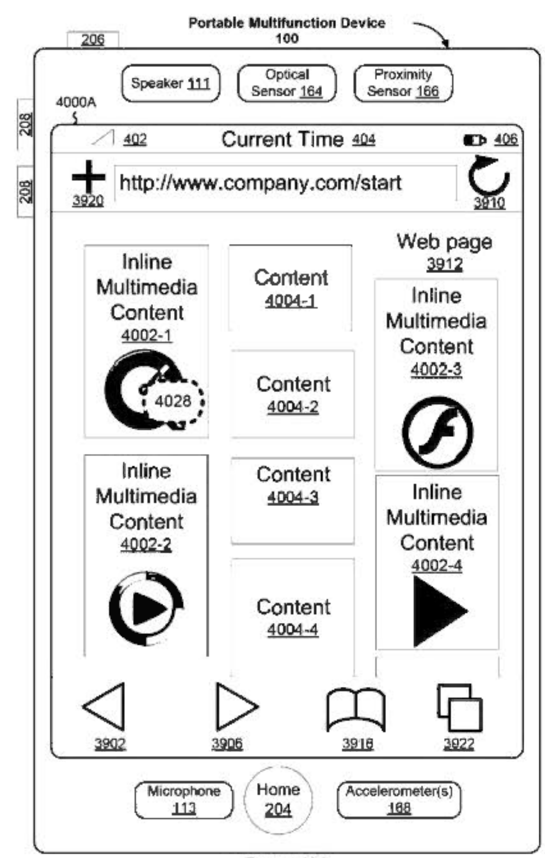


Figure 40A

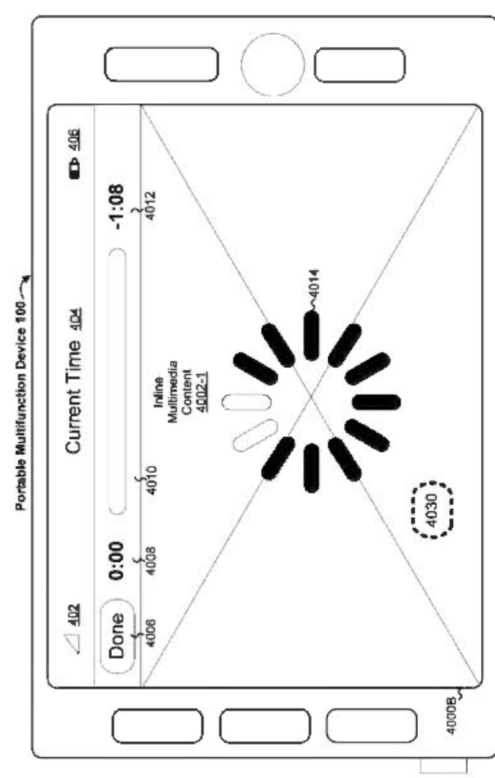


Figure 40B

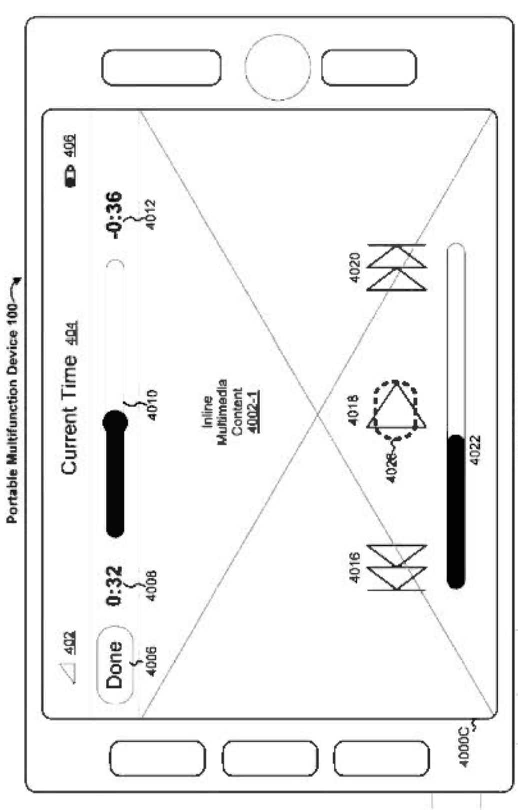


Figure 40C

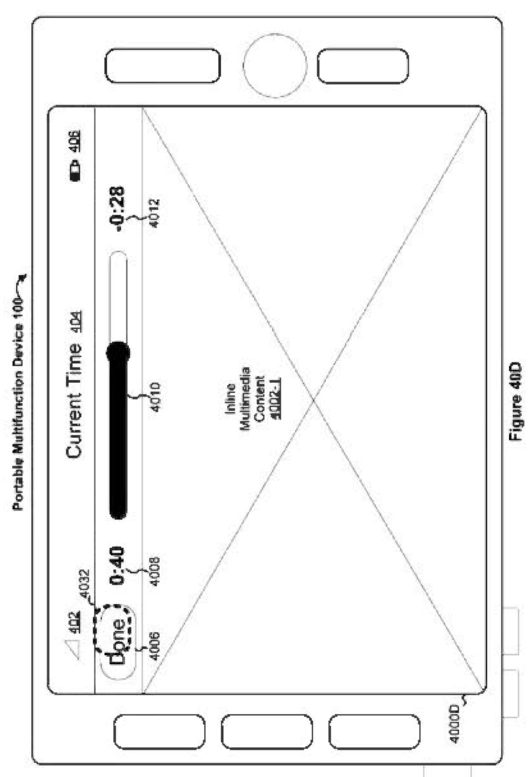


Figure 40D

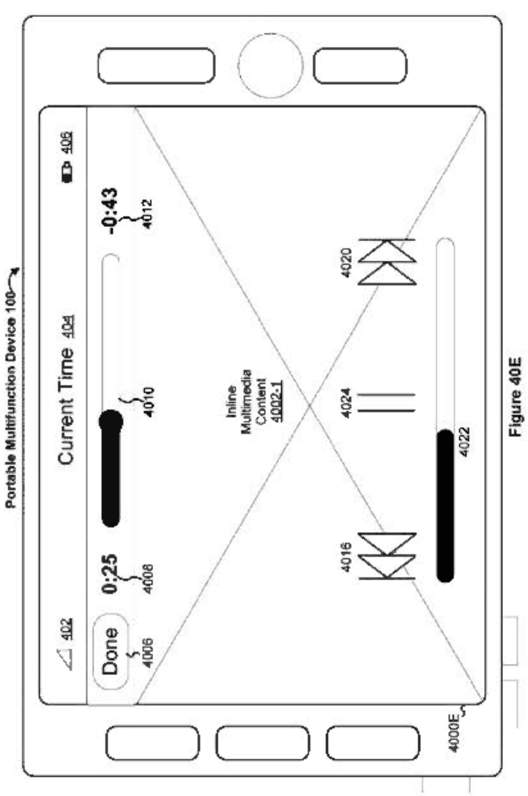


Figure 40E

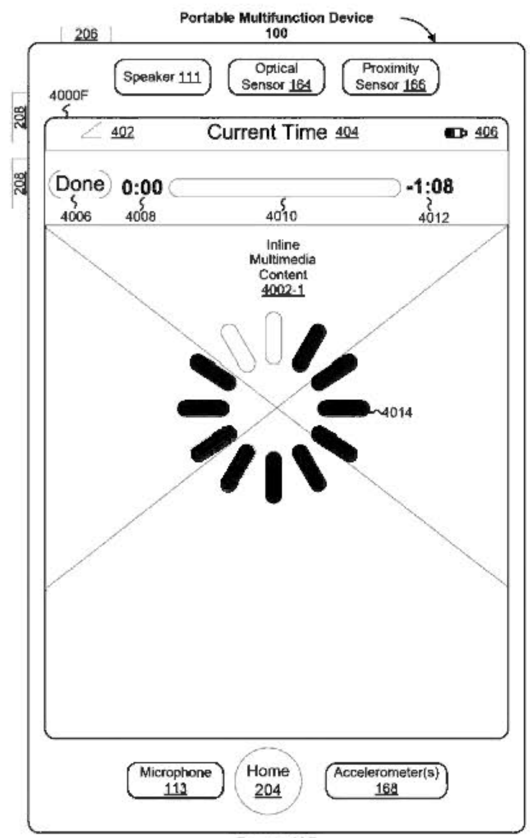


Figure 40F

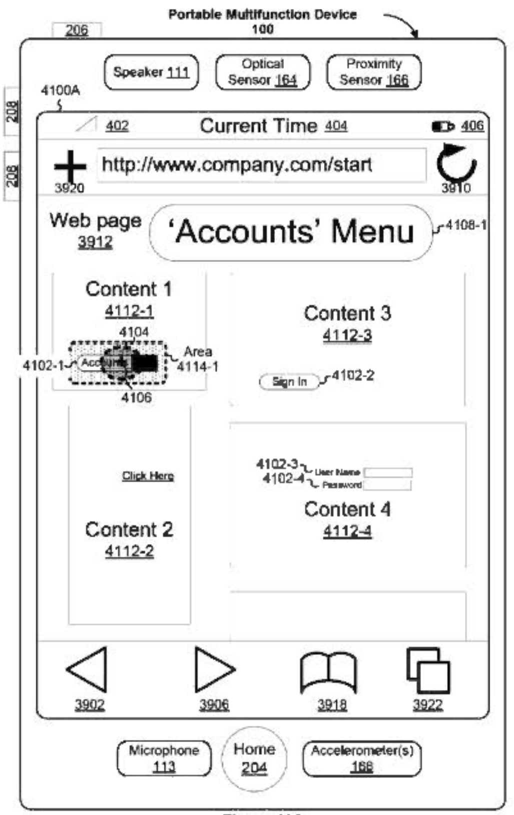


Figure 41A

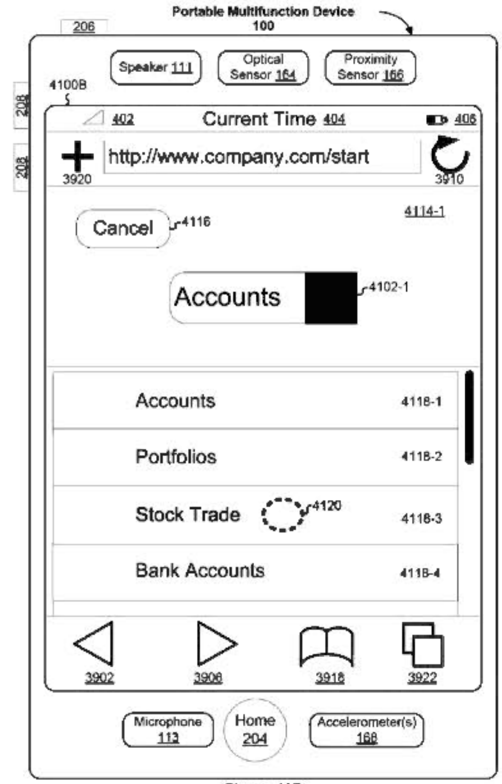


Figure 41B

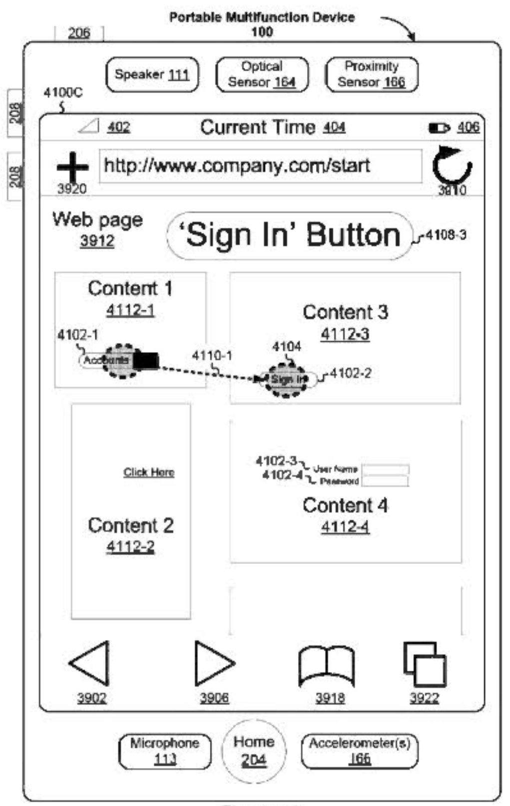


Figure 41C

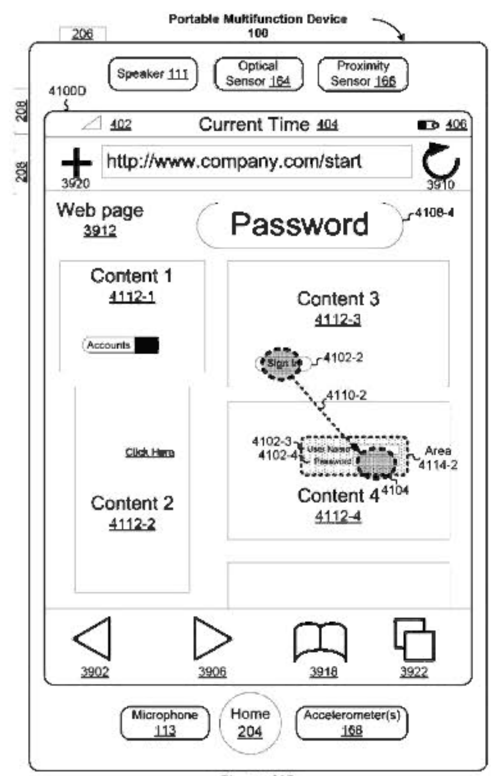


Figure 41D

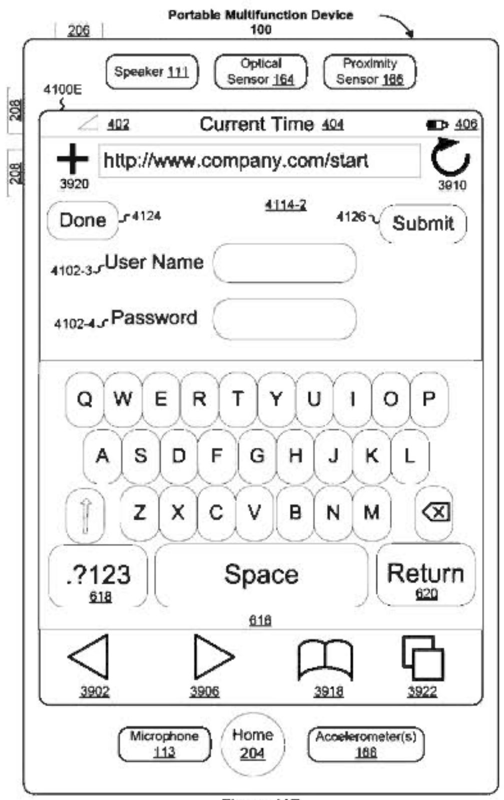


Figure 41E

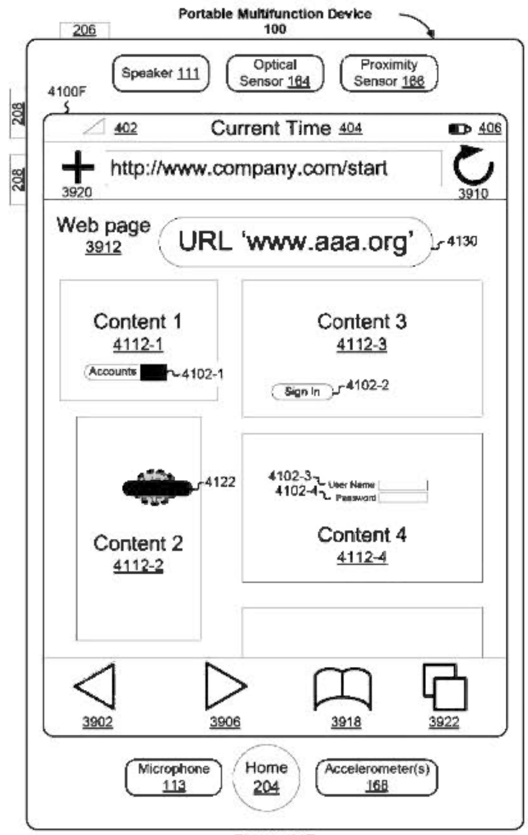
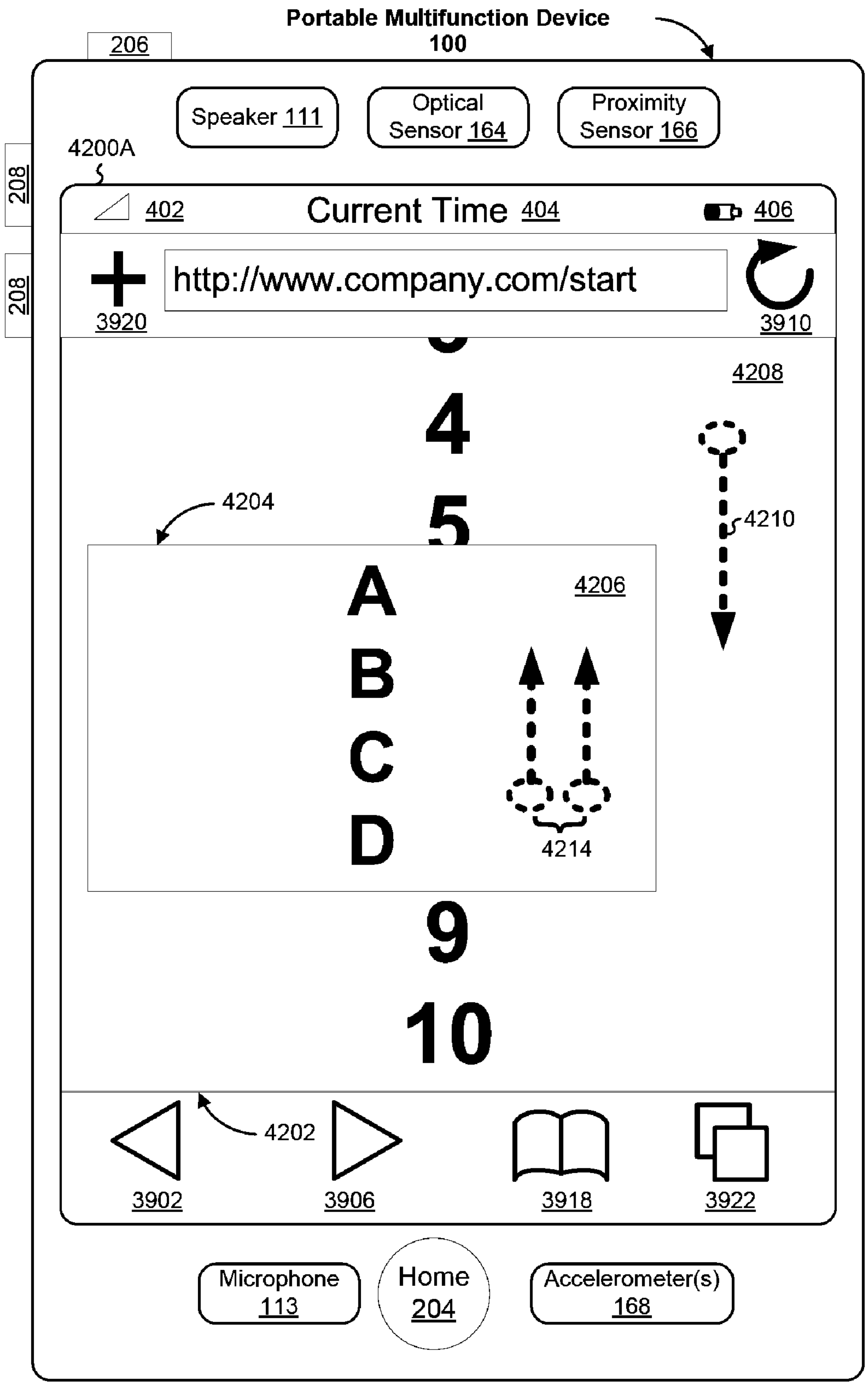


Figure 41F



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Proximity Sensor 166
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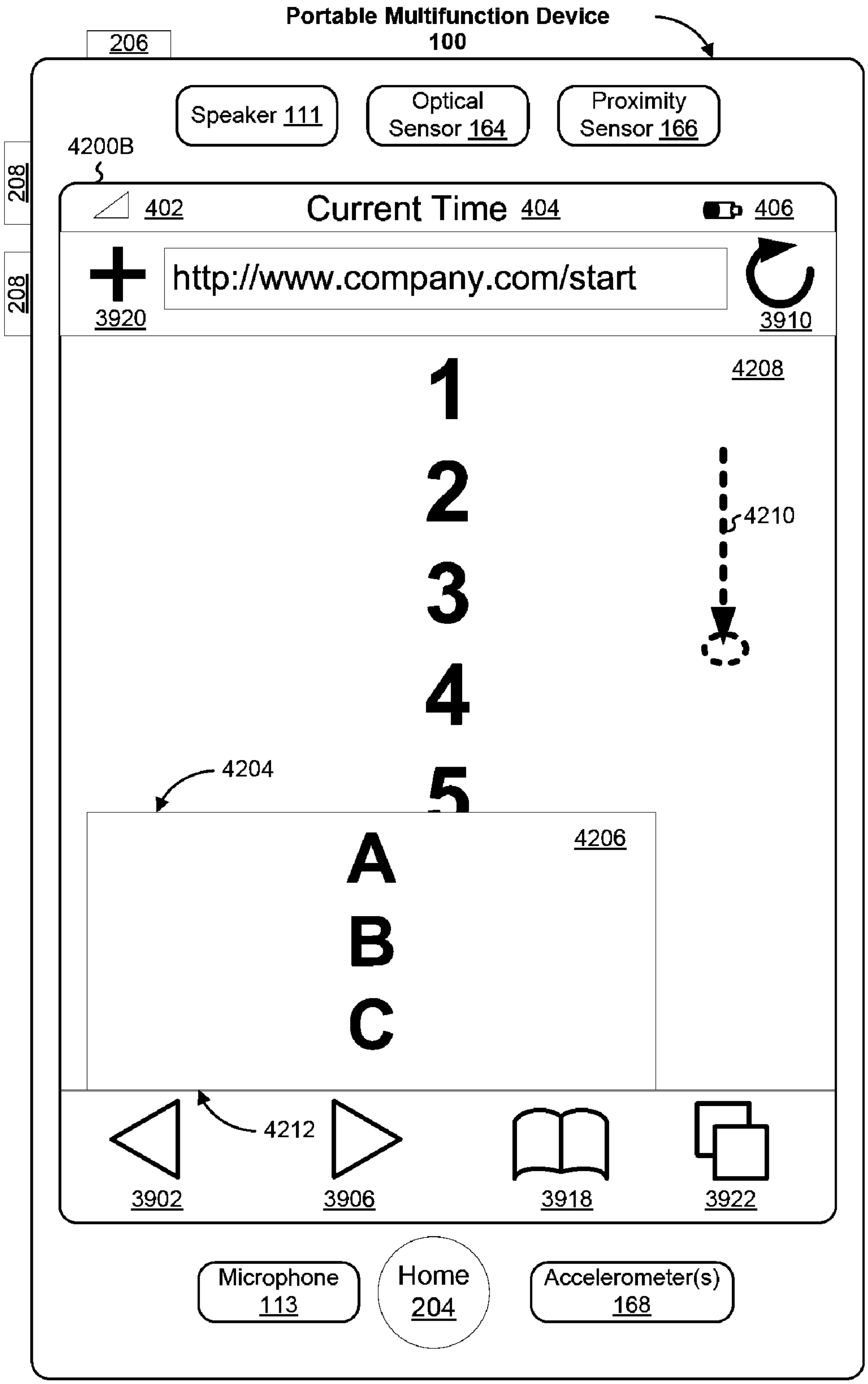
Accelerometer(s) 168

Figure 42A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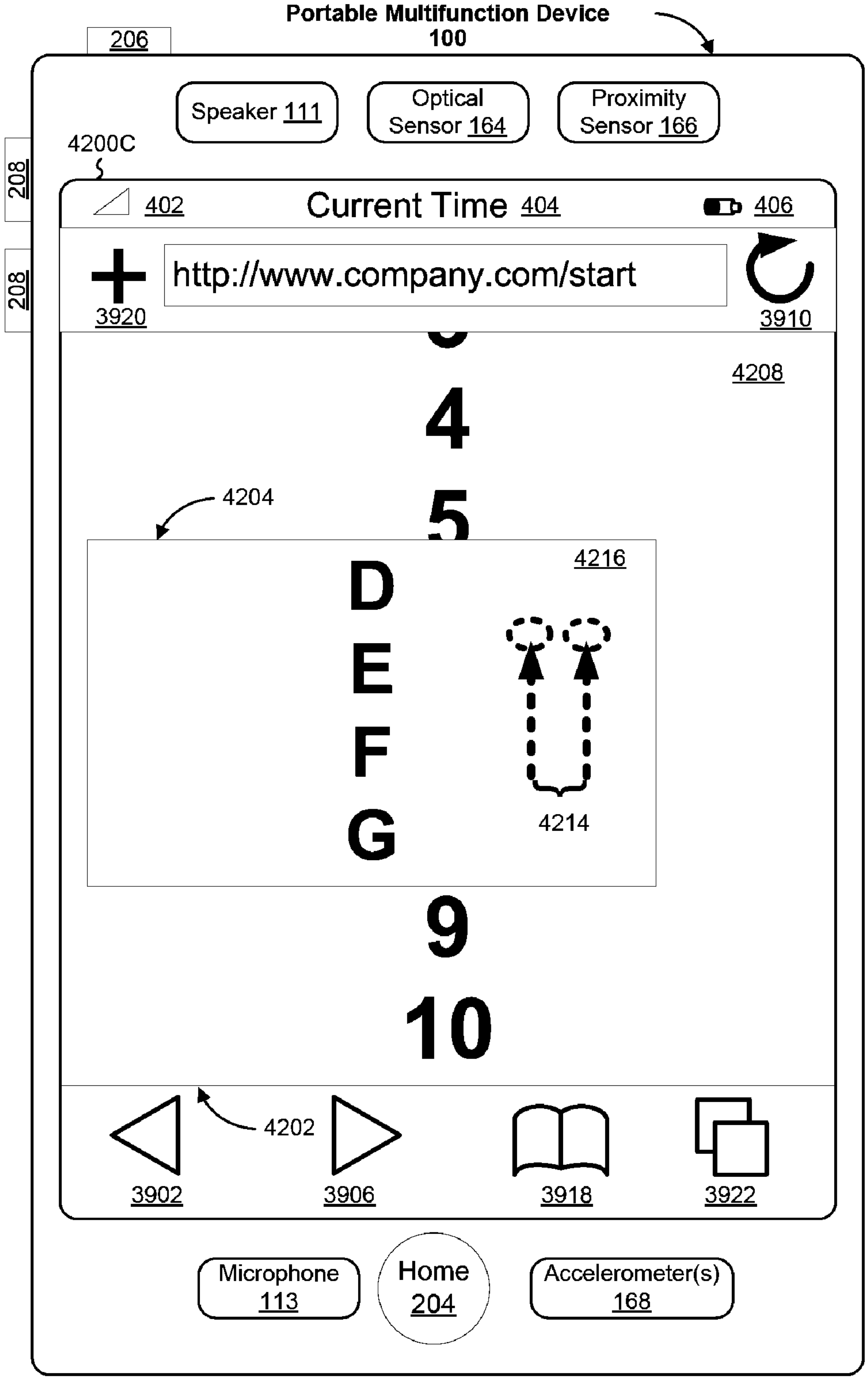
Accelerometer(s) 168

Figure 42B



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Accelerometer(s) 168

Figure 42C

Figure 43A

Figure 43B

Figure 43C

Figure 43D

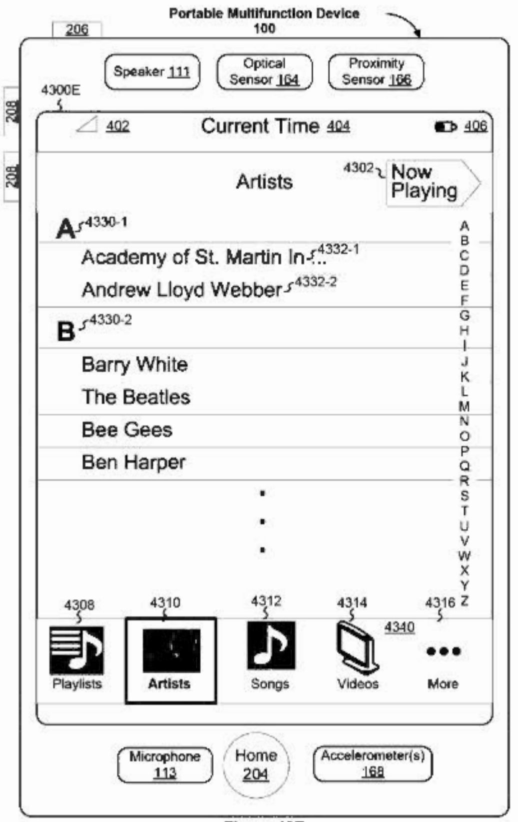


Figure 43E

A375

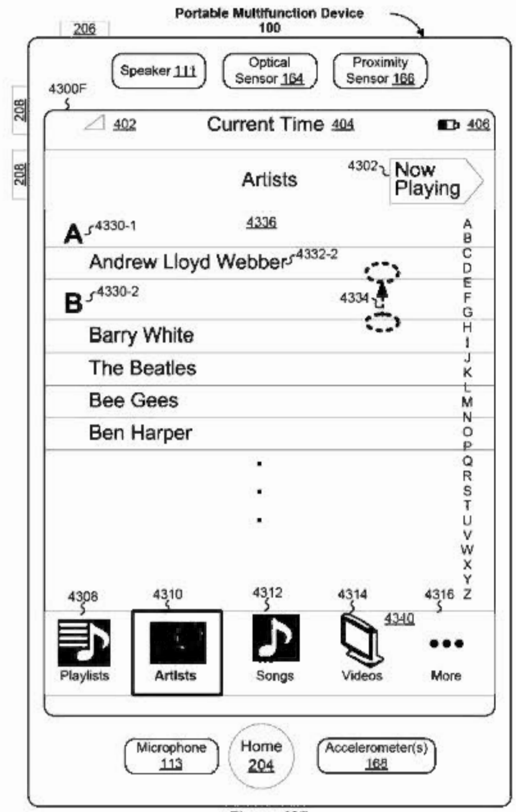


Figure 43F

A376

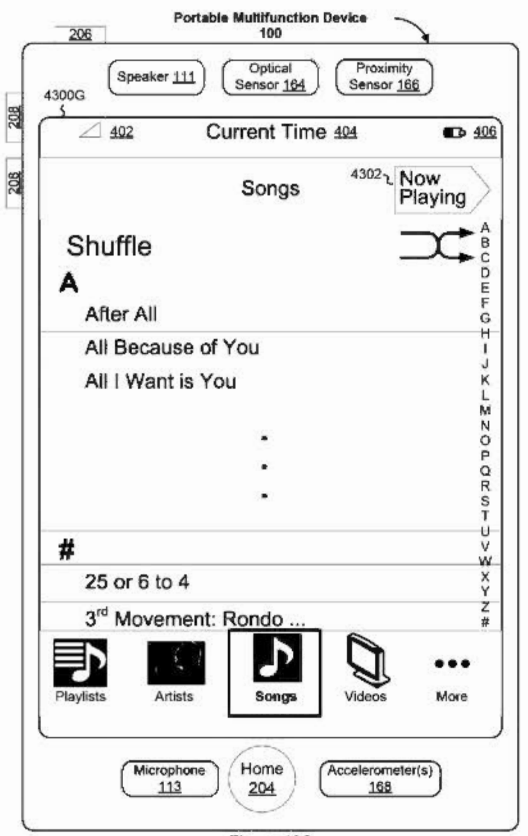


Figure 43G

A377

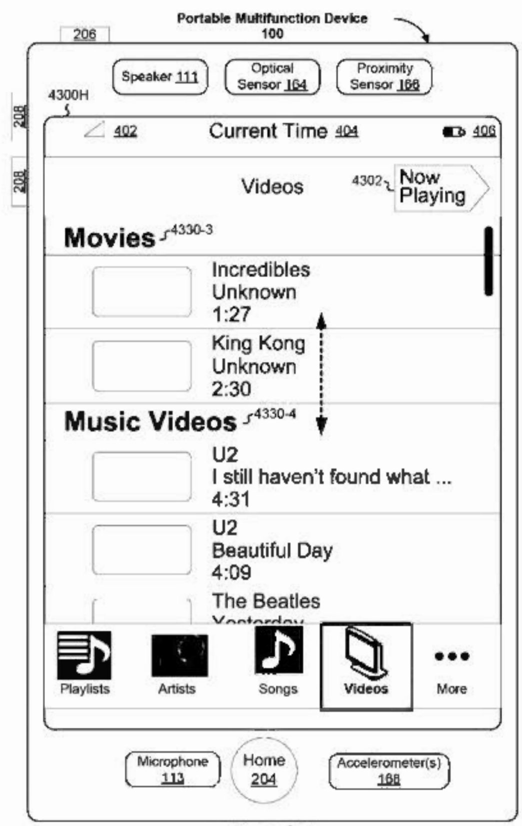


Figure 43H

A378

Figure 43I

Figure 43J

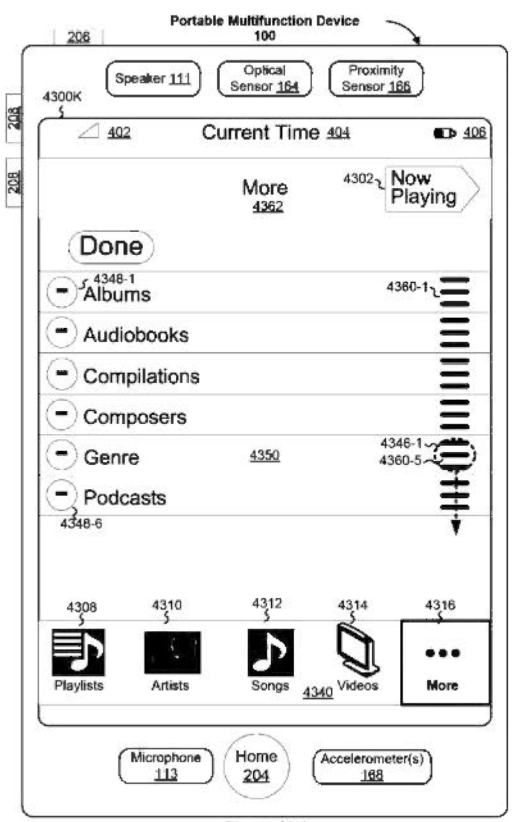


Figure 43K

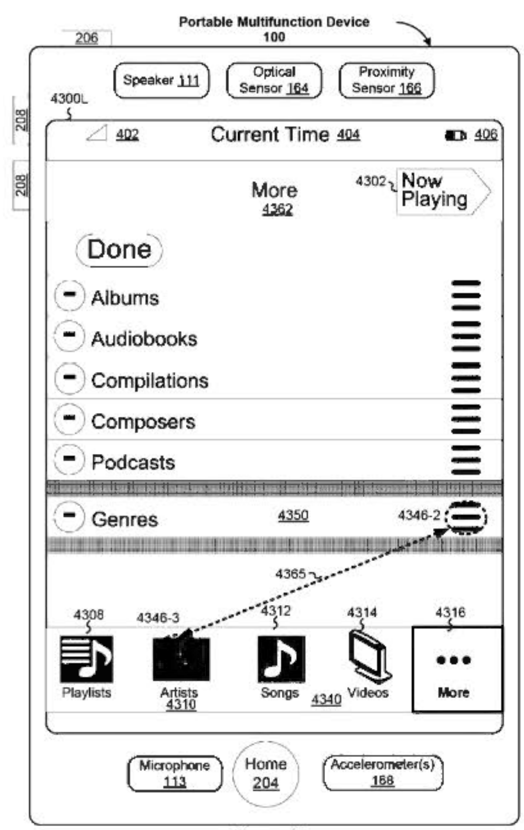


Figure 43L

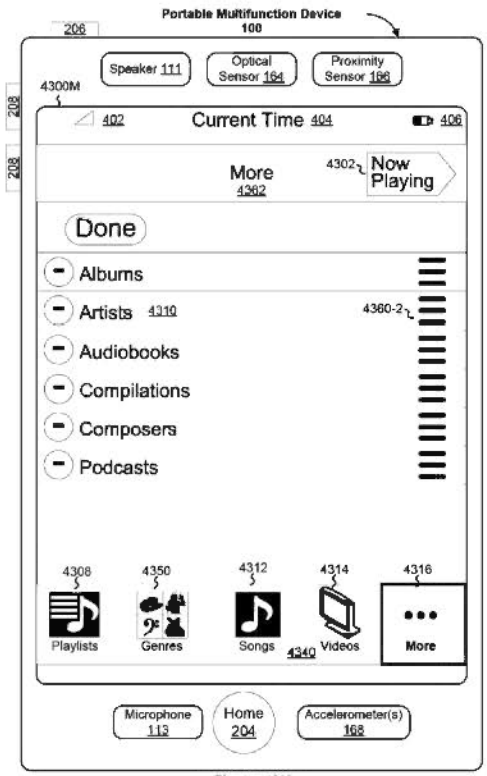


Figure 43M

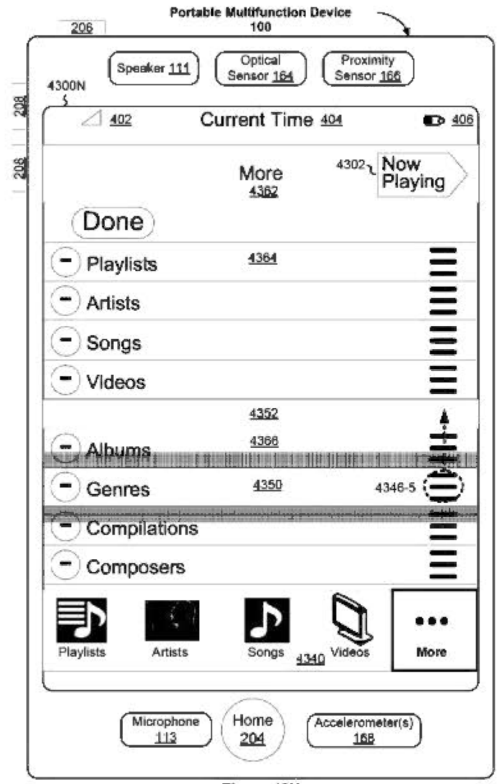
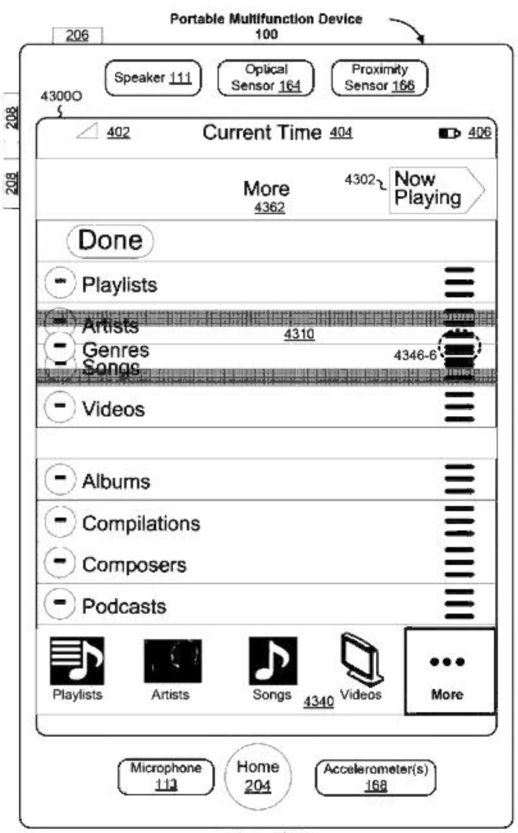


Figure 43N



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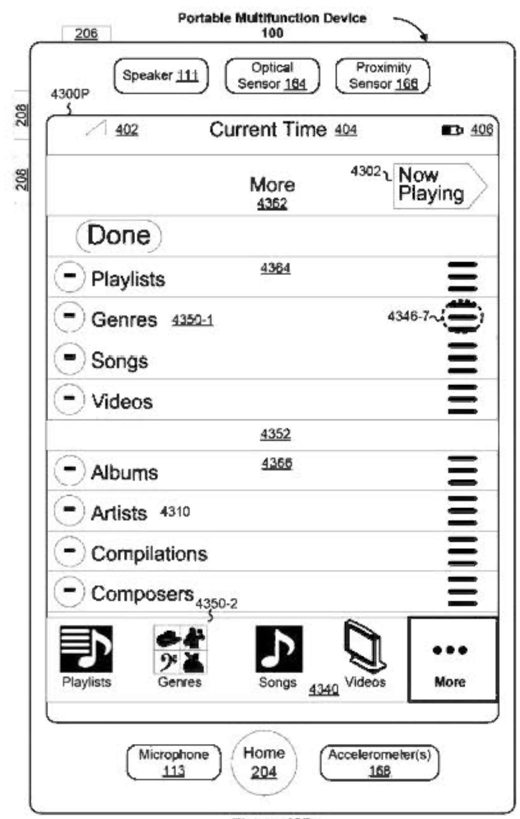

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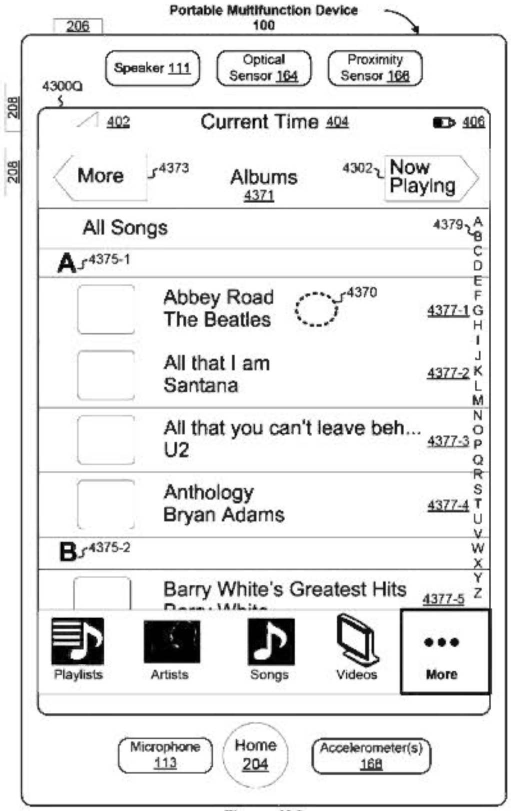


Figure 43Q

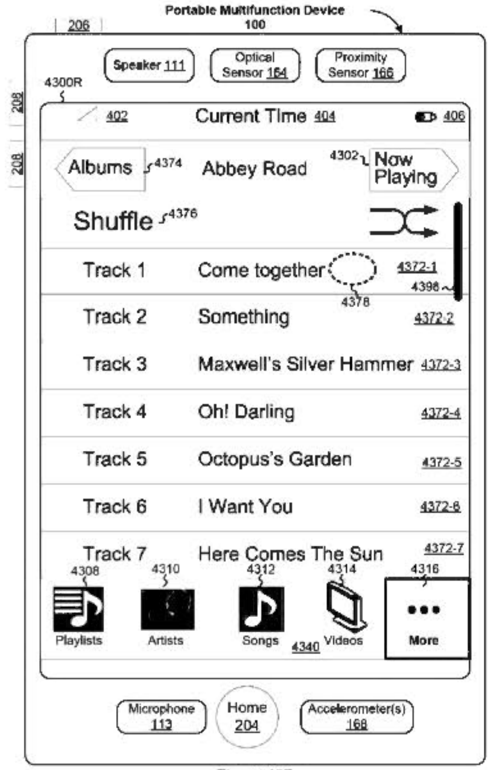


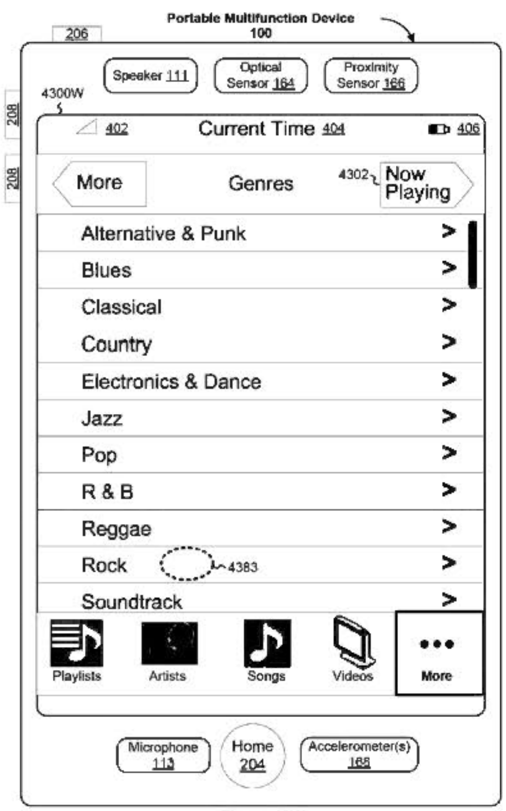
Figure 43R

Figure 43S

Figure 43T

Figure 43U

Figure 43V



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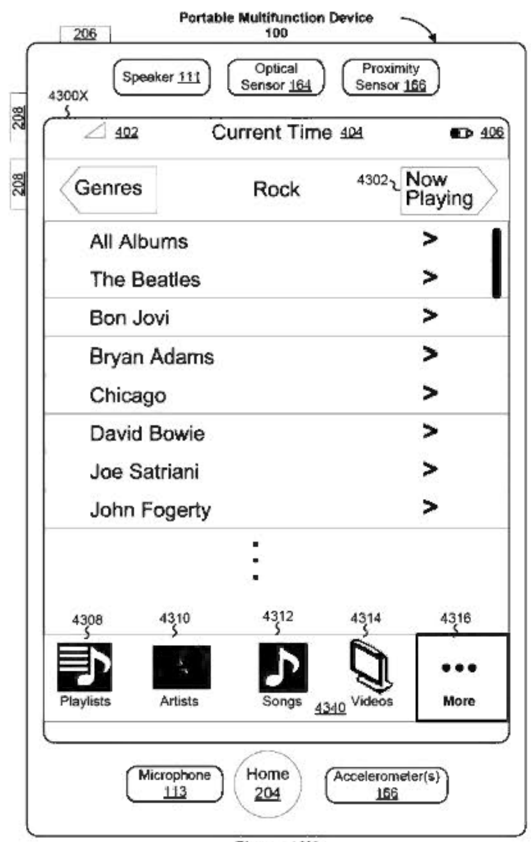

Figure 43X

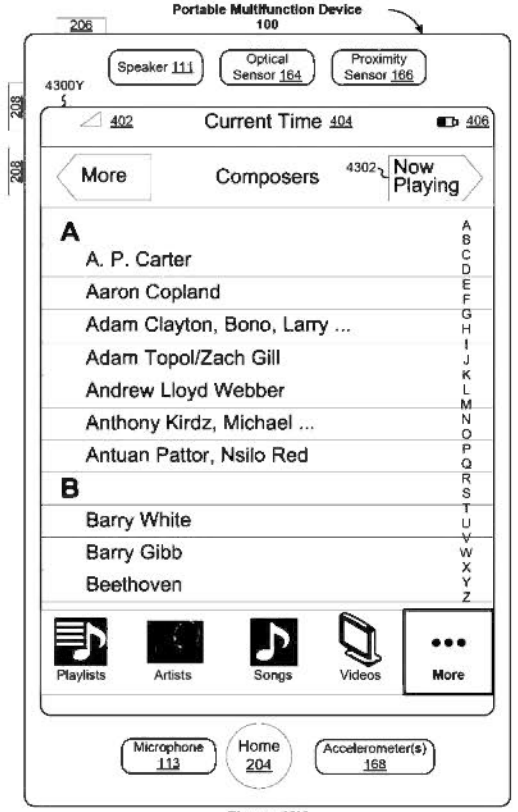

Figure 43Y

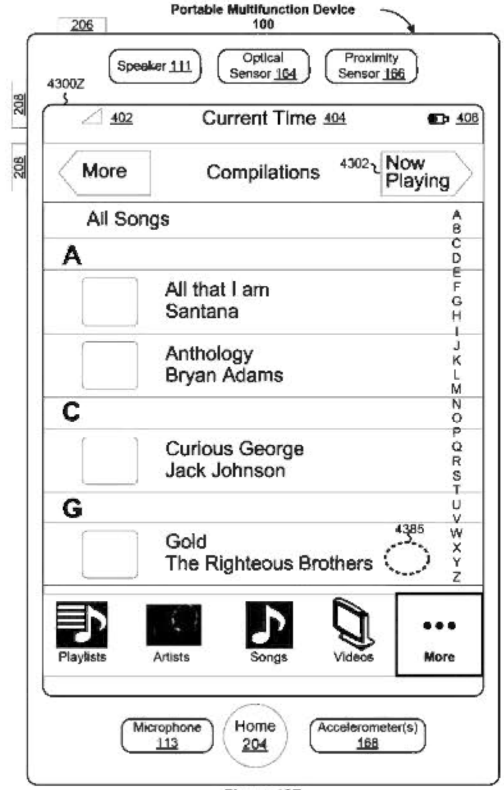

Figure 43Z

Figure 43AA

Figure 43BB

4392

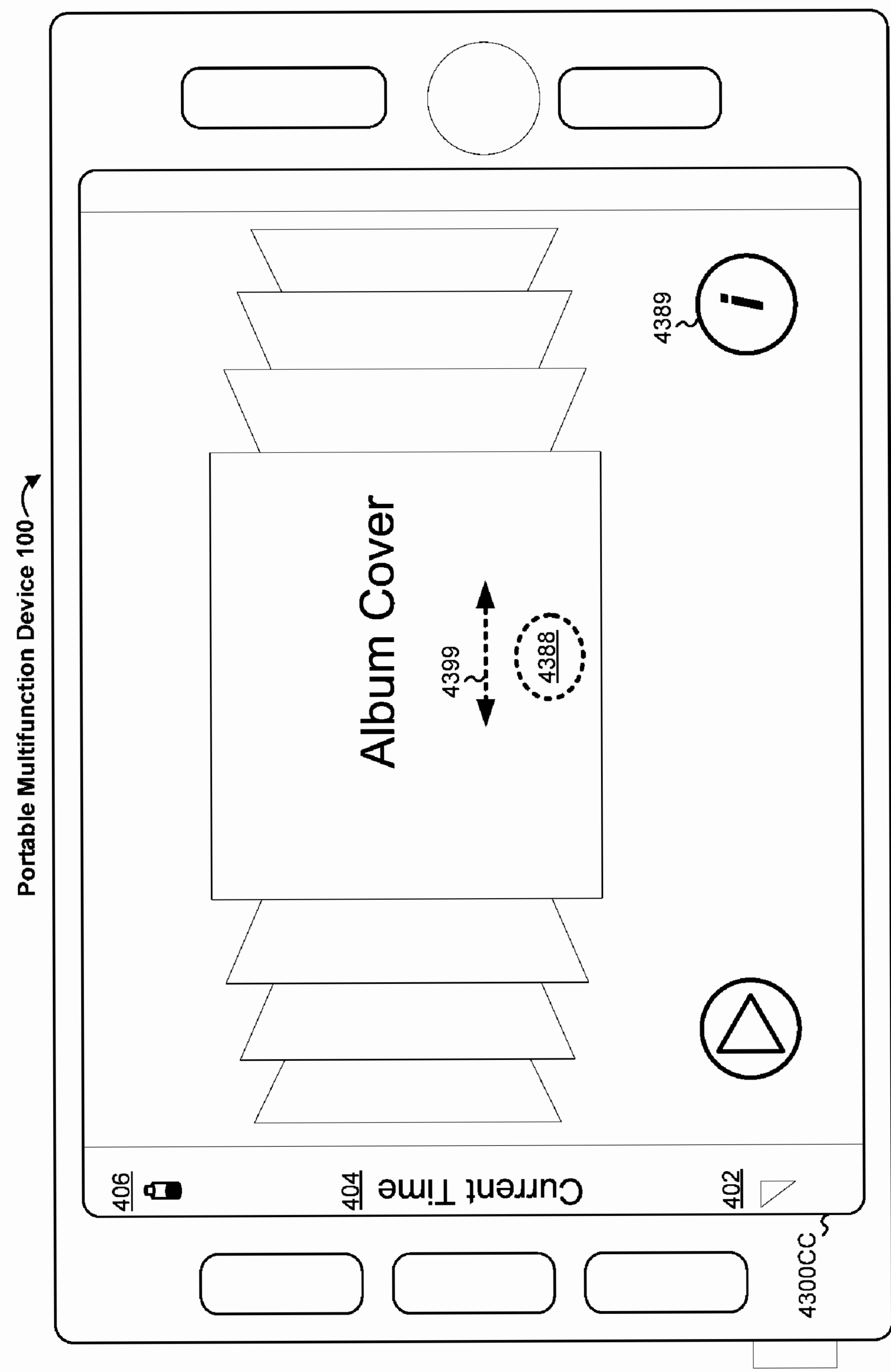
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Figure 43CC

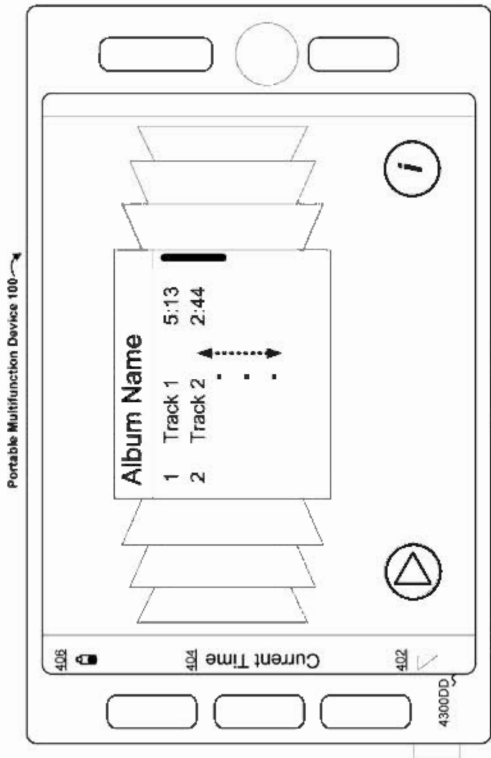


Figure 43DD

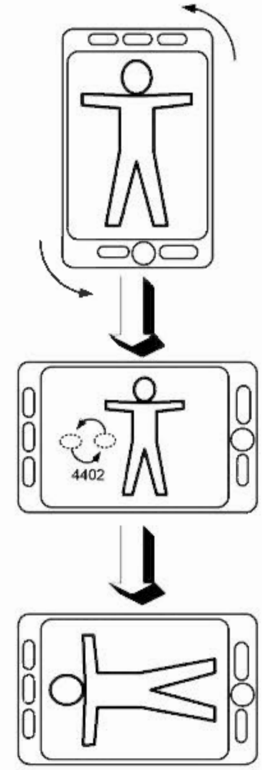


Figure 44A

Figure 44B

Figure 44C

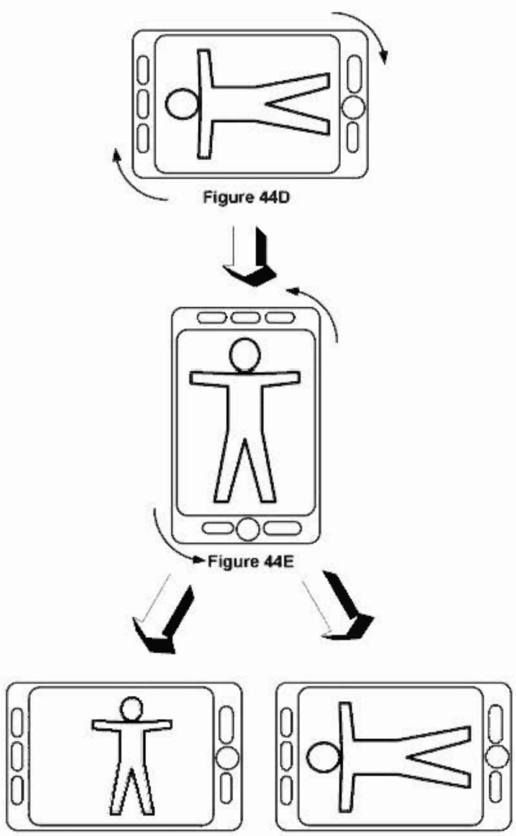


Figure 44D

Figure 44E

Figure 44F

Figure 44G

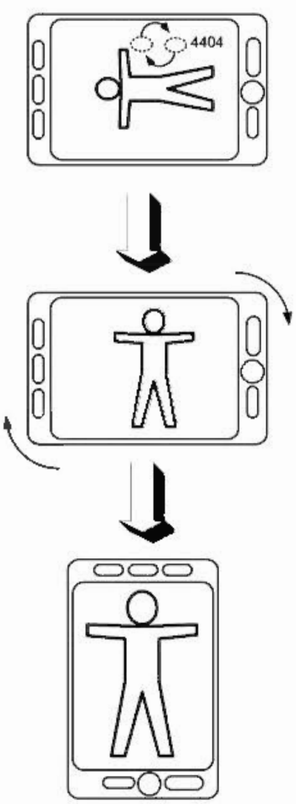


Figure 44H

Figure 44I

Figure 44J

Figure 45A

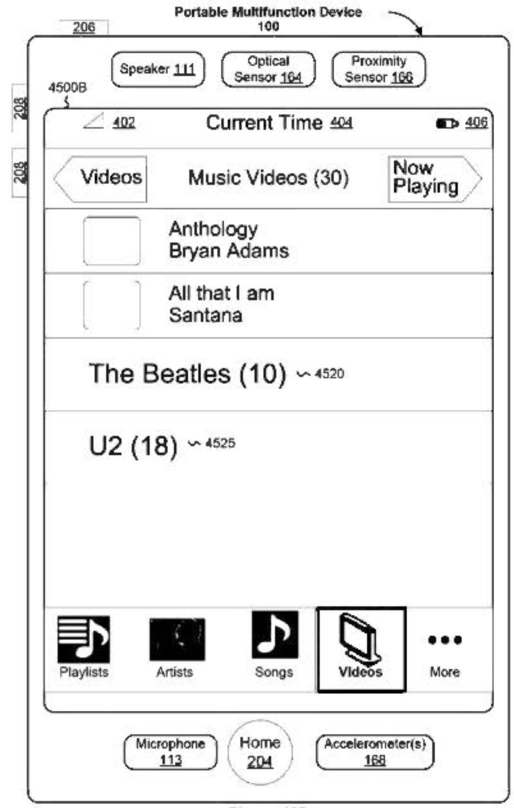


Figure 45B

Figure 45C

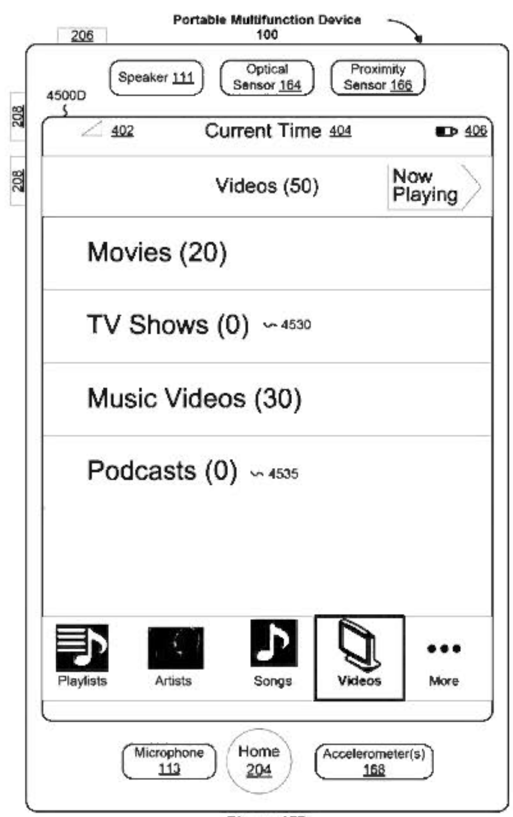


Figure 45D

Figure 45E

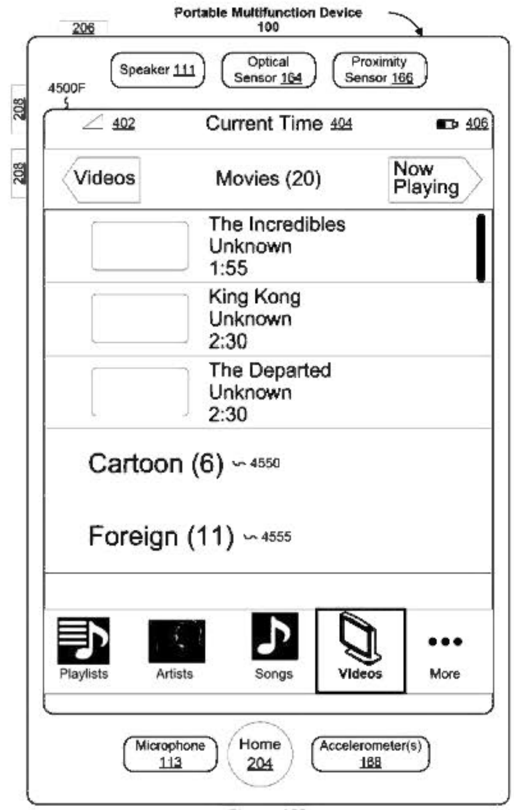


Figure 45F

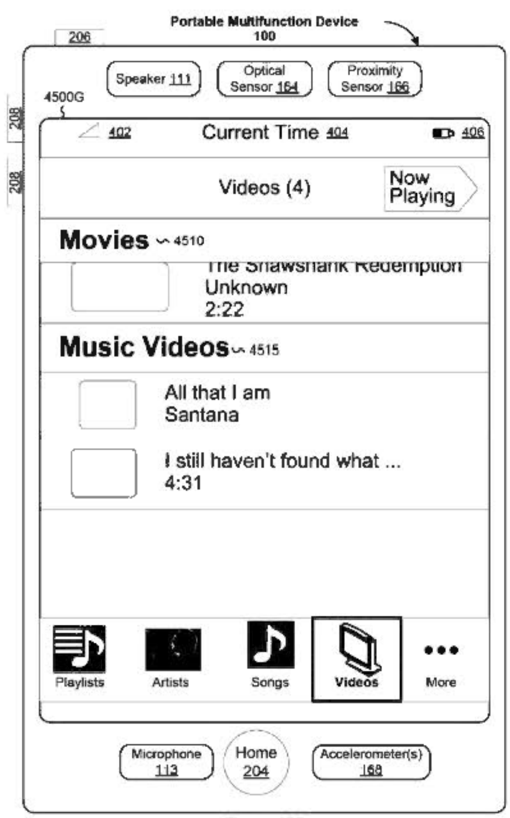


Figure 45G

Rap Album Template

Figure 46A

Jazz Album Template

Figure 46B

Electronica Album Template

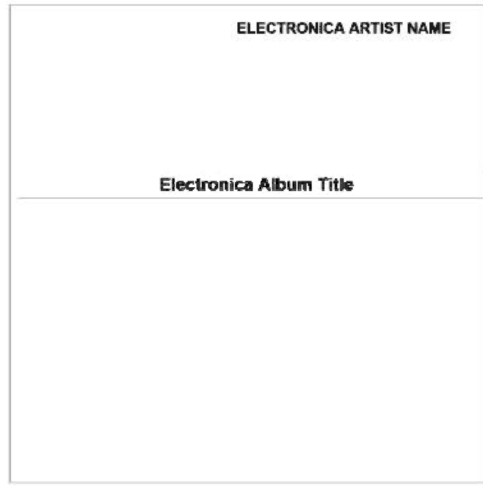


Figure 46C

Figure 47A

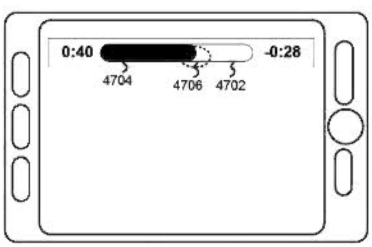
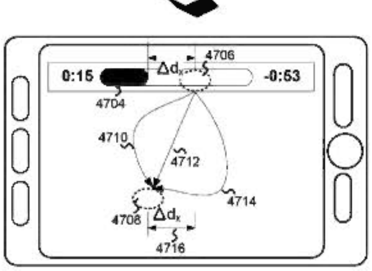


Figure 47B



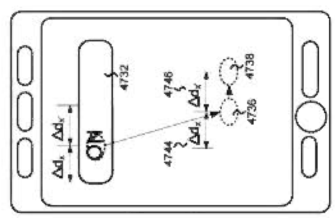


Figure 47E

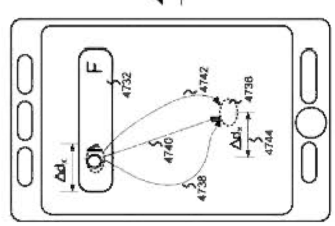


Figure 47D

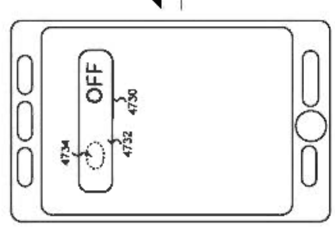


Figure 47C

Figure 48A

Figure 48B

Figure 48C

Figure 49A

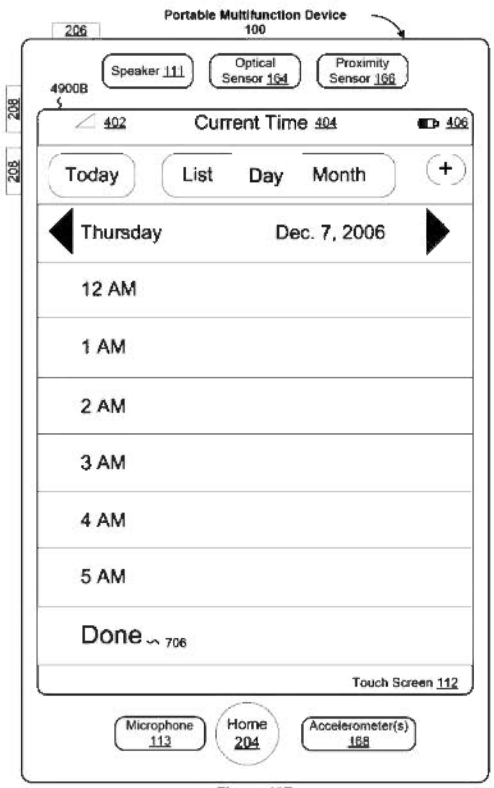


Figure 49B

Figure 49C

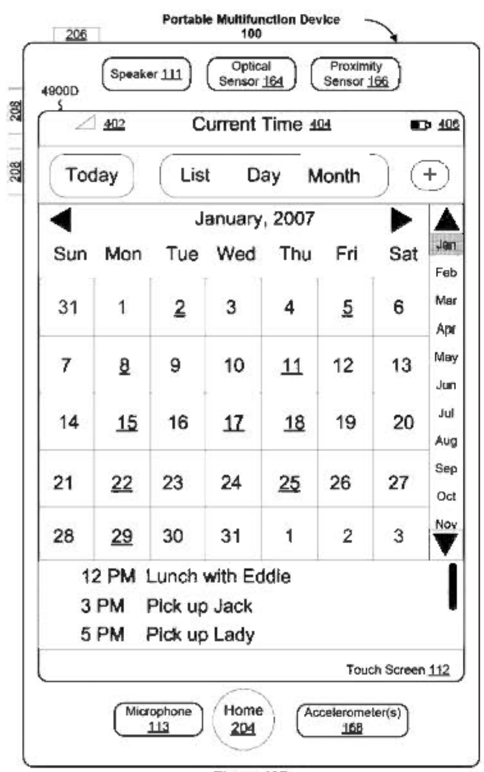


Figure 49D

Figure 49E

Figure 49F

Figure 49G

Figure 49H

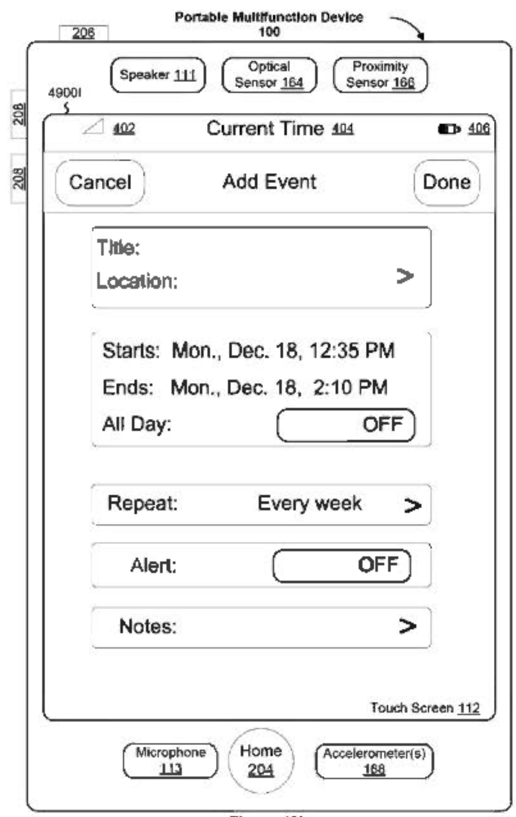


Figure 49I

Figure 49J

Figure 49K

Figure 49L

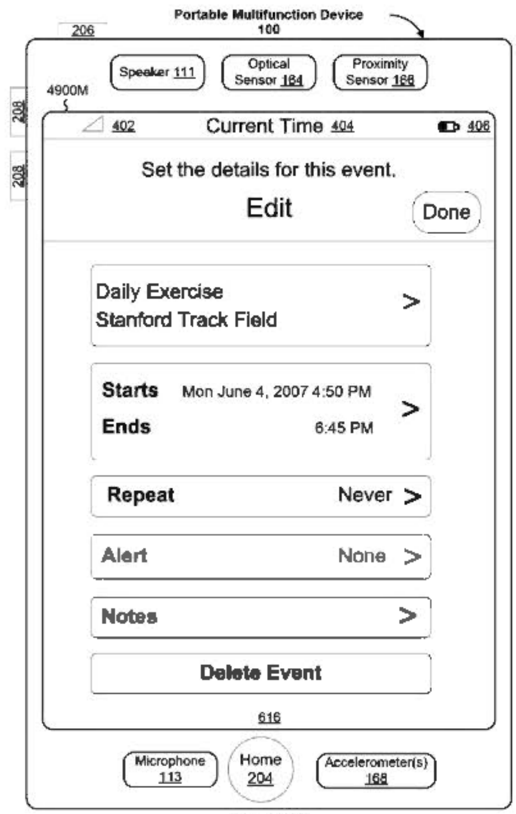


Figure 49M

Figure 49N

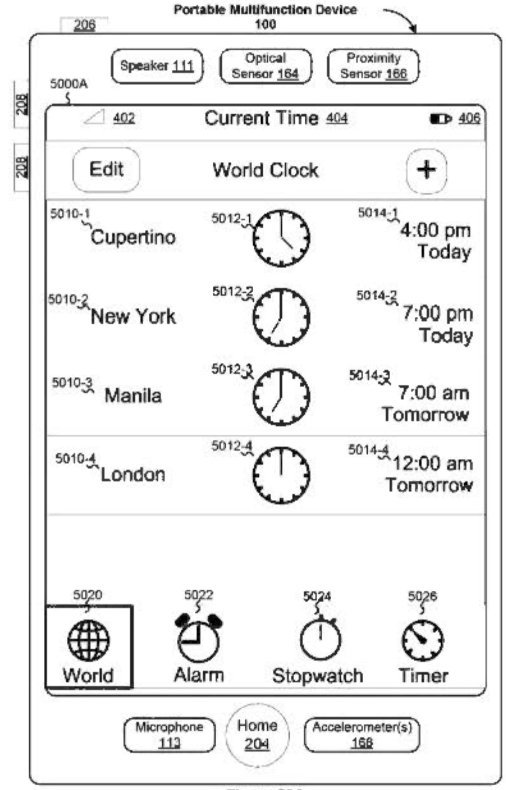


Figure 50A

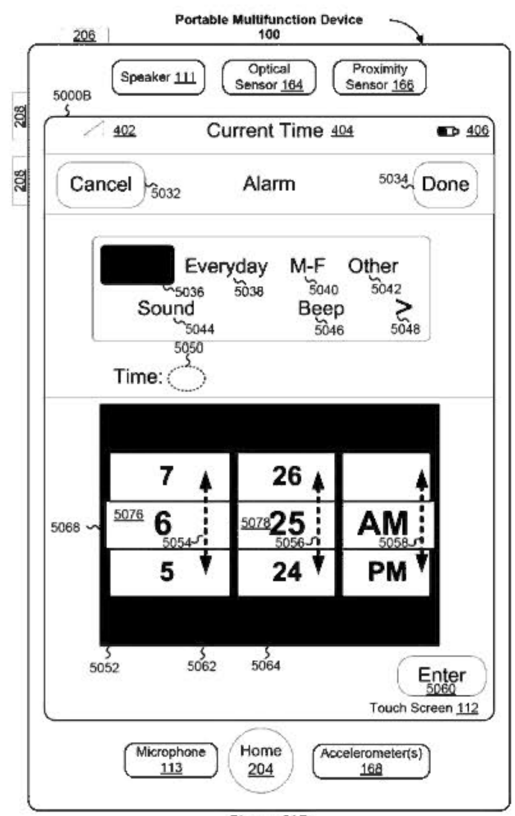


Figure 50B

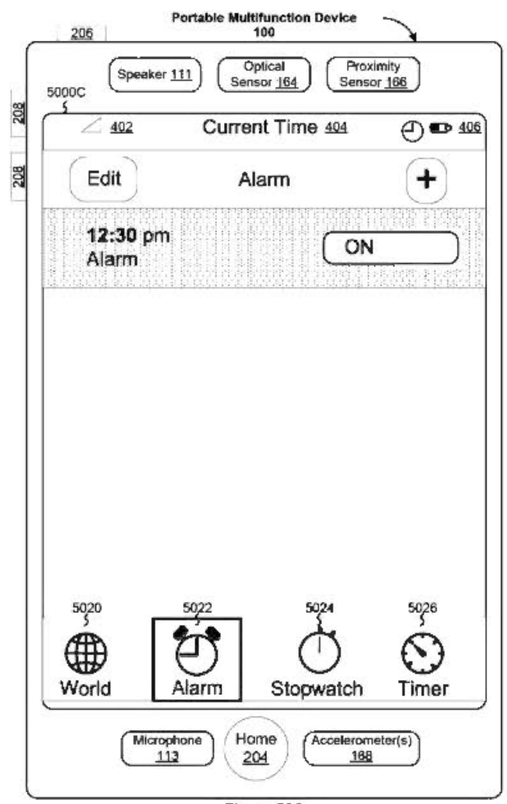


Figure 50C

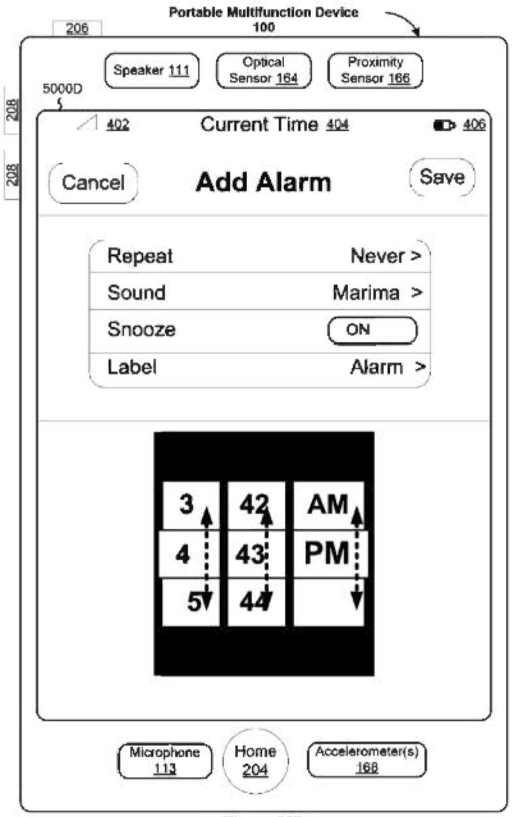


Figure 50D

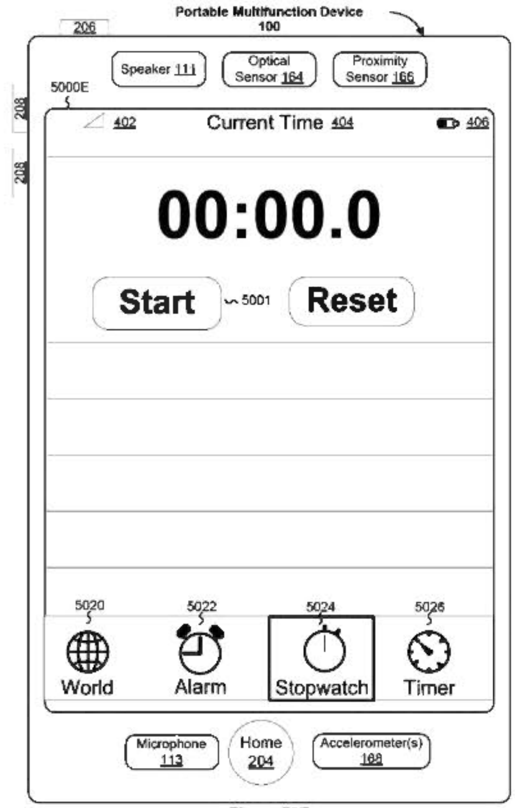


Figure 50E

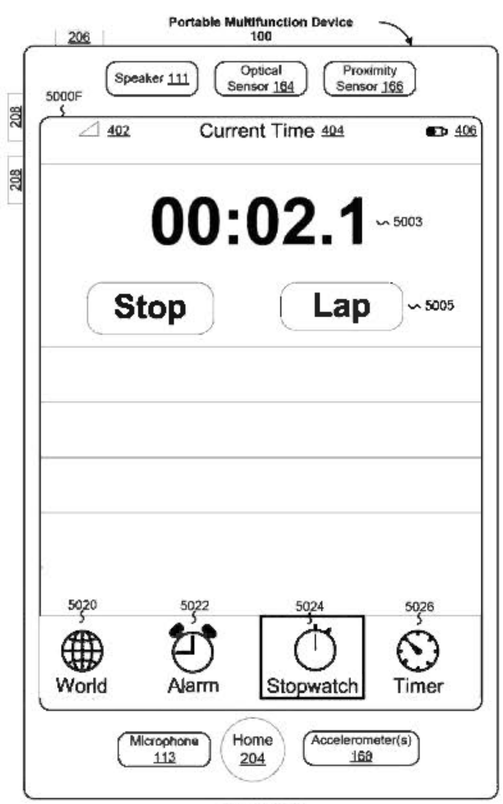


Figure 50F

Figure 50G

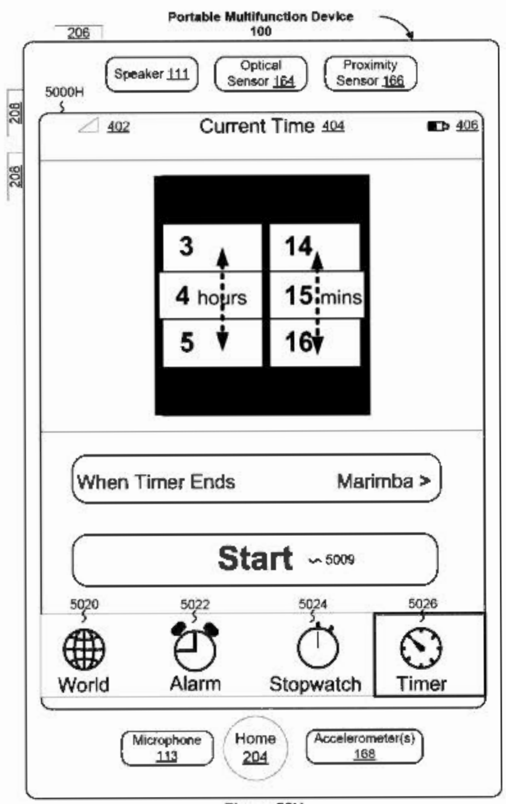


Figure 50H

Figure 50I

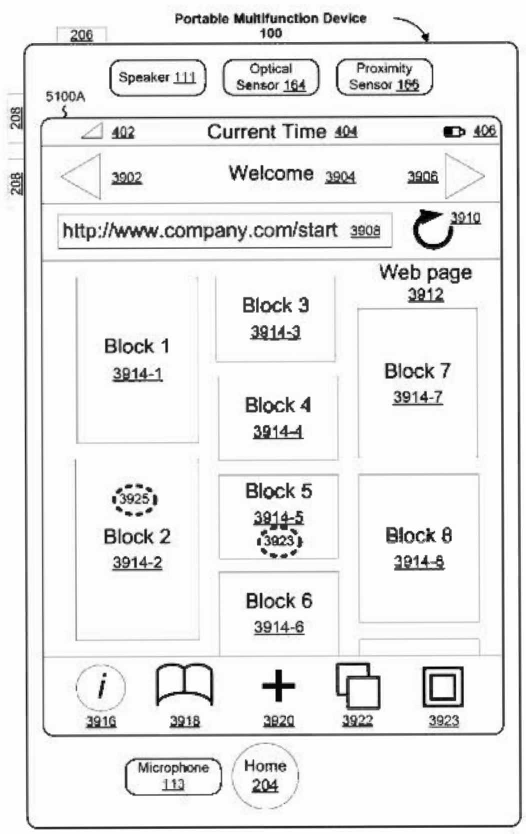


Figure 51A

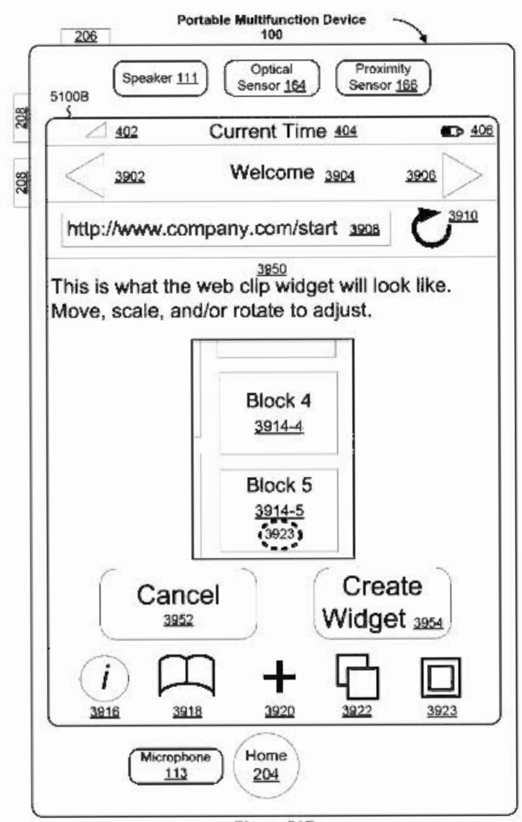


Figure 51B

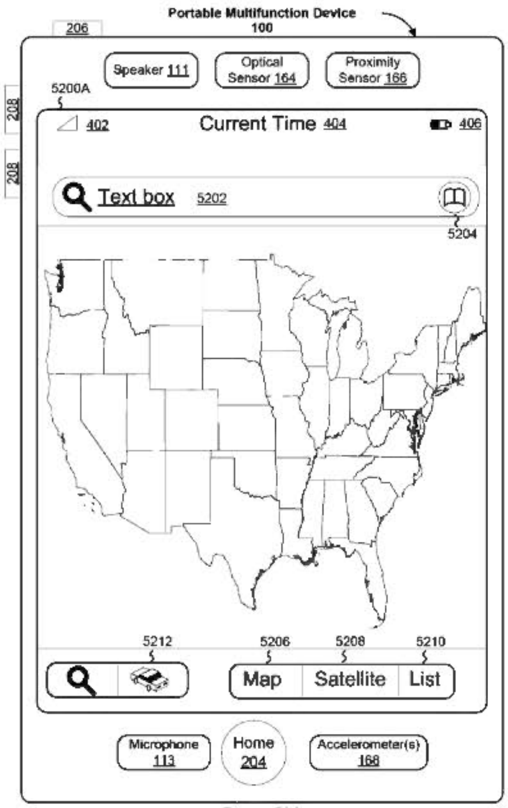


Figure 52A

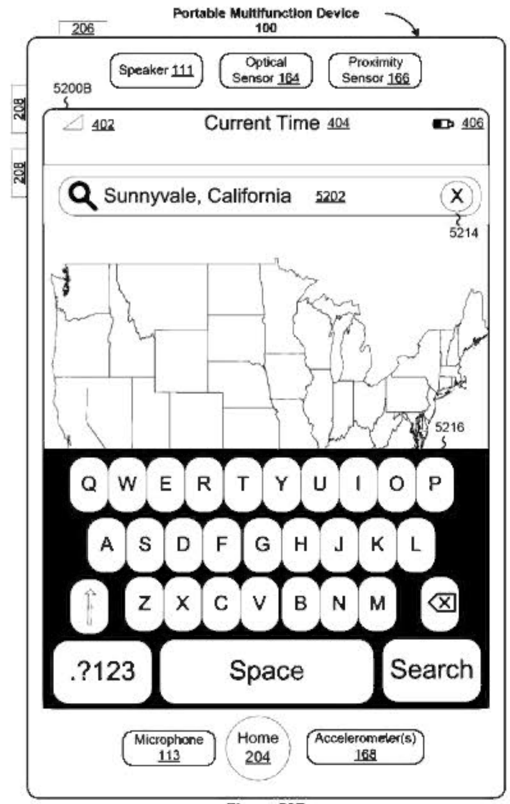


Figure 52B

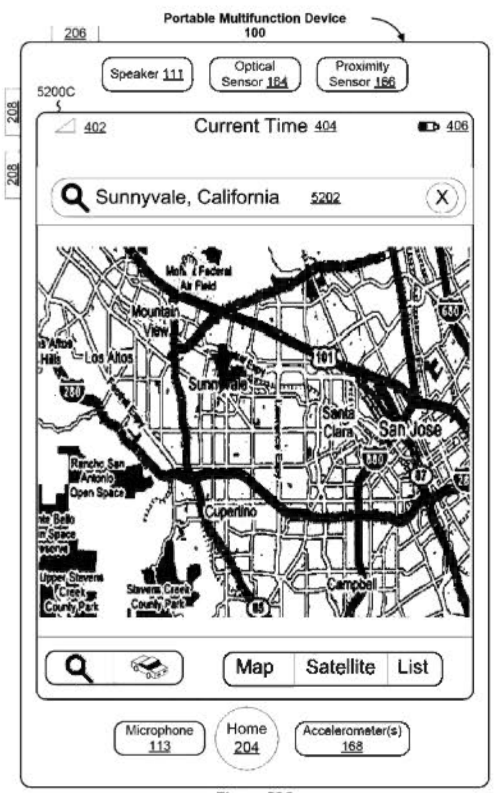


Figure 52C

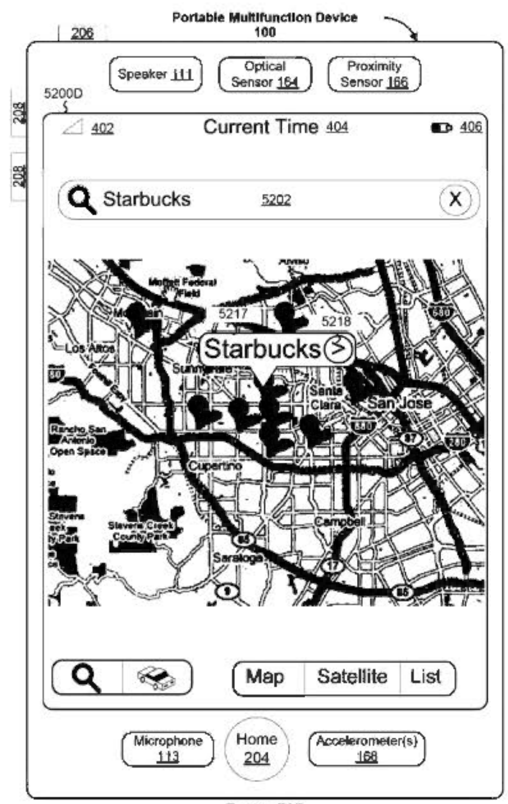


Figure 52D

Figure 52E

Figure 52F

Figure 52G

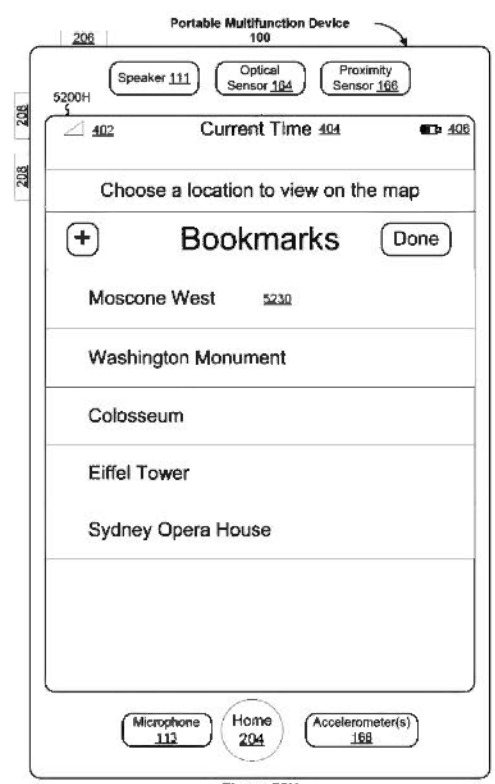


Figure 52H

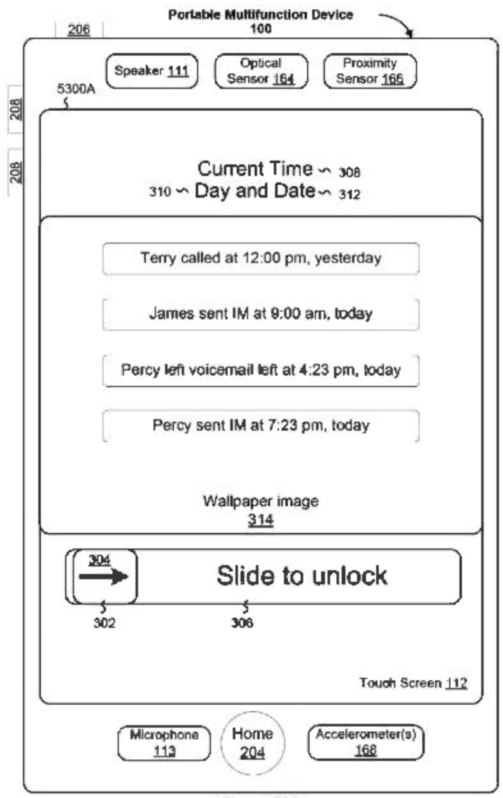


Figure 53A

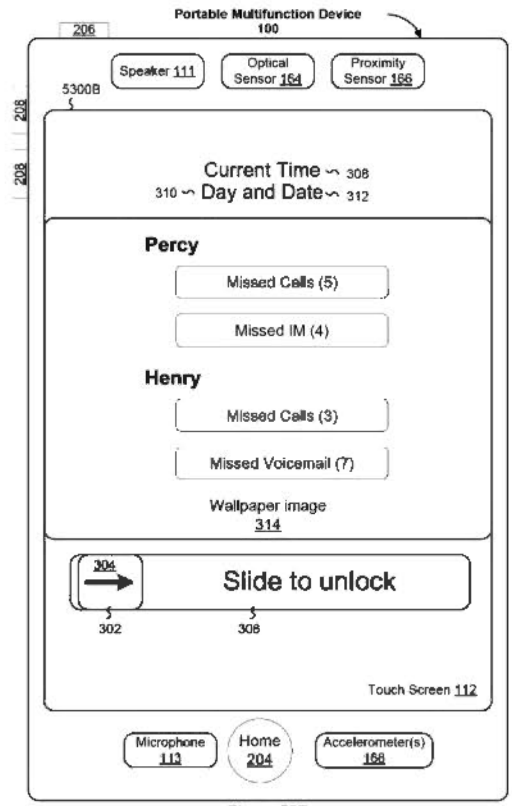


Figure 53B

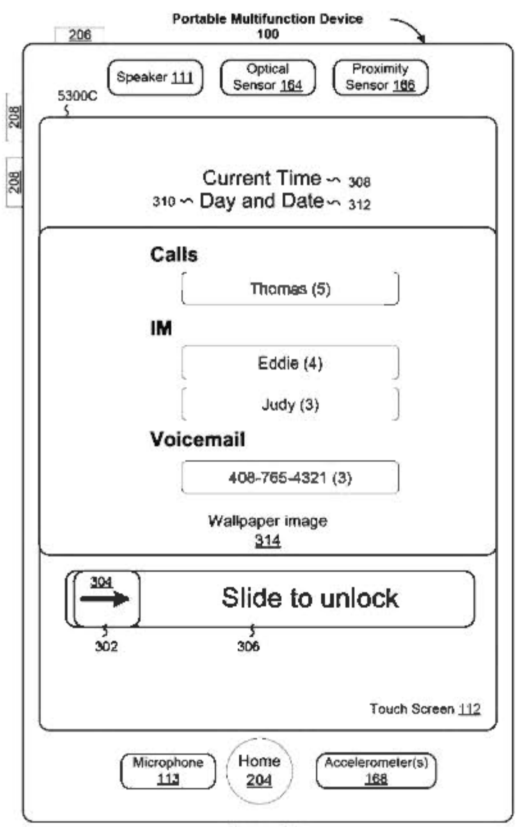


Figure 53C

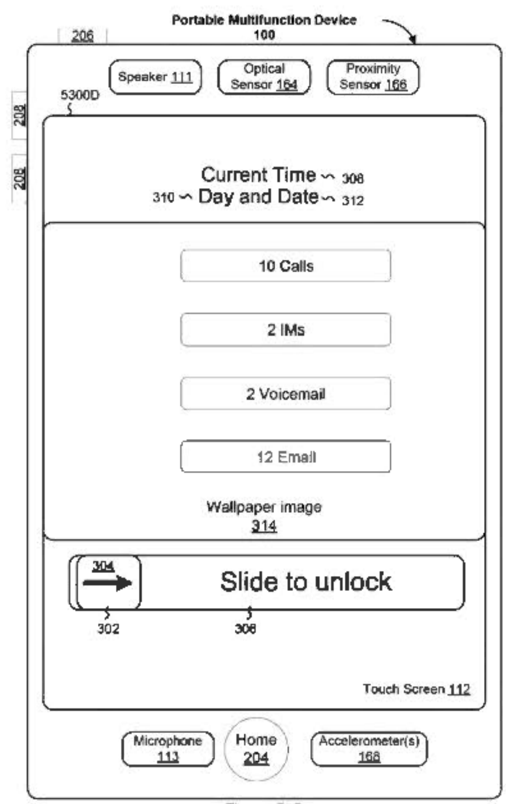


Figure 53D

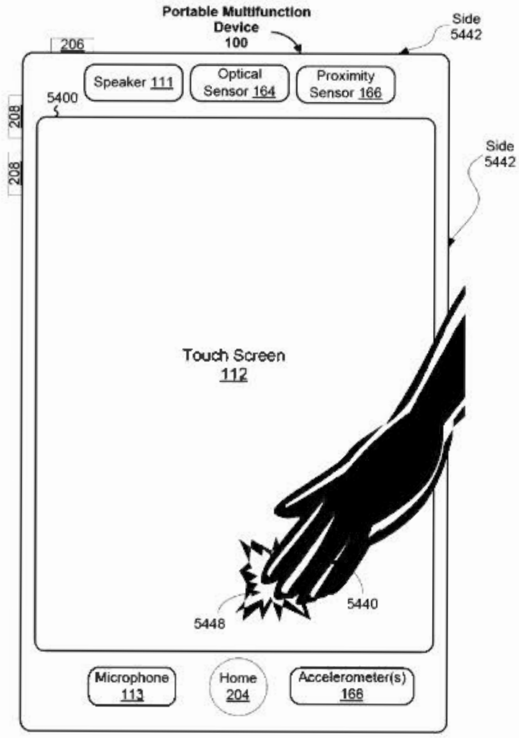


Figure 54

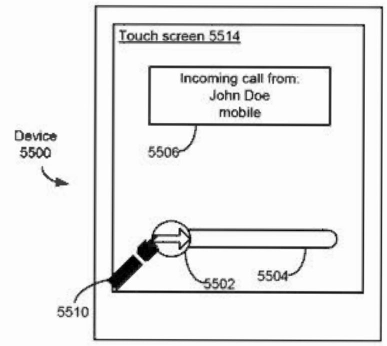


Figure 55A

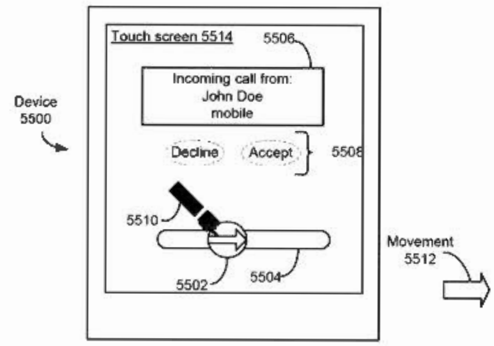


Figure 55B

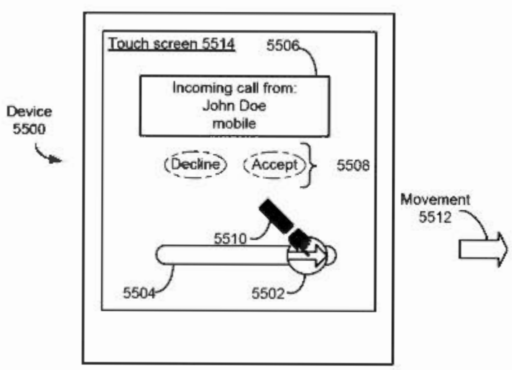


Figure 55C

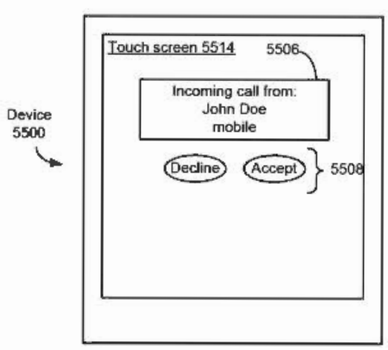


Figure 55D

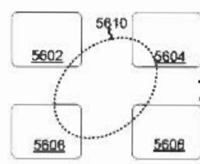


Figure 56A

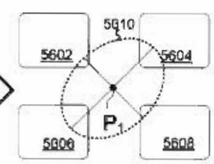


Figure 56B

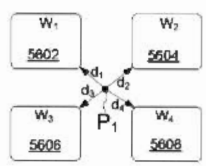


Figure 56C

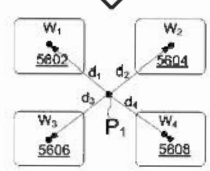


Figure 56D

W_1' and W_1" are two numbers with opposite signs

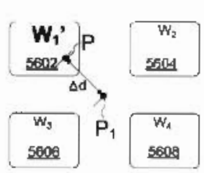


Figure 56E

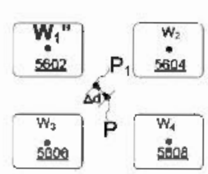


Figure 56F

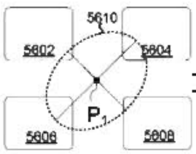


Figure 56G

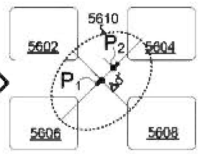


Figure 56H

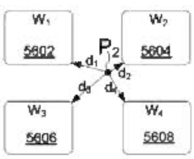


Figure 56I

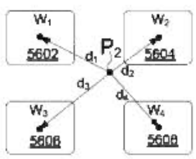


Figure 56J

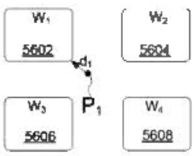


Figure 56K

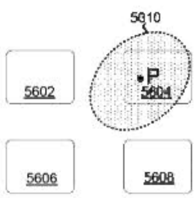


Figure 56L

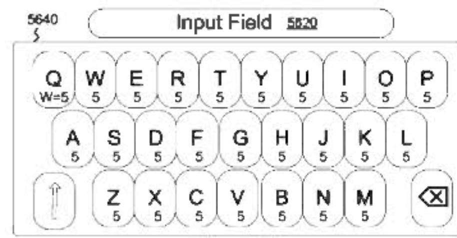


Figure 56M

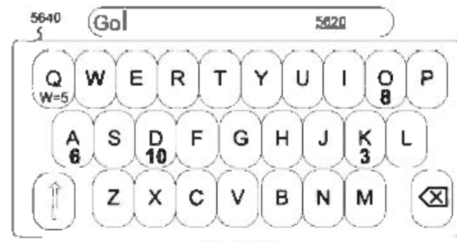


Figure 56N

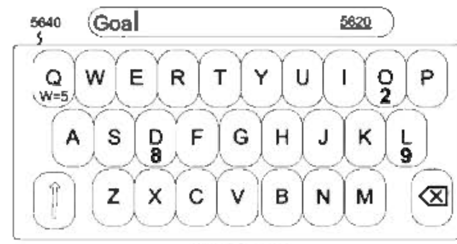


Figure 56O

Figure 57A

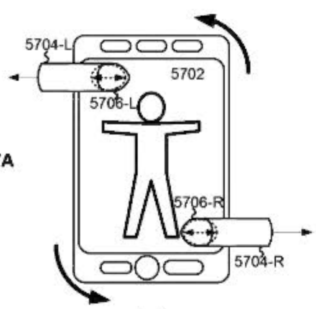


Figure 57B

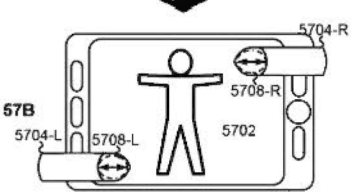
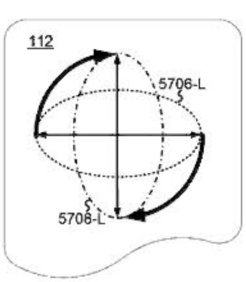


Figure 57C



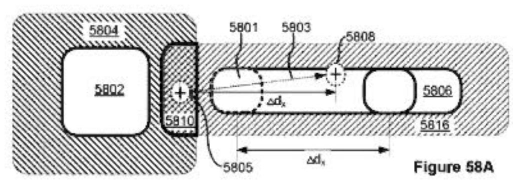


Figure 58A

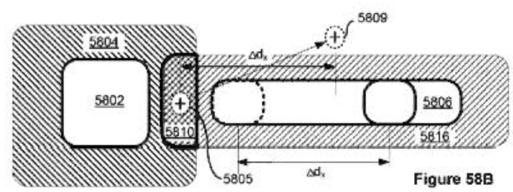


Figure 58B

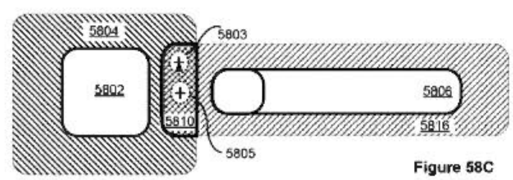


Figure 58C

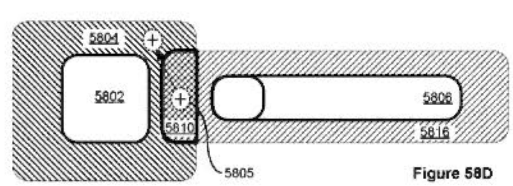


Figure 58D

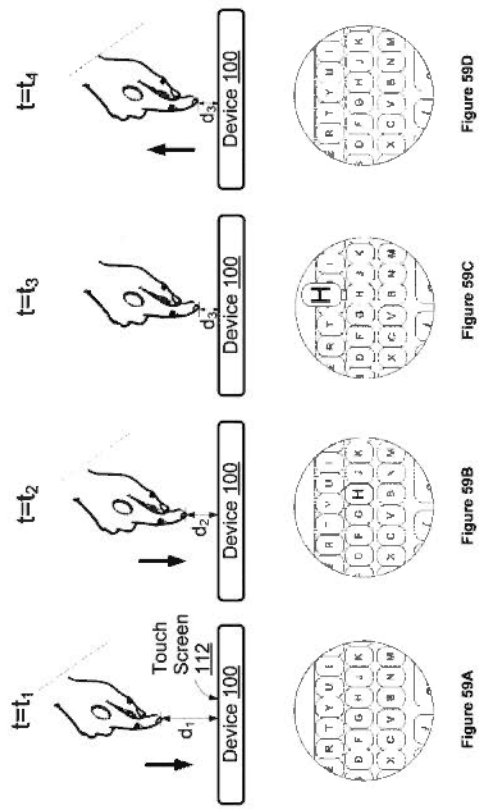


Figure 59A Figure 59B Figure 59C Figure 59D

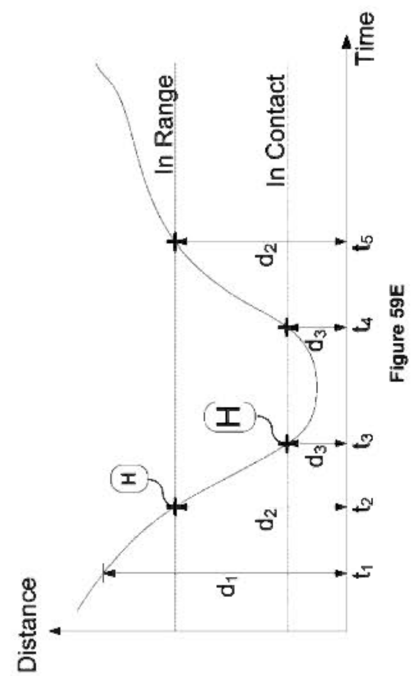


Figure 59E

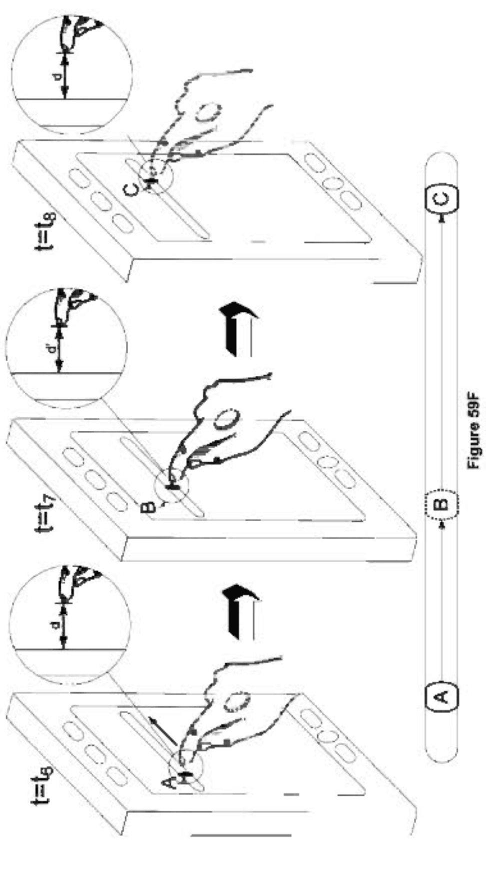


Figure 59F

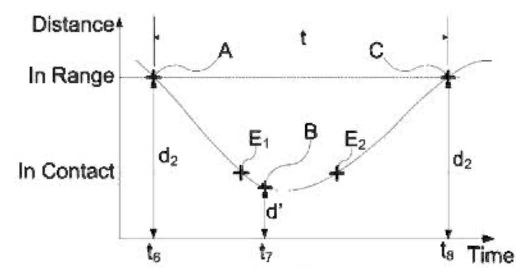


Figure 59G

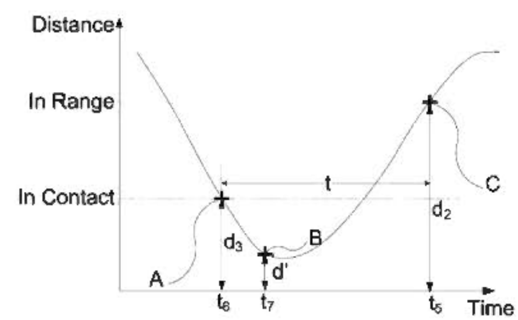


Figure 59H

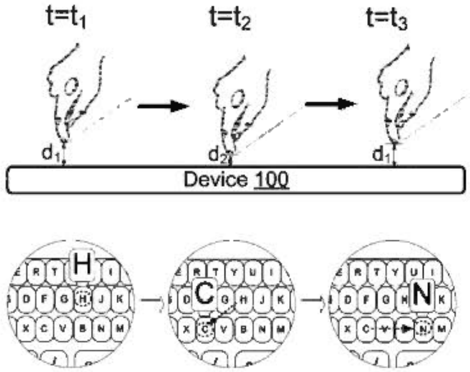


Figure 60A

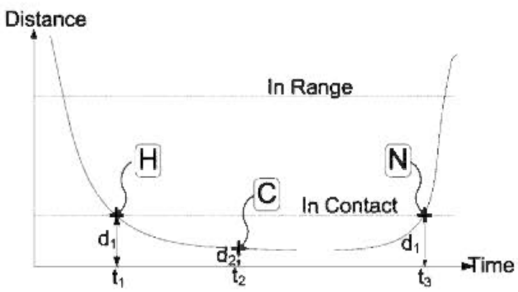


Figure 60B

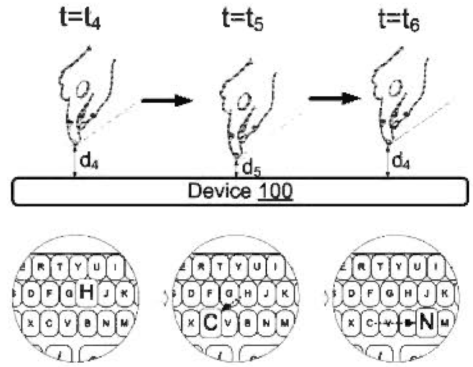


Figure 60C

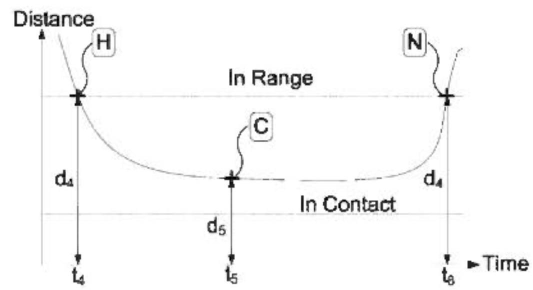


Figure 60D

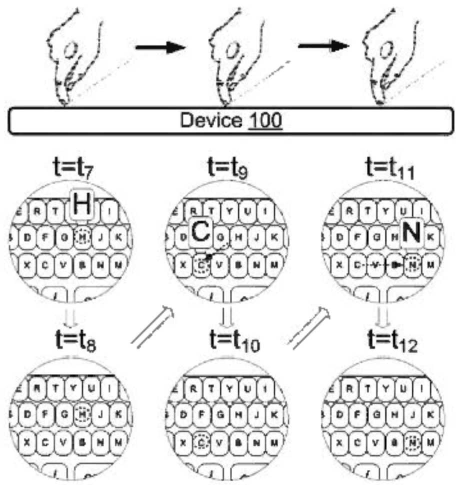


Figure 60E

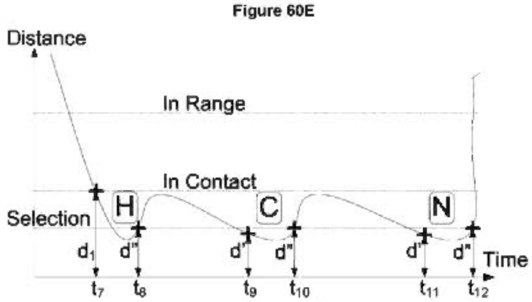


Figure 60F

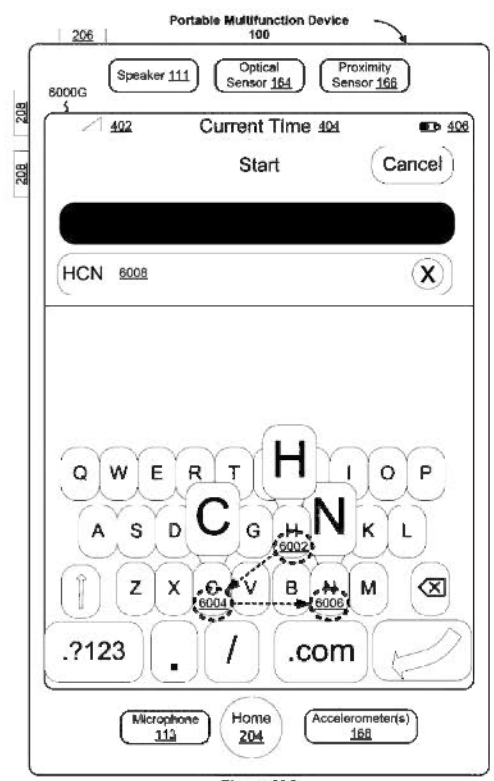


Figure 60G

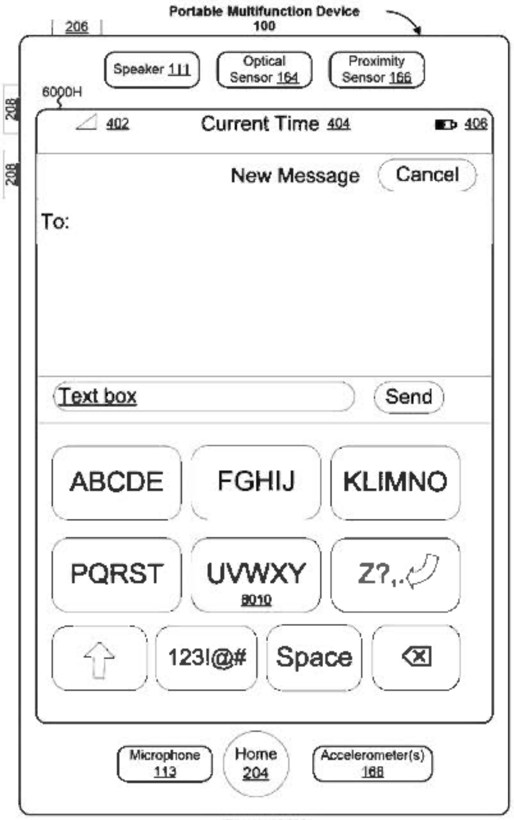


Figure 60H

Figure 60I

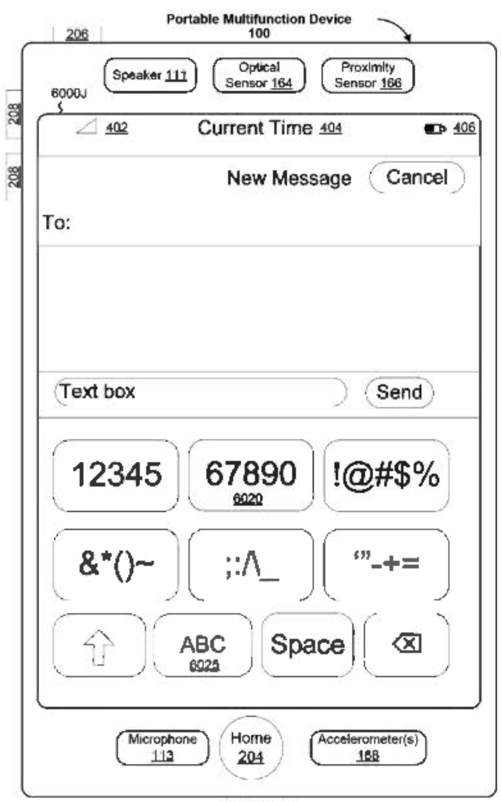


Figure 60J

Figure 60K

Figure 60L

Figure 60M

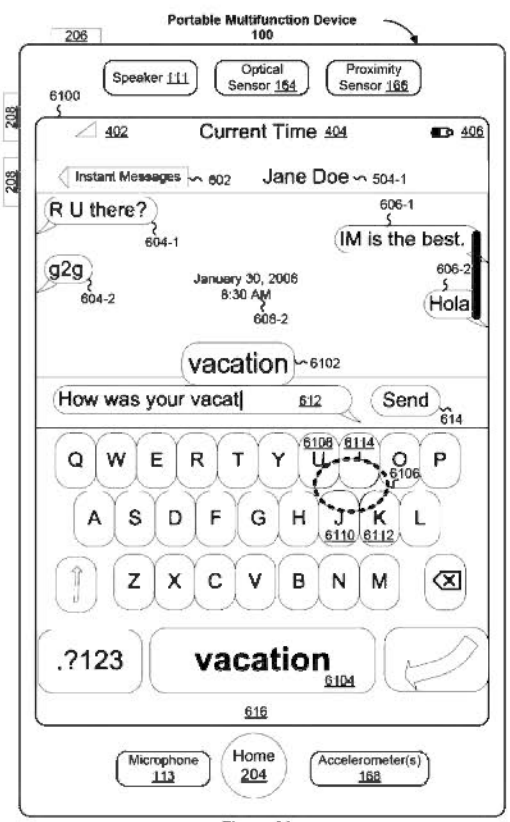


Figure 61

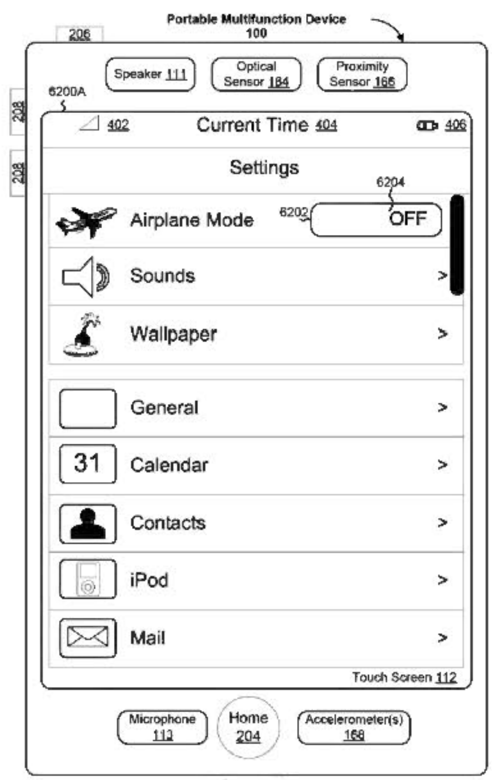


Figure 62A

Figure 62B

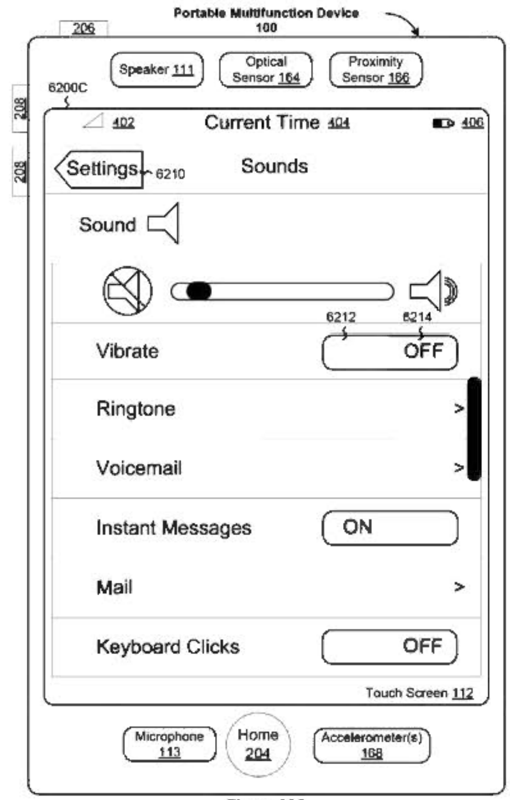


Figure 62C

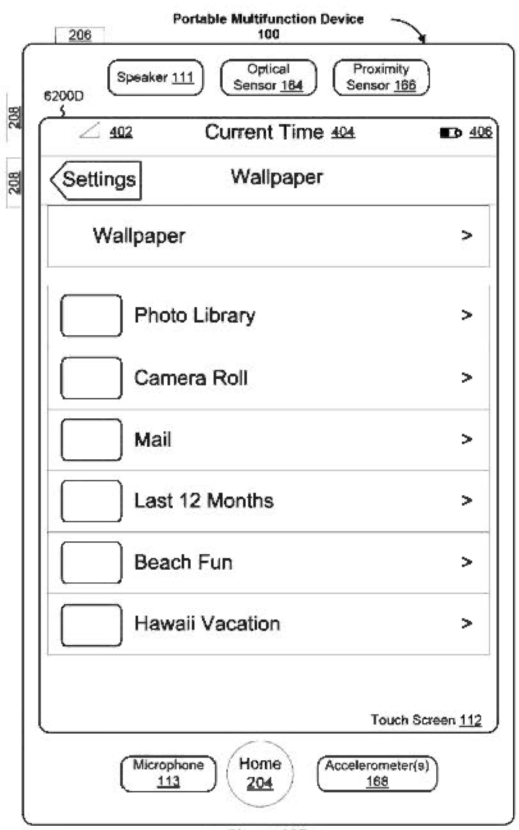


Figure 62D

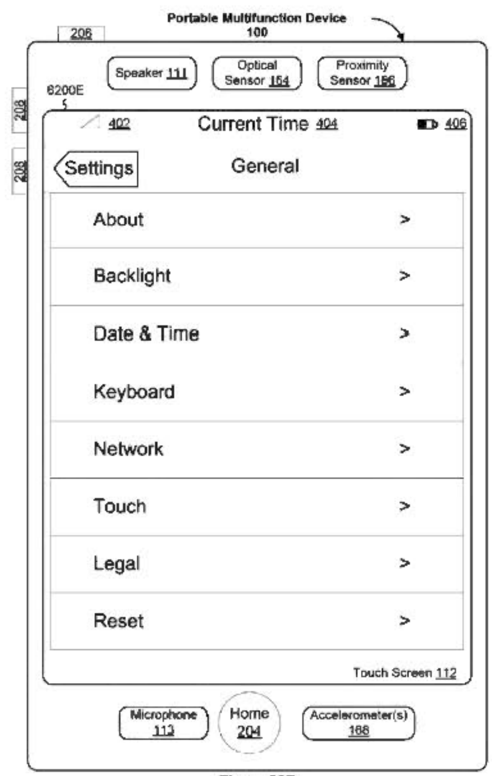


Figure 62E

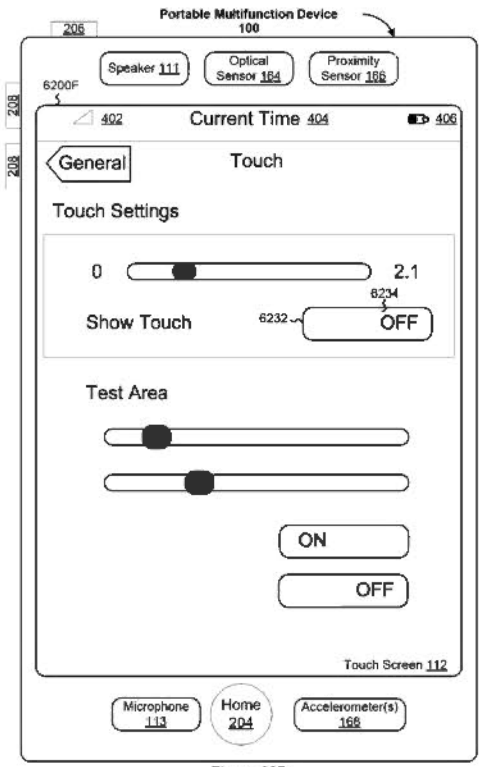


Figure 62F

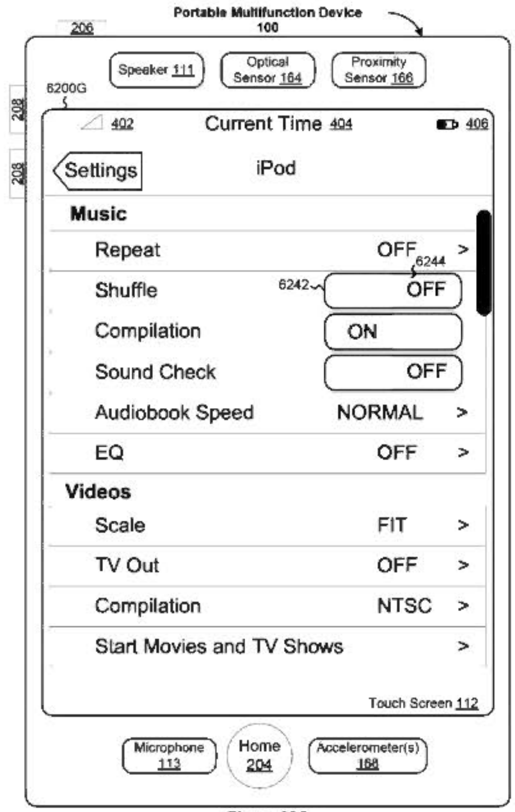


Figure 62G

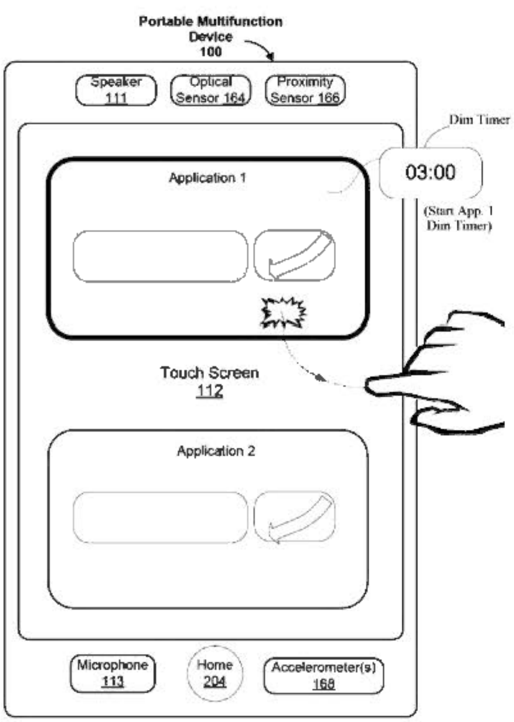


Figure 63

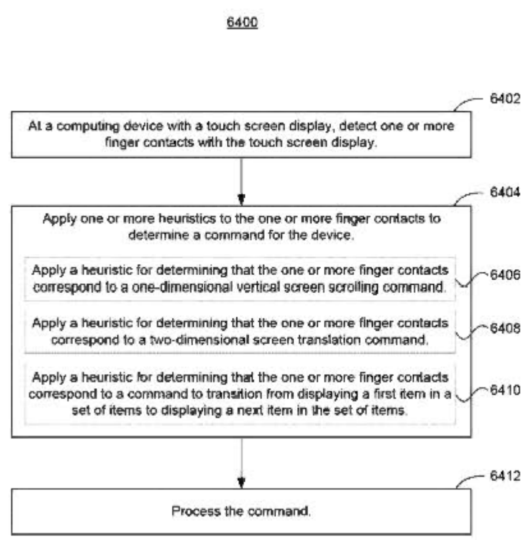


Figure 64A

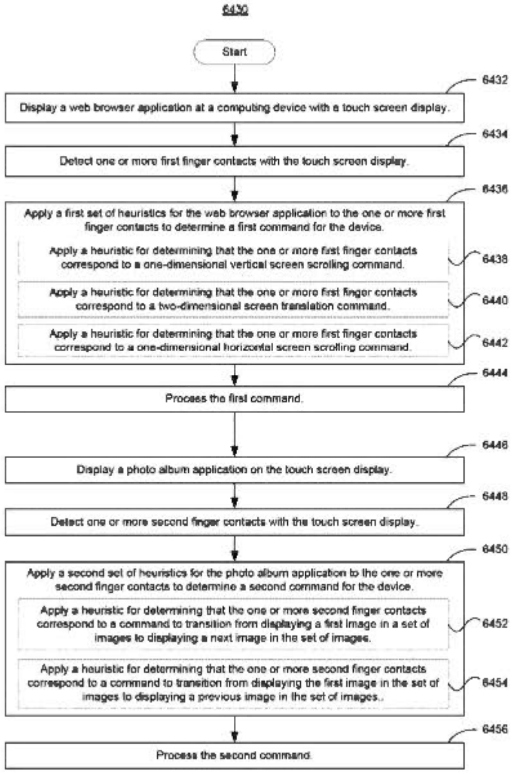

6430
Start
6432
Display a web browser application at a computing device with a touch screen display.
6434
Detect one or more first finger contacts with the touch screen display.
6436
Apply a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device.
Apply a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional vertical screen scrolling command.
6438
Apply a heuristic for determining that the one or more first finger contacts correspond to a two-dimensional screen translation command.
6440
Apply a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command.
6442
6444
Process the first command.
6446
Display a photo album application on the touch screen display.
6448
Detect one or more second finger contacts with the touch screen display.
6450
Apply a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device.
Apply a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying a first image in a set of images to displaying a next image in the set of images.
6452
Apply a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the first image in the set of images to displaying a previous image in the set of images.
6454
6456
Process the second command.

Figure 64B

TOUCH SCREEN DEVICE, METHOD, AND GRAPHICAL USER INTERFACE FOR DETERMINING COMMANDS BY APPLYING HEURISTICS

RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 11/850,635, "Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics," filed Sep. 5, 2007, which claims the benefit of U.S. Provisional Patent Application Nos. 60/937,991, "Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics," filed Jun. 29, 2007; 60/937,993, "Portable Multifunction Device," filed Jun. 29, 2007; 60/879,469, "Portable Multifunction Device," filed Jan. 8, 2007; 60/879,253, "Portable Multifunction Device," filed Jan. 7, 2007; and 60/824,769, "Portable Multifunction Device," filed Sep. 6, 2006. All of these applications are incorporated by referenced herein in their entirety.

This application is related to the following applications: (1) U.S. patent application Ser. No. 10/188,182, "Touch Pad For Handheld Device," filed Jul. 1, 2002; (2) U.S. patent application Ser. No. 10/722,948, "Touch Pad For Handheld Device," filed Nov. 25, 2003; (3) U.S. patent application Ser. No. 10/643,256, "Movable Touch Pad With Added Functionality," filed Aug. 18, 2003; (4) U.S. patent application Ser. No. 10/654,108, "Ambidextrous Mouse," filed Sep. 2, 2003; (5) U.S. patent application Ser. No. 10/840,862, "Multipoint Touchscreen," filed May 6, 2004; (6) U.S. patent application Ser. No. 10/903,964, "Gestures For Touch Sensitive Input Devices," filed Jul. 30, 2004; (7) U.S. patent application Ser. No. 11/038,590, "Mode-Based Graphical User Interfaces For Touch Sensitive Input Devices" filed Jan. 18, 2005; (8) U.S. patent application Ser. No. 11/057,050, "Display Actuator," filed Feb. 11, 2005; (9) U.S. Provisional Patent Application No. 60/658,777, "Multi-Functional Hand-Held Device," filed Mar. 4, 2005; (10) U.S. patent application Ser. No. 11/367,749, "Multi-Functional Hand-Held Device," filed Mar. 3, 2006; and (11) U.S. patent application Ser. No. 29/281,695, "Icons, Graphical User Interfaces, and Animated Graphical User Interfaces For a Display Screen or Portion Thereof," filed Jun. 28, 2007. All of these applications are incorporated by reference herein in their entirety.

TECHNICAL FIELD

The disclosed embodiments relate generally to electronic devices with touch screen displays, and more particularly, to electronic devices that apply heuristics to detected user gestures on a touch screen display to determine commands.

BACKGROUND

As portable electronic devices become more compact, and the number of functions performed by a given device increase, it has become a significant challenge to design a user interface that allows users to easily interact with a multifunction device. This challenge is particular significant for handheld portable devices, which have much smaller screens than desktop or laptop computers. This situation is unfortunate because the user interface is the gateway through which users receive not only content but also responses to user actions or behaviors, including user attempts to access a device's features, tools, and functions. Some portable communication devices (e.g., mobile telephones, sometimes called mobile

phones, cell phones, cellular telephones, and the like) have resorted to adding more pushbuttons, increasing the density of push buttons, overloading the functions of pushbuttons, or using complex menu systems to allow a user to access, store and manipulate data. These conventional user interfaces often result in complicated key sequences and menu hierarchies that must be memorized by the user.

Many conventional user interfaces, such as those that include physical pushbuttons, are also inflexible. This may prevent a user interface from being configured and/or adapted by either an application running on the portable device or by users. When coupled with the time consuming requirement to memorize multiple key sequences and menu hierarchies, and the difficulty in activating a desired pushbutton, such inflexibility is frustrating to most users.

To avoid problems associated with pushbuttons and complex menu systems, portable electronic devices may use touch screen displays that detect user gestures on the touch screen and translate detected gestures into commands to be performed. However, user gestures may be imprecise; a particular gesture may only roughly correspond to a desired command. Other devices with touch screen displays, such as desktop computers with touch screen displays, also may have difficulties translating imprecise gestures into desired commands.

Accordingly, there is a need for touch-screen-display electronic devices with more transparent and intuitive user interfaces for translating imprecise user gestures into precise, intended commands that are easy to use, configure, and/or adapt. Such interfaces increase the effectiveness, efficiency and user satisfaction with portable multifunction devices.

SUMMARY

The above deficiencies and other problems associated with user interfaces for portable devices and touch screen devices are reduced or eliminated by the disclosed multifunction device. In some embodiments, the device is portable. In some embodiments, the device has a touch-sensitive display (also known as a "touch screen") with a graphical user interface (GUI), one or more processors, memory and one or more modules, programs or sets of instructions stored in the memory for performing multiple functions. In some embodiments, the user interacts with the GUI primarily through finger contacts and gestures on the touch-sensitive display. In some embodiments, the functions may include telephoning, video conferencing, e-mailing, instant messaging, blogging, digital photographing, digital videoing, web browsing, digital music playing, and/or digital video playing. Instructions for performing these functions may be included in a computer readable storage medium or other computer program product configured for execution by one or more processors.

In an aspect of the invention, a computer-implemented method for use in conjunction with a computing device with a touch screen display comprises: detecting one or more finger contacts with the touch screen display, applying one or more heuristics to the one or more finger contacts to determine a command for the device, and processing the command. The one or more heuristics comprise: a heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command, a heuristic for determining that the one or more finger contacts correspond to a two-dimensional screen translation command, and a heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a first item in a set of items to displaying a next item in the set of items.

In another aspect of the invention, a computer-implemented method is performed at a computing device with a touch screen display. While displaying a web browser application, one or more first finger contacts with the touch screen display are detected; a first set of heuristics for the web browser application is applied to the one or more first finger contacts to determine a first command for the device; and the first command is processed. The first set of heuristics comprises: a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional vertical screen scrolling command; a heuristic for determining that the one or more first finger contacts correspond to a two-dimensional screen translation command; and a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command. While displaying a photo album application, one or more second finger contacts with the touch screen display are detected; a second set of heuristics for the photo album application is applied to the one or more second finger contacts to determine a second command for the device; and the second command is processed. The second set of heuristics comprises: a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying a first image in a set of images to displaying a next image in the set of images; and a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the first image in the set of images to displaying a previous image in the set of images.

In another aspect of the invention, a computing device comprises: a touch screen display, one or more processors, memory, and a program. The program is stored in the memory and configured to be executed by the one or more processors. The program includes: instructions for detecting one or more finger contacts with the touch screen display, instructions for applying one or more heuristics to the one or more finger contacts to determine a command for the device, and instructions for processing the command. The one or more heuristics comprise: a heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command, a heuristic for determining that the one or more finger contacts correspond to a two-dimensional screen translation command, and a heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a first item in a set of items to displaying a next item in the set of items.

In another aspect of the invention, a computing device comprises: a touch screen display; one or more processors; memory; and one or more programs. The one or more programs are stored in the memory and configured to be executed by the one or more processors. The one or more programs include: instructions for detecting one or more first finger contacts with the touch screen display while displaying a web browser application; instructions for applying a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device; instructions for processing the first command; instructions for detecting one or more second finger contacts with the touch screen display while displaying a photo album application; instructions for applying a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device; and instructions for processing the second command. The first set of heuristics comprises: a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional vertical screen scrolling command; a heuristic for determining that the one or more first finger contacts correspond to a two-dimensional screen translation command; and a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command. The second set of heuristics comprises: a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying a first image in a set of images to displaying a next image in the set of images; and a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the first image in the set of images to displaying a previous image in the set of images.

In another aspect of the invention, a computer-program product comprises a computer readable storage medium and a computer program mechanism (e.g., one or more computer programs) embedded therein. The computer program mechanism comprises instructions, which when executed by a computing device with a touch screen display, cause the device to: detect one or more finger contacts with the touch screen display, apply one or more heuristics to the one or more finger contacts to determine a command for the device, and process the command. The one or more heuristics comprise: a heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command, a heuristic for determining that the one or more finger contacts correspond to a two-dimensional screen translation command, and a heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a first item in a set of items to displaying a next item in the set of items.

In another aspect of the invention, a computer-program product comprises a computer readable storage medium and a computer program mechanism (e.g., one or more computer programs) embedded therein. The computer program mechanism comprises instructions, which when executed by a computing device with a touch screen display, cause the device to: detect one or more first finger contacts with the touch screen display while displaying a web browser application; apply a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device; process the first command; detect one or more second finger contacts with the touch screen display while displaying a photo album application; apply a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device; and process the second command. The first set of heuristics comprises: a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional vertical screen scrolling command; a heuristic for determining that the one or more first finger contacts correspond to a two-dimensional screen translation command; and a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command. The second set of heuristics comprises: a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying a first image in a set of images to displaying a next image in the set of images; and a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the first image in the set of images to displaying a previous image in the set of images.

In another aspect of the invention, a computing device with a touch screen display comprises: means for detecting one or more finger contacts with the touch screen display, means for applying one or more heuristics to the one or more finger contacts to determine a command for the device, and means for processing the command. The one or more heuristics comprise: a heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command, a heuristic for determining that the one or more finger contacts correspond to a two-dimensional screen translation command, and a heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a first item in a set of items to displaying a next item in the set of items.

In another aspect of the invention, a computing device with a touch screen display comprises: means for detecting one or more first finger contacts with the touch screen display while displaying a web browser application; means for applying a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device; means for processing the first command; means for detecting one or more second finger contacts with the touch screen display while displaying a photo album application; means for applying a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device; and means for processing the second command. The first set of heuristics comprises: a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional vertical screen scrolling command; a heuristic for determining that the one or more first finger contacts correspond to a two-dimensional screen translation command; and a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command. The second set of heuristics comprises: a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying a first image in a set of images to displaying a next image in the set of images; and a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the first image in the set of images to displaying a previous image in the set of images.

The disclosed heuristics allow electronic devices with touch screen displays to behave in a manner desired by the user despite inaccurate input by the user.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the aforementioned embodiments of the invention as well as additional embodiments thereof, reference should be made to the Description of Embodiments below, in conjunction with the following drawings in which like reference numerals refer to corresponding parts throughout the figures.

FIGS. **1**A and **1**B are block diagrams illustrating portable multifunction devices with touch-sensitive displays in accordance with some embodiments.

FIG. **2** illustrates a portable multifunction device having a touch screen in accordance with some embodiments.

FIGS. **3**A-**3**C illustrate exemplary user interfaces for unlocking a portable electronic device in accordance with some embodiments.

FIGS. **4**A and **4**B illustrate exemplary user interfaces for a menu of applications on a portable multifunction device in accordance with some embodiments.

FIG. **5** illustrates an exemplary user interface for listing instant message conversations on a portable multifunction device in accordance with some embodiments.

FIGS. **6**A-**6**K illustrate an exemplary user interface for inputting text for an instant message in accordance with some embodiments.

FIG. **7** illustrates an exemplary user interface for deleting an instant message conversation in accordance with some embodiments.

FIGS. **8**A and **8**B illustrate an exemplary user interface for a contact list in accordance with some embodiments.

FIG. **9** illustrates an exemplary user interface for entering a phone number for instant messaging in accordance with some embodiments.

FIG. **10** illustrates an exemplary user interface for a camera in accordance with some embodiments.

FIG. **11** illustrates an exemplary user interface for a camera roll in accordance with some embodiments.

FIGS. **12**A-**12**C illustrate an exemplary user interface for viewing and manipulating acquired images in accordance with some embodiments.

FIGS. **13**A and **13**B illustrate exemplary user interfaces for viewing albums in accordance with some embodiments.

FIG. **14** illustrates an exemplary user interface for setting user preferences in accordance with some embodiments.

FIG. **15** illustrates an exemplary user interface for viewing an album in accordance with some embodiments.

FIGS. **16**A and **16**B illustrate exemplary user interfaces for viewing images in an album in accordance with some embodiments.

FIG. **17** illustrates an exemplary user interface for selecting a use for an image in an album in accordance with some embodiments.

FIGS. **18**A-**18**J illustrate an exemplary user interface for incorporating an image in an email in accordance with some embodiments.

FIGS. **19**A and **19**B illustrate an exemplary user interface for assigning an image to a contact in the user's contact list in accordance with some embodiments.

FIG. **20** illustrates an exemplary user interface for incorporating an image in the user's wallpaper in accordance with some embodiments.

FIGS. **21**A-**21**C illustrate an exemplary user interface for organizing and managing videos in accordance with some embodiments.

FIGS. **22**A and **22**B illustrate an exemplary user interface for setting user preferences for a video player in accordance with some embodiments.

FIGS. **23**A-**23**D illustrate exemplary user interfaces for a video player in accordance with some embodiments.

FIGS. **24**A-**24**E illustrate an exemplary user interface for displaying and managing a weather widget in accordance with some embodiments.

FIGS. **25**A-**25**E illustrate an exemplary user interface for displaying and managing a stocks widget in accordance with some embodiments.

FIGS. **26**A-**26**P illustrate an exemplary user interface for displaying and managing contacts in accordance with some embodiments.

FIGS. **27**A-**27**F illustrate an exemplary user interface for displaying and managing favorite contacts in accordance with some embodiments.

FIGS. **28**A-**28**D illustrate an exemplary user interface for displaying and managing recent calls in accordance with some embodiments.

FIG. **29** illustrates an exemplary dial pad interface for calling in accordance with some embodiments.

FIGS. **30**A-**30**R illustrate exemplary user interfaces displayed during a call in accordance with some embodiments.

FIGS. **31**A and **31**B illustrate an exemplary user interface displayed during an incoming call in accordance with some embodiments.

FIGS. **32**A-**32**H illustrate exemplary user interfaces for voicemail in accordance with some embodiments.

FIG. **33** illustrates an exemplary user interface for organizing and managing email in accordance with some embodiments.

FIGS. **34**A-**34**C illustrate an exemplary user interface for creating emails in accordance with some embodiments.

FIGS. **35**A-**35**O illustrate exemplary user interfaces for displaying and managing an inbox in accordance with some embodiments.

FIG. **36** illustrates an exemplary user interface for setting email user preferences in accordance with some embodiments.

FIGS. **37**A and **37**B illustrate an exemplary user interface for creating and managing email rules in accordance with some embodiments.

FIGS. **38**A and **38**B illustrate an exemplary user interface for moving email messages in accordance with some embodiments.

FIGS. **39**A-**39**M illustrate exemplary user interfaces for a browser in accordance with some embodiments.

FIGS. **40**A-**40**F illustrate exemplary user interfaces for playing an item of inline multimedia content in accordance with some embodiments.

FIGS. **41**A-**41**E illustrate exemplary user interfaces for interacting with user input elements in displayed content in accordance with some embodiments.

FIG. **41**F illustrates an exemplary user interface for interacting with hyperlinks in displayed content in accordance with some embodiments.

FIGS. **42**A-**42**C illustrate exemplary user interfaces for translating page content or translating just frame content within the page content in accordance with some embodiments.

FIGS. **43**A-**43**DD illustrate exemplary user interfaces for a music and video player in accordance with some embodiments.

FIGS. **44**A-**44**J illustrate portrait-landscape rotation heuristics in accordance with some embodiments.

FIGS. **45**A-**45**G are graphical user interfaces illustrating an adaptive approach for presenting information on the touch screen display in accordance with some embodiments.

FIGS. **46**A-**46**C illustrate digital artwork created for a content file based on metadata associated with the content file in accordance with some embodiments.

FIGS. **47**A-**47**E illustrate exemplary methods for moving a slider icon in accordance with some embodiments.

FIGS. **48**A-**48**C illustrate an exemplary user interface for managing, displaying, and creating notes in accordance with some embodiments.

FIGS. **49**A-**49**N illustrate exemplary user interfaces for a calendar in accordance with some embodiments.

FIGS. **50**A-**50**I illustrate exemplary user interfaces for a clock in accordance with some embodiments.

FIGS. **51**A-**51**B illustrate exemplary user interfaces for creating a widget in accordance with some embodiments.

FIGS. **52**A-**52**H illustrate exemplary user interfaces for a map application in accordance with some embodiments.

FIGS. **53**A-**53**D illustrate exemplary user interfaces for displaying notification information for missed communications in accordance with some embodiments.

FIG. **54** illustrates a method for silencing a portable device in accordance with some embodiments.

FIGS. **55**A-**55**D illustrate a method for turning off a portable device in accordance with some embodiments.

FIGS. **56**A-**56**L illustrate exemplary methods for determining a cursor position on a touch screen display in accordance with some embodiments.

FIGS. **56**M-**56**O illustrate an exemplary method for dynamically adjusting numbers associated with soft keyboard keys as a word is typed with the soft keyboard keys in accordance with some embodiments.

FIGS. **57**A-**57**C illustrate an exemplary screen rotation gesture in accordance with some embodiments.

FIGS. **58**A-**58**D illustrate an approach of identifying a user-desired user interface object when a finger contact's corresponding cursor position falls into an overlapping hit region in accordance with some embodiments.

FIGS. **59**A-**59**E illustrate how a finger tap gesture activates a soft key icon on a touch screen display in accordance with some embodiments.

FIGS. **59**F-**59**H illustrate how a finger swipe gesture controls a slide control icon on a touch screen display in accordance with some embodiments.

FIGS. **60**A-**60**M illustrate exemplary soft keyboards in accordance with some embodiments.

FIG. **61** illustrates an exemplary finger contact with a soft keyboard in accordance with some embodiments.

FIGS. **62**A-**62**G illustrate exemplary user interfaces for displaying and adjusting settings in accordance with some embodiments.

FIG. **63** illustrates an exemplary method for adjusting dimming timers in accordance with some embodiments.

FIGS. **64**A and **64**B are flow diagrams illustrating methods of applying heuristics in accordance with some embodiments.

DESCRIPTION OF EMBODIMENTS

Reference will now be made in detail to embodiments, examples of which are illustrated in the accompanying drawings. In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be apparent to one of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well-known methods, procedures, components, circuits, and networks have not been described in detail so as not to unnecessarily obscure aspects of the embodiments.

It will also be understood that, although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are only used to distinguish one element from another. For example, a first gesture could be termed a second gesture, and, similarly, a second gesture could be termed a first gesture, without departing from the scope of the present invention.

The terminology used in the description of the invention herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used in the description of the invention and the appended claims, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will also be understood that the term "and/or" as used herein refers to and encompasses any and all possible combinations of one or more of the associated listed items. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

As used herein, the term "if" may be construed to mean "when" or "upon" or "in response to determining" or "in response to detecting," depending on the context. Similarly, the phrase "if it is determined" or "if [a stated condition or event] is detected" may be construed to mean "upon determining" or "in response to determining" or "upon detecting [the stated condition or event]" or "in response to detecting [the stated condition or event]," depending on the context.

Embodiments of a portable multifunction device, user interfaces for such devices, and associated processes for using such devices are described. In some embodiments, the device is a portable communications device such as a mobile telephone that also contains other functions, such as PDA and/or music player functions.

The user interface may include a physical click wheel in addition to a touch screen or a virtual click wheel displayed on the touch screen. A click wheel is a user-interface device that may provide navigation commands based on an angular displacement of the wheel or a point of contact with the wheel by a user of the device. A click wheel may also be used to provide a user command corresponding to selection of one or more items, for example, when the user of the device presses down on at least a portion of the wheel or the center of the wheel. Alternatively, breaking contact with a click wheel image on a touch screen surface may indicate a user command corresponding to selection. For simplicity, in the discussion that follows, a portable multifunction device that includes a touch screen is used as an exemplary embodiment. It should be understood, however, that some of the user interfaces and associated processes may be applied to other devices, such as personal computers and laptop computers, which may include one or more other physical user-interface devices, such as a physical click wheel, a physical keyboard, a mouse and/or a joystick.

The device supports a variety of applications, such as one or more of the following: a telephone application, a video conferencing application, an e-mail application, an instant messaging application, a blogging application, a photo management application, a digital camera application, a digital video camera application, a web browsing application, a digital music player application, and/or a digital video player application.

The various applications that may be executed on the device may use at least one common physical user-interface device, such as the touch screen. One or more functions of the touch screen as well as corresponding information displayed on the device may be adjusted and/or varied from one application to the next and/or within a respective application. In this way, a common physical architecture (such as the touch screen) of the device may support the variety of applications with user interfaces that are intuitive and transparent.

The user interfaces may include one or more soft keyboard embodiments. The soft keyboard embodiments may include standard (QWERTY) and/or non-standard configurations of symbols on the displayed icons of the keyboard, such as those described in U.S. patent application Ser. Nos. 11/459,606, "Keyboards For Portable Electronic Devices," filed Jul. 24, 2006, and 11/459,615, "Touch Screen Keyboards For Portable Electronic Devices," filed Jul. 24, 2006, the contents of which are hereby incorporated by reference in their entirety. The keyboard embodiments may include a reduced number of icons (or soft keys) relative to the number of keys in existing physical keyboards, such as that for a typewriter. This may make it easier for users to select one or more icons in the keyboard, and thus, one or more corresponding symbols. The keyboard embodiments may be adaptive. For example, displayed icons may be modified in accordance with user actions, such as selecting one or more icons and/or one or more corresponding symbols. One or more applications on the portable device may utilize common and/or different keyboard embodiments. Thus, the keyboard embodiment used may be tailored to at least some of the applications. In some embodiments, one or more keyboard embodiments may be tailored to a respective user. For example, one or more keyboard embodiments may be tailored to a respective user based on a word usage history (lexicography, slang, individual usage) of the respective user. Some of the keyboard embodiments may be adjusted to reduce a probability of a user error when selecting one or more icons, and thus one or more symbols, when using the soft keyboard embodiments.

Attention is now directed towards embodiments of the device. FIGS. **1**A and **1**B are block diagrams illustrating portable multifunction devices **100** with touch-sensitive displays **112** in accordance with some embodiments. The touch-sensitive display **112** is sometimes called a "touch screen" for convenience, and may also be known as or called a touch-sensitive display system. The device **100** may include a memory **102** (which may include one or more computer readable storage mediums), a memory controller **122**, one or more processing units (CPU's) **120**, a peripherals interface **118**, RF circuitry **108**, audio circuitry **110**, a speaker **111**, a microphone **113**, an input/output (I/O) subsystem **106**, other input or control devices **116**, and an external port **124**. The device **100** may include one or more optical sensors **164**. These components may communicate over one or more communication buses or signal lines **103**.

It should be appreciated that the device **100** is only one example of a portable multifunction device **100**, and that the device **100** may have more or fewer components than shown, may combine two or more components, or a may have a different configuration or arrangement of the components. The various components shown in FIGS. **1**A and **1**B may be implemented in hardware, software or a combination of both hardware and software, including one or more signal processing and/or application specific integrated circuits.

Memory **102** may include high-speed random access memory and may also include non-volatile memory, such as one or more magnetic disk storage devices, flash memory devices, or other non-volatile solid-state memory devices. Access to memory **102** by other components of the device **100**, such as the CPU **120** and the peripherals interface **118**, may be controlled by the memory controller **122**.

The peripherals interface **118** couples the input and output peripherals of the device to the CPU **120** and memory **102**. The one or more processors **120** run or execute various software programs and/or sets of instructions stored in memory **102** to perform various functions for the device **100** and to process data.

In some embodiments, the peripherals interface **118**, the CPU **120**, and the memory controller **122** may be implemented on a single chip, such as a chip **104**. In some other embodiments, they may be implemented on separate chips.

The RF (radio frequency) circuitry **108** receives and sends RF signals, also called electromagnetic signals. The RF circuitry **108** converts electrical signals to/from electromagnetic signals and communicates with communications networks and other communications devices via the electromagnetic signals. The RF circuitry **108** may include well-known circuitry for performing these functions, including but not limited to an antenna system, an RF transceiver, one or more amplifiers, a tuner, one or more oscillators, a digital signal processor, a CODEC chipset, a subscriber identity module (SIM) card, memory, and so forth. The RF circuitry **108** may communicate with networks, such as the Internet, also referred to as the World Wide Web (WWW), an intranet and/or a wireless network, such as a cellular telephone network, a wireless local area network (LAN) and/or a metropolitan area network (MAN), and other devices by wireless communication. The wireless communication may use any of a plurality of communications standards, protocols and technologies, including but not limited to Global System for Mobile Communications (GSM), Enhanced Data GSM Environment (EDGE), high-speed downlink packet access (HSDPA), wideband code division multiple access (W-CDMA), code division multiple access (CDMA), time division multiple access (TDMA), Bluetooth, Wireless Fidelity (Wi-Fi) (e.g., IEEE 802.11a, IEEE 802.11b, IEEE 802.11g and/or IEEE 802.11n), voice over Internet Protocol (VoIP), Wi-MAX, a protocol for email (e.g., Internet message access protocol (IMAP) and/or post office protocol (POP)), instant messaging (e.g., extensible messaging and presence protocol (XMPP), Session Initiation Protocol for Instant Messaging and Presence Leveraging Extensions (SIMPLE), and/or Instant Messaging and Presence Service (IMPS)), and/or Short Message Service (SMS)), or any other suitable communication protocol, including communication protocols not yet developed as of the filing date of this document.

The audio circuitry **110**, the speaker **111**, and the microphone **113** provide an audio interface between a user and the device **100**. The audio circuitry **110** receives audio data from the peripherals interface **118**, converts the audio data to an electrical signal, and transmits the electrical signal to the speaker **111**. The speaker **111** converts the electrical signal to human-audible sound waves. The audio circuitry **110** also receives electrical signals converted by the microphone **113** from sound waves. The audio circuitry **110** converts the electrical signal to audio data and transmits the audio data to the peripherals interface **118** for processing. Audio data may be retrieved from and/or transmitted to memory **102** and/or the RF circuitry **108** by the peripherals interface **118**. In some embodiments, the audio circuitry **110** also includes a headset jack (e.g. **212**, FIG. **2**). The headset jack provides an interface between the audio circuitry **110** and removable audio input/output peripherals, such as output-only headphones or a headset with both output (e.g., a headphone for one or both ears) and input (e.g., a microphone).

The I/O subsystem **106** couples input/output peripherals on the device **100**, such as the touch screen **112** and other input/control devices **116**, to the peripherals interface **118**. The I/O subsystem **106** may include a display controller **156** and one or more input controllers **160** for other input or control devices. The one or more input controllers **160** receive/send electrical signals from/to other input or control devices **116**. The other input/control devices **116** may include physical buttons (e.g., push buttons, rocker buttons, etc.), dials, slider switches, joysticks, click wheels, and so forth. In some alternate embodiments, input controller(s) **160** may be coupled to any (or none) of the following: a keyboard, infrared port, USB port, and a pointer device such as a mouse. The one or more buttons (e.g., **208**, FIG. **2**) may include an up/down button for volume control of the speaker **111** and/or the microphone **113**. The one or more buttons may include a push button (e.g., **206**, FIG. **2**). A quick press of the push button may disengage a lock of the touch screen **112** or begin a process that uses gestures on the touch screen to unlock the device, as described in U.S. patent application Ser. No. 11/322,549, "Unlocking a Device by Performing Gestures on an Unlock Image," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety. A longer press of the push button (e.g., **206**) may turn power to the device **100** on or off. The user may be able to customize a functionality of one or more of the buttons. The touch screen **112** is used to implement virtual or soft buttons and one or more soft keyboards.

The touch-sensitive touch screen **112** provides an input interface and an output interface between the device and a user. The display controller **156** receives and/or sends electrical signals from/to the touch screen **112**. The touch screen **112** displays visual output to the user. The visual output may include graphics, text, icons, video, and any combination thereof (collectively termed "graphics"). In some embodiments, some or all of the visual output may correspond to user-interface objects, further details of which are described below.

A touch screen **112** has a touch-sensitive surface, sensor or set of sensors that accepts input from the user based on haptic and/or tactile contact. The touch screen **112** and the display controller **156** (along with any associated modules and/or sets of instructions in memory **102**) detect contact (and any movement or breaking of the contact) on the touch screen **112** and converts the detected contact into interaction with user-interface objects (e.g., one or more soft keys, icons, web pages or images) that are displayed on the touch screen. In an exemplary embodiment, a point of contact between a touch screen **112** and the user corresponds to a finger of the user.

The touch screen **112** may use LCD (liquid crystal display) technology, or LPD (light emitting polymer display) technology, although other display technologies may be used in other embodiments. The touch screen **112** and the display controller **156** may detect contact and any movement or breaking thereof using any of a plurality of touch sensing technologies now known or later developed, including but not limited to capacitive, resistive, infrared, and surface acoustic wave technologies, as well as other proximity sensor arrays or other elements for determining one or more points of contact with a touch screen **112**.

A touch-sensitive display in some embodiments of the touch screen **112** may be analogous to the multi-touch sensitive tablets described in the following U.S. patents: U.S. Pat. Nos. 6,323,846 (Westerman et al.), 6,570,557 (Westerman et al.), and/or 6,677,932 (Westerman), and/or U.S. Patent Publication 2002/0015024A1, each of which is hereby incorporated by reference in its entirety. However, a touch screen **112** displays visual output from the portable device **100**, whereas touch sensitive tablets do not provide visual output.

A touch-sensitive display in some embodiments of the touch screen **112** may be as described in the following applications: (1) U.S. patent application Ser. No. 11/381,313, "Multipoint Touch Surface Controller," filed May 2, 2006; (2) U.S. patent application Ser. No. 10/840,862, "Multipoint Touchscreen," filed May 6, 2004; (3) U.S. patent application Ser. No. 10/903,964, "Gestures For Touch Sensitive Input Devices," filed Jul. 30, 2004; (4) U.S. patent application Ser. No. 11/048,264, "Gestures For Touch Sensitive Input Devices," filed Jan. 31, 2005; (5) U.S. patent application Ser. No. 11/038,590, "Mode-Based Graphical User Interfaces For Touch Sensitive Input Devices," filed Jan. 18, 2005; (6) U.S. patent application Ser. No. 11/228,758, "Virtual Input Device Placement On A Touch Screen User Interface," filed Sep. 16, 2005; (7) U.S. patent application Ser. No. 11/228,700, "Operation Of A Computer With A Touch Screen Interface," filed Sep. 16, 2005; (8) U.S. patent application Ser. No. 11/228,737, "Activating Virtual Keys Of A Touch-Screen Virtual Keyboard," filed Sep. 16, 2005; and (9) U.S. patent application Ser. No. 11/367,749, "Multi-Functional Hand-Held Device," filed Mar. 3, 2006. All of these applications are incorporated by reference herein in their entirety.

The touch screen **112** may have a resolution in excess of 100 dpi. In an exemplary embodiment, the touch screen has a resolution of approximately 160 dpi. The user may make contact with the touch screen **112** using any suitable object or appendage, such as a stylus, a finger, and so forth. In some embodiments, the user interface is designed to work primarily with finger-based contacts and gestures, which are much less precise than stylus-based input due to the larger area of contact of a finger on the touch screen. In some embodiments, the device translates the rough finger-based input into a precise pointer/cursor position or command for performing the actions desired by the user.

In some embodiments, in addition to the touch screen, the device **100** may include a touchpad (not shown) for activating or deactivating particular functions. In some embodiments, the touchpad is a touch-sensitive area of the device that, unlike the touch screen, does not display visual output. The touchpad may be a touch-sensitive surface that is separate from the touch screen **112** or an extension of the touch-sensitive surface formed by the touch screen.

In some embodiments, the device **100** may include a physical or virtual click wheel as an input control device **116**. A user may navigate among and interact with one or more graphical objects (henceforth referred to as icons) displayed in the touch screen **112** by rotating the click wheel or by moving a point of contact with the click wheel (e.g., where the amount of movement of the point of contact is measured by its angular displacement with respect to a center point of the click wheel). The click wheel may also be used to select one or more of the displayed icons. For example, the user may press down on at least a portion of the click wheel or an associated button. User commands and navigation commands provided by the user via the click wheel may be processed by an input controller **160** as well as one or more of the modules and/or sets of instructions in memory **102**. For a virtual click wheel, the click wheel and click wheel controller may be part of the touch screen **112** and the display controller **156**, respectively. For a virtual click wheel, the click wheel may be either an opaque or semitransparent object that appears and disappears on the touch screen display in response to user interaction with the device. In some embodiments, a virtual click wheel is displayed on the touch screen of a portable multifunction device and operated by user contact with the touch screen.

The device **100** also includes a power system **162** for powering the various components. The power system **162** may include a power management system, one or more power sources (e.g., battery, alternating current (AC)), a recharging system, a power failure detection circuit, a power converter or inverter, a power status indicator (e.g., a light-emitting diode (LED)) and any other components associated with the generation, management and distribution of power in portable devices.

The device **100** may also include one or more optical sensors **164**. FIGS. **1**A and **1**B show an optical sensor coupled to an optical sensor controller **158** in I/O subsystem **106**. The optical sensor **164** may include charge-coupled device (CCD) or complementary metal-oxide semiconductor (CMOS) phototransistors. The optical sensor **164** receives light from the environment, projected through one or more lens, and converts the light to data representing an image. In conjunction with an imaging module **143** (also called a camera module), the optical sensor **164** may capture still images or video. In some embodiments, an optical sensor is located on the back of the device **100**, opposite the touch screen display **112** on the front of the device, so that the touch screen display may be used as a viewfinder for either still and/or video image acquisition. In some embodiments, an optical sensor is located on the front of the device so that the user's image may be obtained for videoconferencing while the user views the other video conference participants on the touch screen display. In

some embodiments, the position of the optical sensor **164** can be changed by the user (e.g., by rotating the lens and the sensor in the device housing) so that a single optical sensor **164** may be used along with the touch screen display for both video conferencing and still and/or video image acquisition.

The device **100** may also include one or more proximity sensors **166**. FIGS. **1**A and **1**B show a proximity sensor **166** coupled to the peripherals interface **118**. Alternately, the proximity sensor **166** may be coupled to an input controller **160** in the I/O subsystem **106**. The proximity sensor **166** may perform as described in U.S. patent application Ser. Nos. 11/241,839, "Proximity Detector In Handheld Device"; 11/240,788, "Proximity Detector In Handheld Device"; 11/620,702, "Using Ambient Light Sensor To Augment Proximity Sensor Output"; 11/586,862, "Automated Response To And Sensing Of User Activity In Portable Devices"; and 11/638,251, "Methods And Systems For Automatic Configuration Of Peripherals," which are hereby incorporated by reference in their entirety. In some embodiments, the proximity sensor turns off and disables the touch screen **112** when the multifunction device is placed near the user's ear (e.g., when the user is making a phone call). In some embodiments, the proximity sensor keeps the screen off when the device is in the user's pocket, purse, or other dark area to prevent unnecessary battery drainage when the device is a locked state.

The device **100** may also include one or more accelerometers **168**. FIGS. **1**A and **1**B show an accelerometer **168** coupled to the peripherals interface **118**. Alternately, the accelerometer **168** may be coupled to an input controller **160** in the I/O subsystem **106**. The accelerometer **168** may perform as described in U.S. Patent Publication No. 20050190059, "Acceleration-based Theft Detection System for Portable Electronic Devices," and U.S. Patent Publication No. 20060017692, "Methods And Apparatuses For Operating A Portable Device Based On An Accelerometer," both of which are which are incorporated by reference herein in their entirety. In some embodiments, information is displayed on the touch screen display in a portrait view or a landscape view based on an analysis of data received from the one or more accelerometers.

In some embodiments, the software components stored in memory **102** may include an operating system **126**, a communication module (or set of instructions) **128**, a contact/motion module (or set of instructions) **130**, a graphics module (or set of instructions) **132**, a text input module (or set of instructions) **134**, a Global Positioning System (GPS) module (or set of instructions) **135**, and applications (or set of instructions) **136**.

The operating system **126** (e.g., Darwin, RTXC, LINUX, UNIX, OS X, WINDOWS, or an embedded operating system such as VxWorks) includes various software components and/or drivers for controlling and managing general system tasks (e.g., memory management, storage device control, power management, etc.) and facilitates communication between various hardware and software components.

The communication module **128** facilitates communication with other devices over one or more external ports **124** and also includes various software components for handling data received by the RF circuitry **108** and/or the external port **124**. The external port **124** (e.g., Universal Serial Bus (USB), FIREWIRE, etc.) is adapted for coupling directly to other devices or indirectly over a network (e.g., the Internet, wireless LAN, etc.). In some embodiments, the external port is a multi-pin (e.g., 30-pin) connector that is the same as, or similar to and/or compatible with the 30-pin connector used on iPod (trademark of Apple Computer, Inc.) devices.

The contact/motion module **130** may detect contact with the touch screen **112** (in conjunction with the display controller **156**) and other touch sensitive devices (e.g., a touchpad or physical click wheel). The contact/motion module **130** includes various software components for performing various operations related to detection of contact, such as determining if contact has occurred, determining if there is movement of the contact and tracking the movement across the touch screen **112**, and determining if the contact has been broken (i.e., if the contact has ceased). Determining movement of the point of contact may include determining speed (magnitude), velocity (magnitude and direction), and/or an acceleration (a change in magnitude and/or direction) of the point of contact. These operations may be applied to single contacts (e.g., one finger contacts) or to multiple simultaneous contacts (e.g., "multitouch"/multiple finger contacts). In some embodiments, the contact/motion module **130** and the display controller **156** also detects contact on a touchpad. In some embodiments, the contact/motion module **130** and the controller **160** detects contact on a click wheel.

The graphics module **132** includes various known software components for rendering and displaying graphics on the touch screen **112**, including components for changing the intensity of graphics that are displayed. As used herein, the term "graphics" includes any object that can be displayed to a user, including without limitation text, web pages, icons (such as user-interface objects including soft keys), digital images, videos, animations and the like.

The text input module **134**, which may be a component of graphics module **132**, provides soft keyboards for entering text in various applications (e.g., contacts **137**, e-mail **140**, IM **141**, blogging **142**, browser **147**, and any other application that needs text input).

The GPS module **135** determines the location of the device and provides this information for use in various applications (e.g., to telephone **138** for use in location-based dialing, to camera **143** and/or blogger **142** as picture/video metadata, and to applications that provide location-based services such as weather widgets, local yellow page widgets, and map/navigation widgets).

The applications **136** may include the following modules (or sets of instructions), or a subset or superset thereof:

- a contacts module **137** (sometimes called an address book or contact list);
- a telephone module **138**;
- a video conferencing module **139**;
- an e-mail client module **140**;
- an instant messaging (IM) module **141**;
- a blogging module **142**;
- a camera module **143** for still and/or video images;
- an image management module **144**;
- a video player module **145**;
- a music player module **146**;
- a browser module **147**;
- a calendar module **148**;
- widget modules **149**, which may include weather widget **149-1**, stocks widget **149-2**, calculator widget **149-3**, alarm clock widget **149-4**, dictionary widget **149-5**, and other widgets obtained by the user, as well as user-created widgets **149-6**;
- widget creator module **150** for making user-created widgets **149-6**;
- search module **151**;
- video and music player module **152**, which merges video player module **145** and music player module **146**;
- notes module **153**; and/or map module **154**; and/or online video module **155**.

Examples of other applications **136** that may be stored in memory **102** include other word processing applications, JAVA-enabled applications, encryption, digital rights management, voice recognition, and voice replication.

In conjunction with touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, and text input module **134**, the contacts module **137** may be used to manage an address book or contact list, including: adding name(s) to the address book; deleting name(s) from the address book; associating telephone number(s), e-mail address(es), physical address(es) or other information with a name; associating an image with a name; categorizing and sorting names; providing telephone numbers or e-mail addresses to initiate and/or facilitate communications by telephone **138**, video conference **139**, e-mail **140**, or IM **141**; and so forth. Embodiments of user interfaces and associated processes using contacts module **137** are described further below.

In conjunction with RF circuitry **108**, audio circuitry **110**, speaker **111**, microphone **113**, touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, and text input module **134**, the telephone module **138** may be used to enter a sequence of characters corresponding to a telephone number, access one or more telephone numbers in the address book **137**, modify a telephone number that has been entered, dial a respective telephone number, conduct a conversation and disconnect or hang up when the conversation is completed. As noted above, the wireless communication may use any of a plurality of communications standards, protocols and technologies. Embodiments of user interfaces and associated processes using telephone module **138** are described further below.

In conjunction with RF circuitry **108**, audio circuitry **110**, speaker **111**, microphone **113**, touch screen **112**, display controller **156**, optical sensor **164**, optical sensor controller **158**, contact module **130**, graphics module **132**, text input module **134**, contact list **137**, and telephone module **138**, the videoconferencing module **139** may be used to initiate, conduct, and terminate a video conference between a user and one or more other participants. Embodiments of user interfaces and associated processes using videoconferencing module **139** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, and text input module **134**, the e-mail client module **140** may be used to create, send, receive, and manage e-mail. In conjunction with image management module **144**, the e-mail module **140** makes it very easy to create and send e-mails with still or video images taken with camera module **143**. Embodiments of user interfaces and associated processes using e-mail module **140** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, and text input module **134**, the instant messaging module **141** may be used to enter a sequence of characters corresponding to an instant message, to modify previously entered characters, to transmit a respective instant message (for example, using a Short Message Service (SMS) or Multimedia Message Service (MMS) protocol for telephony-based instant messages or using XMPP, SIMPLE, or IMPS for Internet-based instant messages), to receive instant messages and to view received instant messages. In some embodiments, transmitted and/or received instant messages may include graphics, photos, audio files, video files and/or other attachments as are supported in a MMS and/or an Enhanced Messaging Service (EMS). As used herein, "instant messaging" refers to both telephony-based messages (e.g., messages sent using SMS or MMS) and Internet-based messages (e.g., messages sent using XMPP, SIMPLE, or IMPS). Embodiments of user interfaces and associated processes using instant messaging module **141** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, text input module **134**, image management module **144**, and browsing module **147**, the blogging module **142** may be used to send text, still images, video, and/or other graphics to a blog (e.g., the user's blog). Embodiments of user interfaces and associated processes using blogging module **142** are described further below.

In conjunction with touch screen **112**, display controller **156**, optical sensor(s) **164**, optical sensor controller **158**, contact module **130**, graphics module **132**, and image management module **144**, the camera module **143** may be used to capture still images or video (including a video stream) and store them into memory **102**, modify characteristics of a still image or video, or delete a still image or video from memory **102**. Embodiments of user interfaces and associated processes using camera module **143** are described further below.

In conjunction with touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, text input module **134**, and camera module **143**, the image management module **144** may be used to arrange, modify or otherwise manipulate, label, delete, present (e.g., in a digital slide show or album), and store still and/or video images. Embodiments of user interfaces and associated processes using image management module **144** are described further below.

In conjunction with touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, audio circuitry **110**, and speaker **111**, the video player module **145** may be used to display, present or otherwise play back videos (e.g., on the touch screen or on an external, connected display via external port **124**). Embodiments of user interfaces and associated processes using video player module **145** are described further below.

In conjunction with touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, audio circuitry **110**, speaker **111**, RF circuitry **108**, and browser module **147**, the music player module **146** allows the user to download and play back recorded music and other sound files stored in one or more file formats, such as MP3 or AAC files. In some embodiments, the device **100** may include the functionality of an MP3 player, such as an iPod (trademark of Apple Computer, Inc.). Embodiments of user interfaces and associated processes using music player module **146** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, and text input module **134**, the browser module **147** may be used to browse the Internet, including searching, linking to, receiving, and displaying web pages or portions thereof, as well as attachments and other files linked to web pages. Embodiments of user interfaces and associated processes using browser module **147** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, text input module **134**, e-mail module **140**, and browser module **147**, the calendar module **148** may be used to create, display, modify, and store calendars and data associated with calendars (e.g., calendar entries, to do lists, etc.). Embodiments of user interfaces and associated processes using calendar module **148** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, text input module **134**, and browser module **147**, the widget modules **149** are mini-applications that may be downloaded and used by a user (e.g., weather widget **149-1**, stocks widget **149-2**, calculator widget **149-3**, alarm clock widget **149-4**, and dictionary widget **149-5**) or created by the user (e.g., user-created widget **149-6**). In some embodiments, a widget includes an HTML (Hypertext Markup Language) file, a CSS (Cascading Style Sheets) file, and a JavaScript file. In some embodiments, a widget includes an XML (Extensible Markup Language) file and a JavaScript file (e.g., Yahoo! Widgets). Embodiments of user interfaces and associated processes using widget modules **149** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, text input module **134**, and browser module **147**, the widget creator module **150** may be used by a user to create widgets (e.g., turning a user-specified portion of a web page into a widget). Embodiments of user interfaces and associated processes using widget creator module **150** are described further below.

In conjunction with touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, and text input module **134**, the search module **151** may be used to search for text, music, sound, image, video, and/or other files in memory **102** that match one or more search criteria (e.g., one or more user-specified search terms). Embodiments of user interfaces and associated processes using search module **151** are described further below.

In conjunction with touch screen **112**, display controller **156**, contact module **130**, graphics module **132**, and text input module **134**, the notes module **153** may be used to create and manage notes, to do lists, and the like. Embodiments of user interfaces and associated processes using notes module **153** are described further below.

In conjunction with RF circuitry **108**, touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, text input module **134**, GPS module **135**, and browser module **147**, the map module **154** may be used to receive, display, modify, and store maps and data associated with maps (e.g., driving directions; data on stores and other points of interest at or near a particular location; and other location-based data). Embodiments of user interfaces and associated processes using map module **154** are described further below.

In conjunction with touch screen **112**, display system controller **156**, contact module **130**, graphics module **132**, audio circuitry **110**, speaker **111**, RF circuitry **108**, text input module **134**, e-mail client module **140**, and browser module **147**, the online video module **155** allows the user to access, browse, receive (e.g., by streaming and/or download), play back (e.g., on the touch screen or on an external, connected display via external port **124**), send an e-mail with a link to a particular online video, and otherwise manage online videos in one or more file formats, such as H.264. In some embodiments, instant messaging module **141**, rather than e-mail client module **140**, is used to send a link to a particular online video. Additional description of the online video application can be found in U.S. Provisional Patent Application No. 60/936,562, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Jun. 20, 2007, and U.S. patent application Ser. No. 11/968,067, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

Each of the above identified modules and applications correspond to a set of instructions for performing one or more functions described above. These modules (i.e., sets of instructions) need not be implemented as separate software programs, procedures or modules, and thus various subsets of these modules may be combined or otherwise re-arranged in various embodiments. For example, video player module **145** may be combined with music player module **146** into a single module (e.g., video and music player module **152**, FIG. 1B). In some embodiments, memory **102** may store a subset of the modules and data structures identified above. Furthermore, memory **102** may store additional modules and data structures not described above.

In some embodiments, the device **100** is a device where operation of a predefined set of functions on the device is performed exclusively through a touch screen **112** and/or a touchpad. By using a touch screen and/or a touchpad as the primary input/control device for operation of the device **100**, the number of physical input/control devices (such as push buttons, dials, and the like) on the device **100** may be reduced.

The predefined set of functions that may be performed exclusively through a touch screen and/or a touchpad include navigation between user interfaces. In some embodiments, the touchpad, when touched by the user, navigates the device **100** to a main, home, or root menu from any user interface that may be displayed on the device **100**. In such embodiments, the touchpad may be referred to as a "menu button." In some other embodiments, the menu button may be a physical push button or other physical input/control device instead of a touchpad.

FIG. **2** illustrates a portable multifunction device **100** having a touch screen **112** in accordance with some embodiments. The touch screen may display one or more graphics within user interface (UI) **200**. In this embodiment, as well as others described below, a user may select one or more of the graphics by making contact or touching the graphics, for example, with one or more fingers **202** (not drawn to scale in the figure). In some embodiments, selection of one or more graphics occurs when the user breaks contact with the one or more graphics. In some embodiments, the contact may include a gesture, such as one or more taps, one or more swipes (from left to right, right to left, upward and/or downward) and/or a rolling of a finger (from right to left, left to right, upward and/or downward) that has made contact with the device **100**. In some embodiments, inadvertent contact with a graphic may not select the graphic. For example, a swipe gesture that sweeps over an application icon may not select the corresponding application when the gesture corresponding to selection is a tap.

The device **100** may also include one or more physical buttons, such as "home" or menu button **204**. As described previously, the menu button **204** may be used to navigate to any application **136** in a set of applications that may be executed on the device **100**. Alternatively, in some embodiments, the menu button is implemented as a soft key in a GUI in touch screen **112**.

In one embodiment, the device **100** includes a touch screen **112**, a menu button **204**, a push button **206** for powering the device on/off and locking the device, volume adjustment button(s) **208**, a Subscriber Identity Module (SIM) card slot **210**, a head set jack **212**, and a docking/charging external port **124**. The push button **206** may be used to turn the power on/off on the device by depressing the button and holding the button in the depressed state for a predefined time interval; to lock the device by depressing the button and releasing the button before the predefined time interval has elapsed; and/or to unlock the device or initiate an unlock process. In an alternative embodiment, the device **100** also may accept verbal input for activation or deactivation of some functions through the microphone **113**.

Attention is now directed towards embodiments of user interfaces ("UI") and associated processes that may be implemented on a portable multifunction device **100**.

FIGS. **3**A-**3**C illustrate exemplary user interfaces for unlocking a portable electronic device in accordance with some embodiments. In some embodiments, user interface **300**A includes the following elements, or a subset or superset thereof:

- Unlock image **302** that is moved with a finger gesture to unlock the device;
- Arrow **304** that provides a visual cue to the unlock gesture;
- Channel **306** that provides additional cues to the unlock gesture;
- Time **308**;
- Day **310**;
- Date **312**; and
- Wallpaper image **314**.

In some embodiments, in addition to or in place of wallpaper image **314**, an unlock user interface may include a device charging status icon **316** and a headset charging status icon **318** (e.g., UI **300**B, FIG. **3**B). The device charging status icon **316** indicates the battery status while the device **100** is being recharged (e.g., in a dock). Similarly, headset charging status icon **318** indicates the battery status of a headset associated with device **100** (e.g., a Bluetooth headset) while the headset is being recharged (e.g., in another portion of the dock).

In some embodiments, the device detects contact with the touch-sensitive display (e.g., a user's finger making contact on or near the unlock image **302**) while the device is in a user-interface lock state. The device moves the unlock image **302** in accordance with the contact. The device transitions to a user-interface unlock state if the detected contact corresponds to a predefined gesture, such as moving the unlock image across channel **306**. Conversely, the device maintains the user-interface lock state if the detected contact does not correspond to the predefined gesture. This process saves battery power by ensuring that the device is not accidentally awakened. This process is easy for users to perform, in part because of the visual cue(s) provided on the touch screen.

In some embodiments, after detecting an unlock gesture, the device displays a passcode (or password) interface (e.g., UI **300**C, FIG. **3**C) for entering a passcode to complete the unlock process. The addition of a passcode protects against unauthorized use of the device. In some embodiments, the passcode interface includes an emergency call icon that permits an emergency call (e.g., to 911) without entering the passcode. In some embodiments, the use of a passcode is a user-selectable option (e.g., part of settings **412**).

As noted above, processes that use gestures on the touch screen to unlock the device are described in U.S. patent application Ser. Nos. 11/322,549, "Unlocking A Device By Performing Gestures On An Unlock Image," filed Dec. 23, 2005, and 11/322,550, "Indication Of Progress Towards Satisfaction Of A User Input Condition," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety.

FIGS. **4**A and **4**B illustrate exemplary user interfaces for a menu of applications on a portable multifunction device in accordance with some embodiments. In some embodiments, user interface **400**A includes the following elements, or a subset or superset thereof:

- Signal strength indicator(s) **402** for wireless communication(s), such as cellular and Wi-Fi signals;
- Time **404**;
- Bluetooth indicator **405**;
- Battery status indicator **406**;

- Tray **408** with icons for frequently used applications, such as:
  - Phone **138**, which may include an indicator **414** of the number of missed calls or voicemail messages;
  - E-mail client **140**, which may include an indicator **410** of the number of unread e-mails;
  - Browser **147**; and
  - Music player **146**; and
- Icons for other applications, such as:
  - IM **141**;
  - Image management **144**;
  - Camera **143**;
  - Video player **145**;
  - Weather **149-1**;
  - Stocks **149-2**;
  - Blog **142**;
  - Calendar **148**;
  - Calculator **149-3**;
  - Alarm clock **149-4**;
  - Dictionary **149-5**; and
  - User-created widget **149-6**.

In some embodiments, user interface **400**B includes the following elements, or a subset or superset thereof:

- **402**, **404**, **405**, **406**, **141**, **148**, **144**, **143**, **149-3**, **149-2**, **149-1**, **149-4**, **410**, **414**, **138**, **140**, and **147**, as described above;
- Map **154**;
- Notes **153**;
- Settings **412**, which provides access to settings for the device **100** and its various applications **136**, as described further below;
- Video and music player module **152**, also referred to as iPod (trademark of Apple Computer, Inc.) module **152**; and
- Online video module **155**, also referred to as YouTube (trademark of Google, Inc.) module **155**.

In some embodiments, UI **400**A or **400**B displays all of the available applications **136** on one screen so that there is no need to scroll through a list of applications (e.g., via a scroll bar). In some embodiments, as the number of applications increase, the icons corresponding to the applications may decrease in size so that all applications may be displayed on a single screen without scrolling. In some embodiments, having all applications on one screen and a menu button enables a user to access any desired application with at most two inputs, such as activating the menu button **204** and then activating the desired application (e.g., by a tap or other finger gesture on the icon corresponding to the application). In some embodiments, a predefined gesture on the menu button **204** (e.g., a double tap or a double click) acts as a short cut that initiates display of a particular user interface in a particular application. In some embodiments, the short cut is a user-selectable option (e.g., part of settings **412**). For example, if the user makes frequent calls to persons listed in a Favorites UI (e.g., UI **2700**A, FIG. **27**A) in the phone **138**, the user may choose to have the Favorites UI be displayed in response to a double click on the menu button. As another example, the user may choose to have a UI with information about the currently playing music (e.g., UI **4300**S, FIG. **43**S) be displayed in response to a double click on the menu button.

In some embodiments, UI **400**A or **400**B provides integrated access to both widget-based applications and non-widget-based applications. In some embodiments, all of the widgets, whether user-created or not, are displayed in UI **400**A or **400**B. In other embodiments, activating the icon for

user-created widget **149-6** may lead to another UI that contains the user-created widgets or icons corresponding to the user-created widgets.

In some embodiments, a user may rearrange the icons in UI **400**A or **400**B, e.g., using processes described in U.S. patent application Ser. No. 11/459,602, "Portable Electronic Device With Interface Reconfiguration Mode," filed Jul. 24, 2006, which is hereby incorporated by reference in its entirety. For example, a user may move application icons in and out of tray **408** using finger gestures.

In some embodiments, UI **400**A or **400**B includes a gauge (not shown) that displays an updated account usage metric for an account associated with usage of the device (e.g., a cellular phone account), as described in U.S. patent application Ser. No. 11/322,552, "Account Information Display For Portable Communication Device," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety.

In some embodiments, a signal strength indicator **402** (FIG. **4**B) for a WiFi network is replaced by a symbol for a cellular network (e.g., the letter "E" for an EDGE network, FIG. **4**A) when the device switches from using the WiFi network to using the cellular network for data transmission (e.g., because the WiFi signal is weak or unavailable).

Instant Messaging

FIG. **5** illustrates an exemplary user interface for listing instant message conversations on a portable multifunction device in accordance with some embodiments. In some embodiments, user interface **500** includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- "Instant Messages" or other similar label **502**:
- Names **504** of the people a user is having instant message conversations with (e.g., Jane Doe **504-1**) or the phone number if the person's name is not available (e.g., 408-123-4567 **504-3**);
- Text **506** of the last message in the conversation;
- Date **508** and/or time of the last message in the conversation;
- Selection icon **510** that when activated (e.g., by a finger tap on the icon) initiates transition to a UI for the corresponding conversation (e.g., FIG. **6**A for Jane Doe **504-1**);
- Edit icon **512** that when activated (e.g., by a finger tap on the icon) initiates transition to a UI for deleting conversations (e.g., FIG. **7**);
- Create message icon **514** that when activated (e.g., by a finger tap on the icon) initiates transition to the users contact list (e.g., FIG. **8**A); and
- Vertical bar **516** that helps a user understand what portion of the list of instant message conversations is being displayed.

In some embodiments, the name **504** used for an instant message conversation is determined by finding an entry in the user's contact list **137** that contains the phone number used for the instant message conversation. If no such entry is found, then just the phone number is displayed (e.g., **504-3**). In some embodiments, if the other party sends messages from two or more different phone numbers, the messages may appear as a single conversation under a single name if all of the phone numbers used are found in the same entry (i.e., the entry for the other party) in the user's contact list **137**.

Automatically grouping the instant messages into "conversations" (instant message exchanges with the same user or the same phone number) makes it easier for the user to carry on and keep track of instant message exchanges with multiple parties.

In some embodiments, vertical bar **516** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list of instant message conversations). In some embodiments, the vertical bar **516** has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **516** has a vertical length that corresponds to the portion of the list being displayed. In some embodiments, if the entire list of IM conversations can be displayed simultaneously on the touch screen **112**, the vertical bar **516** is not displayed. In some embodiments, if the entire list of IM conversations can be displayed simultaneously on the touch screen **112**, the vertical bar **516** is displayed with a length that corresponds to the length of the list display area (e.g., as shown in FIG. **5**).

FIGS. **6**A-**6**K illustrate an exemplary user interface for inputting text for an instant message in accordance with some embodiments.

In some embodiments, user interface **600**A includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Name **504** corresponding to the phone number used in the instant message conversation (or the phone number itself if the name is not available);
- Instant messages icon **602** that when activated (e.g., by a finger tap on the icon) initiates transition to a UI listing instant message conversations (e.g., UI **500**);
- Instant messages **604** from the other party, typically listed in order along one side of UI **600**A;
- Instant messages **606** to the other party, typically listed in order along the opposite side of UI **600**A to show the back and forth interplay of messages in the conversation;
- Timestamps **608** for at least some of the instant messages;
- Text entry box **612**;
- Send icon **614** that when activated (e.g., by a finger tap on the icon) initiates sending of the message in text box **612** to the other party (e.g., Jane Doe **504-1**);
- Letter keyboard **616** for entering text in box **612**;
- Alternate keyboard selector icon **618** that when activated (e.g., by a finger tap on the icon) initiates the display of a different keyboard (e.g., **624**, FIG. **6**C);
- Return icon **620** that when activated (e.g., by a finger tap on the icon) initiates sending of the message in text box **612** to the other party (e.g., Jane Doe **504-1**);
- Shift key **628** that when activated (e.g., by a finger tap on the icon) capitalizes the next letter chosen on letter keyboard **616**; and
- Vertical bar **630** that helps a user understand what portion of the list of instant messages in an IM conversation is being displayed.

In some embodiments, a user can scroll through the message conversation (comprised of messages **604** and **606**) by applying a vertical swipe gesture **610** to the area displaying the conversation. In some embodiments, a vertically downward gesture scrolls the conversation downward, thereby showing older messages in the conversation. In some embodiments, a vertically upward gesture scrolls the conversation upward, thereby showing newer, more recent messages in the conversation. In some embodiments, as noted above, the last message in the conversation (e.g., **606-2**) is displayed in the list of instant messages **500** (e.g., **506-1**).

In some embodiments, keys in keyboards **616** (FIGS. **6**A, **6**B, **6**E-**6**K), **624** (FIG. **6**C), and/or **639** (FIG. **6**D) briefly change shade and/or color when touched/activated by a user to help the user learn to activate the desired keys.

In some embodiments, vertical bar **630** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list of instant messages). In some embodiments, the vertical bar **630** has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **630** has a vertical length that corresponds to the portion of the list being displayed. For example, in FIG. **6**A, the vertical position of the vertical bar **630** indicates that the bottom of the list of messages is being displayed (which correspond to the most recent messages) and the vertical length of the vertical bar **630** indicates that roughly half of the messages in the conversation are being displayed.

In some embodiments, user interface **600**B includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **504**, **602**, **604**, **606**, **608**, **612**, **614**, **616**, **618**, **620**, and **630** as described above; and
- word suggestion area **622** that provides a list of possible words to complete the word fragment being typed by the user in box **612**.

In some embodiments, the word suggestion area does not appear in UI **600**B until after a predefined time delay (e.g., 2-3 seconds) in text being entered by the user. In some embodiments, the word suggestion area is not used or can be turned off by the user.

In some embodiments, user interface **600**C includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **504**, **602**, **604**, **606**, **608**, **612**, **614**, **620**, and **622** as described above;
- Alternate keyboard **624**, which may be made up primarily of digits and punctuation, with frequently used punctuation keys (e.g., period key **631**, comma key **633**, question mark key **635**, and exclamation point key **637**) made larger than the other keys;
- Letter keyboard selector icon **626** that when activated (e.g., by a finger tap on the icon) initiates the display of a letter keyboard (e.g., **616**, FIG. **6**A); and
- Shift key **628** that when activated (e.g., by a finger tap on the icon) initiates display of yet another keyboard (e.g., **639**, FIG. **6**D).

In some embodiments, keeping the period key **631** near keyboard selector icon **626** reduces the distance that a user's finger needs to travel to enter the oft-used period.

In some embodiments, user interface **600**D includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **504**, **602**, **604**, **606**, **608**, **612**, **614**, **620**, **622**, **626**, **628** as described above; and
- Another alternate keyboard **639**, which may be made up primarily of symbols and punctuation, with frequently used punctuation keys (e.g., period key **631**, comma key **633**, question mark key **635**, and exclamation point key **637**) made larger than the other keys.

In some embodiments, user interface **600**E includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **504**, **602**, **604**, **606**, **608**, **612**, **614**, **616**, **618**, and **620**, as described above; and
- New instant message **606-3** sent to the other party.

In some embodiments, when the user activates a send key (e.g., either **614** or **620**), the text in text box **612** "pops" or otherwise comes out of the box and becomes part of the string of user messages **606** to the other party. The black arrows in FIG. **6**E illustrate an animated formation of a quote bubble **606-3**. In some embodiments, the size of the quote bubble scales with the size of the message. In some embodiments, a sound is also made when the message is sent, such as a droplet sound, to notify the user.

In some embodiments, user interface **600**F includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **612**, **614**, **616**, **618**, **620**, and **628**, as described above;
- Recipient input field **632** that when activated (e.g., by a finger tap on the field) receives and displays the phone number of the recipient of the instant message (or the recipient's name if the recipient is already in the user's contact list);
- Add recipient icon **634** that when activated (e.g., by a finger tap on the icon) initiates the display of a scrollable list of contacts (e.g., **638**, FIG. **6**G); and
- Cancel icon **636** that when activated (e.g., by a finger tap on the icon) cancels the new instant message.

In some embodiments, user interface **600**G includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **616**, **618**, **620**, **628**, **632**, **634**, and **636**, as described above;
- Scrollable list **638** of contacts that match the input in recipient input field **632**; and
- Vertical bar **640** that helps a user understand how many items in the contact list that match the input in recipient input field **632** are being displayed.

In some embodiments, list **638** contains contacts that match the input in recipient input field **632**. For example, if the letter "v" is input, then contacts with either a first name or last name beginning with "v" are shown. If the letters "va" are input in field **632**, then the list of contacts is narrowed to contacts with either a first name or last name beginning with "va", and so on until one of the displayed contacts is selected (e.g., by a tap on a contact in the list **638**).

In some embodiments, a user can scroll through the list **638** by applying a vertical swipe gesture **642** to the area displaying the list **638**. In some embodiments, a vertically downward gesture scrolls the list downward and a vertically upward gesture scrolls the list upward,

In some embodiments, vertical bar **640** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list **638**). In some embodiments, the vertical bar **640** has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **640** has a vertical length that corresponds to the portion of the list being displayed.

In some embodiments, user interfaces **600**H and **600**I include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **612**, **614**, **616**, **618**, **620**, **628**, **632**, **634**, and **636**, as described above;
- Suggested word **644** adjacent to the word being input;
- Suggested word **646** in the space bar in keyboard **616**; and/or
- Insertion marker **656** (e.g., a cursor, insertion bar, insertion point, or pointer).

In some embodiments, activating suggested word **644** (e.g., by a finger tap on the suggested word) replaces the word being typed with the suggested word **644**. In some embodiments, activating suggested word **646** (e.g., by a finger tap on the space bar) replaces the word being typed with the suggested word **646**. In some embodiments, a user can set whether suggested words **644** and/or **646** are shown (e.g., by setting a user preference).

In some embodiments, a letter is enlarged briefly after it is selected (e.g., "N" is enlarged briefly after typing "din" in FIG. **6**H) to provide feedback to the user.

In some embodiments, user interfaces **600**J and **600**K include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **612**, **614**, **616**, **618**, **620**, **628**, **632**, **634**, **636**, **646**, and **656** as described above; and
- Expanded portion **650** of graphics that helps a user adjust the position of an expanded insertion marker **657** (sometimes called an "insertion point magnifier"); and
- Expanded insertion marker **657**.

In some embodiments, a finger contact **648-1** on or near the insertion marker **656** initiates display of insertion point magnifier **650** and expanded insertion marker **657-1**. In some embodiments, as the finger contact is moved on the touch screen (e.g., to position **648-2**), there is corresponding motion of the expanded insertion marker (e.g., to **657-2**) and the insertion point magnifier **650**. Thus, the insertion point magnifier **650** provides an efficient way to position a cursor or other insertion marker using finger input on the touch screen. In some embodiments, the magnifier **650** remains visible and can be repositioned as long as continuous contact is maintained with the touch screen (e.g., from **648-1** to **648-2** to even **648-3**).

In some embodiments, a portable electronic device displays graphics and an insertion marker (e.g., marker **656**, FIG. **6**I) at a first location in the graphics on a touch screen display (e.g., FIG. **6**I). In some embodiments, the insertion marker **656** is a cursor, insertion bar, insertion point, or pointer. In some embodiments, the graphics comprise text (e.g., text in box **612**, FIG. **6**I).

A finger contact is detected with the touch screen display (e.g., contact **648-1**, FIG. **6**I). In some embodiments, the location of the finger contact is proximate to the location of the insertion marker. In some embodiments, the location of the finger contact is anywhere within a text entry area (e.g., box **612**, FIG. **6**I).

In response to the detected finger contact, the insertion marker is expanded from a first size (e.g., marker **656**, FIG. **6**I) to a second size (e.g., marker **657-1**, FIG. **6**J) on the touch screen display, and a portion (e.g., portion **650-1**, FIG. **6**J) of the graphics on the touch screen display is expanded from an original size to an expanded size.

In some embodiments, the portion of the graphics that is expanded includes the insertion marker and adjacent graphics. In some embodiments, after the insertion point and the portion of the graphics are expanded, graphics are displayed that include the insertion marker and adjacent graphics at the original size and at the expanded size.

Movement of the finger contact is detected on the touch screen display (e.g., from **648-1** to **648-2**, FIG. **6**J).

The expanded insertion marker is moved in accordance with the detected movement of the finger contact from the first location (e.g., **657-1**, FIG. **6**J) to a second location in the graphics (e.g., **657-2**, FIG. **6**J).

In some embodiments, the portion of the graphics that is expanded changes as the insertion marker moves from the first location to the second location (e.g., from **650-1** to **650-2**, FIG. **6**J). In some embodiments, the portion of the graphics that is expanded is displayed in a predefined shape. In some embodiments the portion (e.g., **650**, FIG. **6**J) of the graphics that is expanded is displayed in a circle. In some embodiments, the expanded insertion marker **657** is within the circle.

In some embodiments, the detected movement of the finger contact has a horizontal component on the touch screen display and a vertical component on the touch screen display. In some embodiments, moving the expanded insertion marker **657** in accordance with the detected movement of the finger contact includes moving the expanded insertion marker and the expanded portion of the graphics in accordance with the horizontal component of motion of the finger contact if the finger contact moves outside a text entry area without breaking contact. For example, in FIG. 6J, if the finger contact moves from **648-2** (inside the text entry area **612**) to **648-3** (in the keyboard area), the expanded insertion point **657** and the expanded portion **650** of the graphics may move horizontally along the lower portion of the text entry area in accordance with the horizontal component of the movement from **648-2** to **648-3** (not shown).

In some embodiments, moving the expanded insertion marker in accordance with the detected movement of the finger contact includes moving the expanded insertion marker in a first area of the touch screen that includes characters entered using a soft keyboard (e.g., text box **612**, FIG. **6**J), wherein the soft keyboard is located in a second area of the touch screen that is separate from the first area (e.g., keyboard **616**, FIG. **6**J).

In some embodiments, the expanded insertion marker is contracted from the second size to the first size if finger contact with the touch screen display is broken (e.g., insertion marker **656**, FIG. **6**K). In some embodiments, the contracting includes an animation of the expanded insertion marker **657** shrinking into the insertion marker **656** at the second location. As used herein, an animation is a display of a sequence of images that gives the appearance of movement, and informs the user of an action that has been performed (such as moving an insertion point). A respective animation that confirms an action by the user of the device typically takes a predefined, finite amount of time, such as an amount of time between 0.2 and 0.5 seconds, between 0.2 and 1.0 seconds, or between 0.5 and 2.0 seconds, depending on the context.

In some embodiments, the expanded portion **650** of the graphics is contracted if finger contact with the touch screen display is no longer detected for a predetermined time.

A graphical user interface on a portable electronic device with a touch screen display comprises an insertion marker and graphics. In response to detecting a finger contact **648** with the touch screen display, the insertion marker is expanded from a first size **656** to a second size **657**, and a portion **650** of the graphics is expanded. In response to detecting movement of the finger contact on the touch screen display, the expanded insertion marker is moved in accordance with the detected movement of the finger contact from a first location **657-1** in the graphics to a second location **657-2** in the graphics.

Additional description of insertion marker positioning can be found in U.S. patent application Ser. No. 11/553,436, "Method, System, And Graphical User Interface For Positioning An Insertion Marker In A Touch Screen Display," filed Oct. 26, 2006, and U.S. Provisional Patent Application No. 60/947,382, "Portable Multifunction Device, Method, and Graphical User Interface for Adjusting an Insertion Point Marker," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/923,453, "Portable Multifunction Device, Method, and Graphical User Interface for Adjusting an Insertion Point Marker," filed Oct. 24, 2007, the contents of which are hereby incorporated by reference herein in their entirety.

Additional description of instant messaging on portable electronic devices can be found in U.S. Provisional Patent Application Nos. 60/883,819, "Portable Electronic Device For Instant Messaging," filed Jan. 7, 2007, and 60/946,969, "Portable Electronic Device For Instant Messaging," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/848, 208, "Portable Electronic Device for Instant Messaging," filed Aug. 30, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIG. **7** illustrates an exemplary user interface for deleting an instant message conversation in accordance with some embodiments. In some embodiments, user interface **700** includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **502**, **504**, **506**, **508**, as described above;
- Delete icons **702**;
- Confirm delete icon **704**; and
- Done icon **706**.

In some embodiments, if the user activates edit icon **512** (FIG. **5**), the delete icons **702** appear next to each instant message conversation. If a user activates a delete icon (e.g., by tapping it with a finger), the icon may rotate 90 degrees (e.g., **702-4**) or otherwise change its appearance and/or a second icon may appear (e.g., confirm delete icon **704**). If the user activates the second icon, the corresponding instant message conversation is deleted.

This deletion process, which requires multiple gestures by the user on different parts of the touch screen (e.g., delete icon **702-4** and confirm delete icon **704** are on opposite sides of the touch screen) greatly reduces the chance that a user will accidentally delete a conversation or other similar item.

The user activates the done icon **706** (e.g., by tapping on it with a finger) when the user has finished deleting IM conversations and the device returns to UI **500**.

If there is a long list of conversations (not shown) that fill more than the screen area, the user may scroll through the list using vertically upward and/or vertically downward gestures **708** on the touch screen.

Additional description of deletion gestures on portable electronic devices can be found in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007 and 60/936, 755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642, "Deletion Gestures on a Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIGS. **8**A and **8**B illustrate an exemplary user interface for a contact list in accordance with some embodiments.

In some embodiments, user interfaces **800**A and **800**B include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, as described above;
- Groups icon **802** that when activated (e.g., by a finger tap on the icon) initiates display of groups of contacts;
- First name icon **804** that when activated (e.g., by a finger tap on the icon) initiates an alphabetical display of the user's contacts by their first names (FIG. **8**B);
- Last name icon **806** that when activated (e.g., by a finger tap on the icon) initiates an alphabetical display of the user's contacts by their last names (FIG. **8**A);
- Alphabet list icons **808** that the user can touch to quickly arrive at a particular first letter in the displayed contact list;
- Cancel icon **810** that when activated (e.g., by a finger tap on the icon) initiates transfer back to the previous UI (e.g., UI **500**); and
- Other number icon **812** that when activated (e.g., by a finger tap on the icon) initiates transfer to a UI for entering a phone number for instant messaging, such as a phone number that is not in the user's contact list (e.g., UI **900**, FIG. **9**).

In some embodiments, the functions of first name icon **804** and last name icon **806** are incorporated into settings **412** (FIG. **4**B, e.g., as a user preference setting) rather than being displayed in a contacts list UI (e.g., **800**A and **800**B).

As described in U.S. patent application Ser. Nos. 11/322,547, "Scrolling List With Floating Adjacent Index Symbols," filed Dec. 23, 2005; 11/322,551, "Continuous Scrolling List With Acceleration," filed Dec. 23, 2005; and 11/322,553, "List Scrolling In Response To Moving Contact Over List Of Index Symbols," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety, the user may scroll through the contact list using vertically upward and/or vertically downward gestures **814** on the touch screen.

FIG. **9** illustrates an exemplary user interface for entering a phone number for instant messaging in accordance with some embodiments. In some embodiments, user interface **900** includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **504**, **602**, and **624**, as described above;
- Cancel icon **902** that when activated (e.g., by a finger tap on the icon) initiates transfer back to the previous UI (e.g., UI **800**A or UI **800**B);
- Save icon **904** that when activated (e.g., by a finger tap on the icon) initiates saving the entered phone number in the instant messages conversation list (e.g., UI **500**) and displaying a UI to compose an instant message to be sent to the entered phone number (e.g., UI **600**A); and
- Number entry box **906** for entering the phone number using keyboard **624**.

Note that the keyboard displayed may depend on the application context. For example, the UI displays a soft keyboard with numbers (e.g., **624**) when numeric input is needed or expected. The UI displays a soft keyboard with letters (e.g., **616**) when letter input is needed or expected.

In some embodiments, instead of using UI **900**, a phone number for instant messaging may be entered in UI **600**F (FIG. **6**F) by inputting numbers in To: field **632** using numeric keypad **624**.

Camera

FIG. **10** illustrates an exemplary user interface for a camera in accordance with some embodiments. In some embodiments, user interface **1000** includes the following elements, or a subset or superset thereof:

- Viewfinder **1002**;
- Camera roll **1004** that manages images and/or videos taken with the camera;
- Shutter **1006** for taking still images;
- Record button **1008** for starting and stopping video recording;
- Timer **1010** for taking an image after a predefined time delay; and
- Image **1012** that appears (e.g., via the animation illustrated schematically in FIG. **10**) to be added to camera roll **1004** when it is obtained.

In some embodiments, the orientation of the camera in the shutter icon **1006** rotates as the device **100** is rotated between portrait and landscape orientations.

FIG. **11** illustrates an exemplary user interface for a camera roll in accordance with some embodiments. In some embodiments, user interface **1100** includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Thumbnail images **1102** of images and/or videos obtained by camera **143**;
- Camera icon **1104** or done icon **1110** that when activated (e.g., by a finger tap on the icon) initiates transfer to the camera UI (e.g., UI **1000**); and
- Vertical bar **1112** that helps a user understand what portion of the camera roll is being displayed.

In some embodiments, the user may scroll through the thumbnails **1102** using vertically upward and/or vertically downward gestures **1106** on the touch screen. In some embodiments, a stationary gesture on a particular thumbnail (e.g., a tap gesture **1108** on thumbnail **1102-11**) initiates transfer to an enlarged display of the corresponding image (e.g., UI **1200**A).

In some embodiments, vertical bar **1112** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the thumbnails **1102**). In some embodiments, the vertical bar **1112** has a vertical position on top of the displayed portion of the camera roll that corresponds to the vertical position in the camera roll of the displayed portion of the camera roll. In some embodiments, the vertical bar **1112** has a vertical length that corresponds to the portion of the camera roll being displayed. For example, in FIG. **11**, the vertical position of the vertical bar **1112** indicates that the middle of the camera roll is being displayed and the vertical length of the vertical bar **1112** indicates that roughly half of the images in the camera roll are being displayed.

FIGS. **12**A-**12**C illustrate an exemplary user interface for viewing and manipulating acquired images in accordance with some embodiments.

In some embodiments, user interface **1200**A includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **1104**, and **1110**, as described above;
- Camera roll icon **1202** that when activated (e.g., by a finger tap on the icon) initiates transfer to the camera roll UI (e.g., UI **1100**);
- Image **1204**;
- Additional options icon **1206** that when activated (e.g., by a finger tap on the icon) initiates transfer to a UI with additional options for use of image **1204** (e.g., UI **1700**, FIG. **17**));
- Previous image icon **1208** that when activated (e.g., by a finger tap on the icon) initiates display of the previous image in the camera roll (e.g., **1102-10**);
- Play icon **1210** that when activated (e.g., by a finger tap on the icon) initiates a slide show of the images in the camera roll;
- Next image icon **1212** that when activated (e.g., by a finger tap on the icon) initiates display of the next image in the camera roll (e.g., **1102-12**);
- Delete symbol icon **1214** that when activated (e.g., by a finger tap on the icon) initiates display of a UI to confirm that the user wants to delete image **1204** (e.g. UI **1200**B, FIG. **12**B);
- Vertical bar **1222** that helps a user understand what portion of the image **1204** is being displayed; and
- Horizontal bar **1224** that helps a user understand what portion of the image **1204** is being displayed.

In some embodiments, the user can also initiate viewing of the previous image by making a tap gesture **1216** on the left side of the image. In some embodiments, the user can also initiate viewing of the previous image by making a swipe gesture **1220** from left to right on the image.

In some embodiments, the user can also initiate viewing of the next image by making a tap gesture **1218** on the right side of the image. In some embodiments, the user can also initiate viewing of the next image by making a swipe gesture **1220** from right to left on the image.

By offering multiple ways to perform the same task (e.g., to view the next image by tapping icon **1212**, tap **1218**, or right to left swipe **1220**), the user can choose whichever way the user prefers, thereby making the UI simpler and more intuitive for the user.

In some embodiments, image **1204** moves off screen to the left as the next image moves on screen from the right. In some embodiments, image **1204** moves off screen to the right as the previous image moves on screen from the left.

In some embodiments, a tap gesture such as **1216** or **1218** magnifies the image **1204** by a predetermined amount, rather than initiating viewing of another image, so that just a portion of image **1204** is displayed. In some embodiments, when the image is already magnified, repeating the tap gesture demagnifies the image (e.g., so that the entire image is displayed).

In some embodiments, if just a portion of image **1204** is displayed, vertical bar **1222** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the image **1204**). In some embodiments, the vertical bar **1222** has a vertical position on top of the displayed portion of the image that corresponds to the vertical position in the image of the displayed portion of the image. In some embodiments, the vertical bar **1222** has a vertical length that corresponds to the portion of the image being displayed. For example, in FIG. **12**A, the vertical position of the vertical bar **1222** indicates that the top of the image is being displayed and the vertical length of the vertical bar **1222** indicates that a portion from the top half of the image is being displayed.

In some embodiments, if just a portion of image **1204** is displayed, horizontal bar **1224** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the image **1204**). In some embodiments, the horizontal bar **1224** has a horizontal position on top of the displayed portion of the image that corresponds to the horizontal position in the image of the displayed portion of the image. In some embodiments, the horizontal bar **1224** has a horizontal length that corresponds to the portion of the image being displayed. For example, in FIG. **12**A, the horizontal position of the horizontal bar **1224** indicates that a portion of the right side of the image is being displayed and the horizontal length of the horizontal bar **1224** indicates that a portion from the right half of the image is being displayed. Together, vertical bar **1222** and horizontal bar **1224** indicate that the northeast quadrant of the image **1204** is being displayed.

In some embodiments, user interface **1200**B includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **1104**, **1110**,**1202**, and **1204**, as described above;
- Delete icon **1216** that when activated (e.g., by a finger tap on the icon) deletes the image **1204**; and
- Cancel icon **1218** that when activated (e.g., by a finger tap on the icon) returns the device to the previous user interface (e.g. UI **1200**A)

In some embodiments, as illustrated in FIG. **12**C, the image may go through a deletion animation to show the user that the image is being deleted.

This deletion process, which requires gestures by the user on two different user interfaces (e.g., **1200**A and **1200**B) greatly reduces the chance that a user will accidentally delete an image or other similar item.

Image Management

FIGS. **13**A and **13**B illustrate exemplary user interfaces for viewing albums in accordance with some embodiments. In some embodiments, user interface **1300**A includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Graphics **1304**, e.g., thumbnail images of the first picture or a user-selected picture in the corresponding albums;
- Album names **1306**;

- Selection icons **1308** that when activated (e.g., by a finger tap on the icon) initiates display of the corresponding album (e.g., UI **1500**, FIG. **15**);
- Settings icon **1310**, that brings up a settings menu (e.g., FIG. **14**) when activated by a user gesture (e.g., a tap gesture); and
- Vertical bar **1314** that helps a user understand what portion of the list of albums is being displayed.

In some embodiments, as shown in FIG. **13**B, one of the photo albums (e.g., **1306-7**) may correspond to the user's photo library; another album (e.g., **1306-8**) may correspond to the camera roll (FIG. **11**); another album (e.g., **1306-9**) may correspond to images added to the photo library in the last 12 months; and other albums (e.g., **1306-10-1306-13**) may correspond to albums created and organized by the user.

The albums may be downloaded on to the device from a wide range of sources, such as the user's desktop or laptop computer, the Internet, etc.

If there is a long list of albums that fill more than the screen area, the user may scroll through the list using vertically upward and/or vertically downward gestures **1312** on the touch screen.

In some embodiments, a user may tap anywhere in the row for a particular album (e.g., a tap on the graphic **1304**, album name **1306**, or selection icon **1308**) to initiate display of the corresponding album (e.g., UI **1500**, FIG. **15**).

In some embodiments, vertical bar **1314** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list of albums). In some embodiments, the vertical bar **1314** has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **1314** has a vertical length that corresponds to the portion of the list being displayed. For example, in FIG. **13**B, the vertical position of the vertical bar **1314** indicates that the top of the list of albums is being displayed and the vertical length of the vertical bar **1314** indicates that roughly half of the albums in the list are being displayed.

FIG. **14** illustrates an exemplary user interface for setting user preferences in accordance with some embodiments. In some embodiments, user interface **1400** includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Music setting **1402** for selecting the music during a slide show (e.g., Now Playing, 90s Music, Recently Added, or Off);
- Repeat setting **1404** for selecting whether the slide show repeats (e.g., On or Off);
- Shuffle setting **1406** for selecting whether the images in the slide show are put in a random order (e.g., On or Off);
- Time per slide setting **1408** (e.g., 2, 3, 5, 10, 20 seconds or manual);
- Transition setting **1410** (e.g., random, wipe across, wipe down, or off);
- TV out setting **1412** for external display (e.g., on, off, or ask);
- TV signal setting **1414** (e.g., NTSC or PAL);
- Auto Rotate setting **1416** (e.g. on or off);
- Done icon **1418** that when activated (e.g., by a finger tap on the icon) returns the device to the previous UI (e.g., UI **1300**); and
- Selection icons **1420** that when activated (e.g., by a finger tap on the icon) show choices for the corresponding settings.

In some embodiments, a user may tap anywhere in the row for a particular setting to initiate display of the corresponding setting choices.

In some embodiments, the settings in FIG. **14** are incorporated into settings **412** (FIG. **4**B) and settings icon **1310** need not be displayed in the image management application **144** (e.g., FIG. **13**B).

FIG. **15** illustrates an exemplary user interface for viewing an album in accordance with some embodiments. In some embodiments, user interface **1500** includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Photo albums icon **1502** that when activated (e.g., by a finger tap on the icon) initiates transfer to the photo albums UI (e.g., UI **1300**B);
- Thumbnail images **1506** of images in the corresponding album;
- Play icon **1508** that when activated (e.g., by a finger tap on the icon) initiates a slide show of the images in the album; and
- Vertical bar **1514** that helps a user understand what portion of the list of thumbnail images **1506** in an album is being displayed.

In some embodiments, the user may scroll through the thumbnails **1506** using vertically upward and/or vertically downward gestures **1510** on the touch screen. In some embodiments, a stationary gesture on a particular thumbnail (e.g., a tap gesture **1512** on thumbnail **1506-11**) initiates transfer to an enlarged display of the corresponding image (e.g., UI **1600**).

In some embodiments, vertical bar **1514** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list of thumbnails). In some embodiments, the vertical bar **1514** has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **1514** has a vertical length that corresponds to the portion of the list being displayed. For example, in FIG. **15**, the vertical position of the vertical bar **1514** indicates that the middle of the list of thumbnails is being displayed and the vertical length of the vertical bar **1514** indicates that roughly half of the thumbnails in the album are being displayed.

FIGS. **16**A and **16**B illustrate exemplary user interfaces for viewing images in an album in accordance with some embodiments. In some embodiments, user interfaces **1600**A and **1600**B include the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Album name icon **1602** that when activated (e.g., by a finger tap on the icon) initiates transfer to the corresponding album UI (e.g., UI **1500**);
- Image **1606**;
- Additional options icon **1608** that when activated (e.g., by a finger tap on the icon) initiates transfer to a UI with additional options for use of image **1606** (e.g., UI **1700**, FIG. **17**));
- Previous image icon **1610** that when activated (e.g., by a finger tap on the icon) initiates display of the previous image in the album (e.g., **1506-10**);
- Play icon **1612** that when activated (e.g., by a finger tap on the icon) initiates a slide show of the images in the album; and
- Next image icon **1614** that when activated (e.g., by a finger tap on the icon) initiates display of the next image in the album (e.g., **1506-12**).

In some embodiments, icons **1608**, **1610**, **1612**, and **1614** are displayed in response to detecting a gesture on the touch screen (e.g., a single finger tap on the image **1606**) and then cease to be displayed if no interaction with the touch screen is detected after a predetermined time (e.g., 3-5 seconds), thereby providing a "heads up display" effect for these icons.

In some embodiments, the user can also initiate viewing of the previous image by making a tap gesture **1618** on the left side of the image. In some embodiments, the user can also initiate viewing of the previous image by making a swipe gesture **1616** from left to right on the image.

In some embodiments, the user can also initiate viewing of the next image by making a tap gesture **1620** on the right side of the image. In some embodiments, the user can also initiate viewing of the next image by making a swipe gesture **1616** from right to left on the image.

By offering multiple ways to perform the same task (e.g., to view the next image by tapping icon **1614**, tap **1620**, or right to left swipe **1616**), the user can choose whichever way the user prefers, thereby making the UI simpler and more intuitive for the user.

In some embodiments, image **1606** moves off screen to the left as the next image moves on screen from the right. In some embodiments, image **1606** moves off screen to the right as the previous image moves on screen from the left.

In some embodiments, a double tap gesture such as **1618** or **1620** magnifies the image **1606** by a predetermined amount, rather than initiating viewing of another image, so that just a portion of image **1606** is displayed. In some embodiments, when the image is already magnified, repeating the double tap gesture demagnifies the image (e.g., so that the entire image is displayed, or so that the prior view of the image is restored).

In some embodiments, a multi-finger de-pinching gesture magnifies the image **1606** by a variable amount in accordance with the position of the multi-finger de-pinching gesture and the amount of finger movement in the multi-finger de-pinching gesture. In some embodiments, a multi-finger pinching gesture demagnifies the image **1606** by a variable amount in accordance with the position of the multi-finger pinching gesture and the amount of finger movement in the multi-finger pinching gesture.

In some embodiments, if just a portion of image **1606** is displayed, vertical bar **1622** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the image **1606**). In some embodiments, the vertical bar **1622** has a vertical position on top of the displayed portion of the image that corresponds to the vertical position in the image of the displayed portion of the image. In some embodiments, the vertical bar **1622** has a vertical length that corresponds to the portion of the image being displayed. For example, in FIG. **16**A, the vertical position of the vertical bar **1622** indicates that the bottom of the image is being displayed and the vertical length of the vertical bar **1622** indicates that a portion from the bottom half of the image is being displayed.

In some embodiments, if just a portion of image **1606** is displayed, horizontal bar **1624** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the image **1606**). In some embodiments, the horizontal bar **1624** has a horizontal position on top of the displayed portion of the image that corresponds to the horizontal position in the image of the displayed portion of the image. In some embodiments, the horizontal bar **1624** has a horizontal length that corresponds to the portion of the image being displayed. For example, in FIG. **16**A, the horizontal position of the horizontal bar **1224** indicates that a portion of the left side of the image is being displayed and the horizontal length of the horizontal bar **1624** indicates that a portion from the left half of the image is being displayed. Together, vertical bar **1622** and horizontal bar **1624** indicate that the southwest quadrant of the image **1606** is being displayed.

In some embodiments, in response to detecting a change in orientation of the device **100** from a portrait orientation to a landscape orientation (e.g., using accelerometer **168**), UI **1600**A (including image **1606**) is rotated by 90° to UI **1600**B (FIG. **16**B). In some embodiments, if just a portion of image **1606** is displayed in landscape orientation (UI **1600**B, FIG. **16**B), vertical bar **1628** and horizontal bar **1630** are displayed and act in an analogous manner to vertical bar **1622** and horizontal bar **1624** (UI **1600**A, FIG. **16**A), described above. In some embodiments, in response to detecting a change in orientation of the device **100** from a landscape orientation to a portrait orientation (e.g., using accelerometer **168**), the UI **1600**B is rotated by 90° to UI **1600**A (FIG. **16**A).

In some embodiments, if just a portion of image **1606** is displayed, in response to detecting a finger drag or swipe gesture (e.g., **1626**), the displayed portion of the image is translated in accordance with the direction of the drag or swipe gesture (e.g., vertical, horizontal, or diagonal translation).

FIG. **17** illustrates an exemplary user interface for selecting a use for an image in an album in accordance with some embodiments. In some embodiments, user interface **1700** includes the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **1602**, and **1606** as described above;
- Email photo icon **1708** that when activated (e.g., by a finger tap on the icon) initiates a process for incorporating the image **1606** in an email (e.g., as illustrated in FIGS. **18**A-**18**J);
- Assign to contact icon **1710** that when activated (e.g., by a finger tap on the icon) initiates a process for associating the image **1606** with a contact in the user's contact list (e.g., as illustrated in FIGS. **19**A-**19**B);
- Use as wallpaper icon **1712** that when activated (e.g., by a finger tap on the icon) initiates a process for incorporating the image **1606** in the user's wallpaper (e.g., as illustrated in FIG. **20**); and
- Cancel icon **1714** that when activated (e.g., by a finger tap on the icon) initiates transfer back to the previous UI (e.g., UI **1600**A).

FIGS. **18**A-**18**J illustrate an exemplary user interface for incorporating an image **1606** in an email in accordance with some embodiments.

In response to the user activating Email photo icon **1708**, the device displays an animation to show that the image has been placed into an email message, ready for text input, addressing, and sending. In some embodiments, the animation includes initially shrinking the image (FIG. **18**A); sliding or otherwise forming an email message template behind the image **1606** (FIG. **18**B); and expanding the image (FIG. **18**C).

In some embodiments, if the user makes a tap or other predefined gesture on the subject line **1804** or in the body of the email **1806** (FIG. **18**D), a letter keyboard **616** appears and the user may input the subject and/or body text (FIG. **18**E).

In some embodiments, to enter the email address, the user makes a tap or other predefined gesture on the To: line **1802** of the email (FIG. **18**E); the user's contact list appears (FIG. **18**J); the user makes a tap or other predefined gesture on the desired recipient/contact (e.g., tapping **1816** on Bob Adams in FIG. **18**J); and the device places the corresponding email address in the email message (FIG. **18**G). If others need to be copied on the email, the user makes a tap or other predefined gesture on the CC: line **1818** of the email; the user's contact list appears (FIG. **18**J); the user makes a tap or other predefined gesture on the desired recipient/contact (e.g., tapping **1820** on Darin Adler in FIG. **18**J); and the device places the corresponding email address in the email message (FIG. **18**G).

In some embodiments, to enter the email address, the user makes a tap or other predefined gesture on the To: line **1802** of the email (FIG. **18**E). Add recipient icon **1822** appears, which when activated (e.g., by a finger tap on the icon **1822**) initiates the display of a scrollable list of contacts (e.g., **1826**, FIG. **18**F) that match the input, if any, in the To: field. For example, if the letter "B" is input, then contacts with either a first name or last name beginning with "B" are shown. If the letters "Bo" are input in the To: field, then the list of contacts is narrowed to contacts with either a first name or last name beginning with "Bo", and so on until one of the displayed contacts is selected (e.g., by a tap on a contact in the list **1826**, FIG. **18**F). If others need to be copied on the email, the user makes a tap or other predefined gesture on the CC: line **1818** of the email and follows an analogous procedure to that used for inputting addresses in the To: field.

In some embodiments, a user can scroll through the list **1826** by applying a vertical swipe gesture **1828** to the area displaying the list **1826** (FIG. **18**F). In some embodiments, a vertically downward gesture scrolls the list downward and a vertically upward gesture scrolls the list upward,

In some embodiments, a vertical bar **1830** (FIG. **18**F) is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list **1826**). In some embodiments, the vertical bar **1830** has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **1830** has a vertical length that corresponds to the portion of the list being displayed.

In some embodiments, the user may also enter the email address using one or more keyboards (e.g., **616** and **624**, not shown).

In some embodiments, as the user types the email message, a suggested word **1832** appears adjacent to the word being typed and/or in the space bar **1834** (FIG. **18**G). Activating suggested word **1832** (e.g., by a finger tap on the suggested word) replaces the word being typed with the suggested word **1832** (FIG. **18**H). Activating suggested word **1834** (e.g., by a finger tap on the space bar) replaces the word being typed with the suggested word **1834** (FIG. **18**H). In some embodiments, a user can set whether suggested words **1832** and/or **1834** are shown (e.g., by setting a user preference). Additional descriptions of word suggestion can be found in U.S. patent application Ser. No. 11/620,641, "Method, System, And Graphical User Interface For Providing Word Recommendations for Text Input," filed Jan. 5, 2007) and U.S. patent application Ser. No. 11/620,642, "Method, System, And Graphical User Interface For Providing Word Recommendations," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

In some embodiments, a vertical bar **1836** (FIG. **18**H), analogous to the vertical bars described above, is displayed on top of the body of the email that helps a user understand what portion of the email is being displayed.

The device sends the email message in response to the user activating the send icon **1814** (FIG. **18**I) (e.g., by a finger tap on the icon). Alternatively, if the user activates the cancel icon **1808**, the device may display the save draft icon **1810**, the don't save (or delete message) icon **1812**, and the edit message icon **1890**. The device saves the draft if the user activates the save draft icon **1810**, e.g., in a drafts folder in email client **140** (FIG. **33**). The device deletes the draft if the user activates the don't save icon **1812**. The device returns to editing the draft if the user activates the edit message icon **1890**.

FIGS. **19**A and **19**B illustrate an exemplary user interface for assigning an image **1606** to a contact in the user's contact list in accordance with some embodiments.

In some embodiments, in response to the user activating assign to contact icon **1710** (FIG. **17**), the device displays the user's contact list (FIG. **19**A). In response to the user selecting a contact in the contact list (e.g., selecting Bob Adams with a tap **1901** in UI **1900**A, FIG. **19**A), the device displays a user interface (e.g., UI **1900**B, FIG. **19**B) that lets the user crop, scale, and otherwise adjust the image for the selected contact. In some embodiments, the user may move the image with a one-finger gesture **1908**; enlarge the image with a de-pinching gesture using multiple contacts **1910** and **1912**; reduce the image with a pinching gesture using multiple contacts **1910** and **1912**; and/or rotate the image with a twisting gesture using multiple contacts **1910** and **1912**. In some embodiments, in response to the user activating a set photo icon **1906**, the device assigns the adjusted image to the selected contact. Alternatively, in response to the user activating a cancel icon **1904**, the device stops the assignment process. In some embodiments, the interface **1900**B may include information **1902** to help guide the user.

FIG. **20** illustrates an exemplary user interface for incorporating an image **1606** in the user's wallpaper in accordance with some embodiments.

In some embodiments, in response to the user activating use as wallpaper icon **1712** (FIG. **17**), the device displays a user interface (e.g., UI **2000**, FIG. **20**) that lets the user crop, scale, and otherwise adjust the image. In some embodiments, the user may move the image with a one-finger gesture **2008**; enlarge the image with a de-pinching gesture using multiple contacts **2010** and **2012**; reduce the image with a pinching gesture using multiple contacts **2010** and **2012**; and/or rotate the image with a twisting gesture using multiple contacts **2010** and **2012**. In some embodiments, in response to the user activating a set wallpaper icon **2006**, the device assigns the adjusted image as wallpaper. Alternatively, in response to the user activating a cancel icon **2004**, the device stops the assignment process. In some embodiments, the interface **2000** may include information **2002** to help guide the user.

Additional description of image management can be found in U.S. Provisional Patent Application Nos. 60/883,785, "Portable Electronic Device For Photo Management," filed Jan. 6, 2007, and 60/947,118, "Portable Electronic Device For Photo Management," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/848,210, "Portable Electronic Device For Photo Management," filed Aug. 30, 2007, the contents of which are hereby incorporated by reference in their entirety.

Video Player

FIGS. **21**A-**21**C illustrate an exemplary user interface for organizing and managing videos in accordance with some embodiments.

In some embodiments, in response to a series of gestures (e.g., finger taps) by the user, the device displays a series of video categories and sub-categories. For example, if the user activates selection icon **2101** (e.g., by a finger tap on the icon) or, in some embodiments, taps anywhere in the Playlists row **2108**, the UI changes from a display of video categories (UI **2100**A, FIG. **21**A) to a display of Playlist sub-categories (UI **2100**B, FIG. **21**B). In turn, if the user activates the selection icon for My Movies (e.g., by a finger tap on the icon) or, in some embodiments, taps anywhere in the My Movies row

2110, the UI changes from a display of Playlist sub-categories (UI **2100**B, FIG. **21**B) to a display of My Movies sub-categories (UI **2100**C, FIG. **21**C), and so forth.

In some embodiments, in response to a series of gestures (e.g., finger taps) by the user, the device navigates back up through the hierarchy of video categories and sub-categories. For example, if the user activates Playlists icon **2106** (e.g., by a finger tap on the icon), the UI changes from a display of My Movies sub-categories (UI **2100**C, FIG. **21**C) to a display of Playlist sub-categories (UI **2100**B, FIG. **21**B). In turn, if the user activates the Videos icon **2104** (e.g., by a finger tap on the icon), the UI changes from a display of Playlist sub-categories (UI **2100**B, FIG. **21**B) to a display of video categories (UI **2100**A, FIG. **21**A). As another example, if the device detects a horizontal swipe gesture (e.g., a left to right swipe gesture), the device may navigate up one level in the hierarchy of video categories and sub-categories. More generally, in response to detecting a horizontal swipe gesture (e.g., a left to right swipe gesture), the device may navigate up one level in a hierarchy of content categories, sub-categories, and content (e.g., from UI **4300** S (FIG. **43**S) for an individual song to a UI **4300**R (FIG. **43**R) for an album; from UI **4300**R (FIG. **43**R) for an album to UI **4300**Q for a list of albums; and so on).

In some embodiments, in response to user selection of a particular video (e.g., by a tap or other predefined gesture on the graphic, title, or anywhere **2112** (FIG. **21**C) in the row for a particular video), the device displays the selected video (e.g., King Kong) in a video player UI (e.g., UI **2300**A, FIG. **23**A).

In some embodiments, in response to user selection of settings icon **2102** (e.g., by a finger tap on the icon), the device displays a settings UI (UI **2200**A, FIG. **22**A) for a video player.

FIGS. **22**A and **22**B illustrate an exemplary user interface for setting user preferences for a video player in accordance with some embodiments.

In some embodiments, a user may make a tap or other predefined gesture anywhere in a row for a particular setting to initiate display of the corresponding setting choices. For example, in response to a tap **2202** on the Scale to fit setting (UI **2200**A, FIG. **22**A), the device displays the setting choices for scale to fit (UI **2200**B, FIG. **22**B).

In some embodiments, user interface **2200**B includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Settings icon **2204** that when activated (e.g., by a finger tap on the icon) returns the device to the settings UI (e.g., UI **2200**A);
- Scale to fit icon **2206** that when activated (e.g., by a finger tap on the icon) sets the video player to scale the video to fit into the touch screen **112** ("wide screen mode"), which may result in two horizontal black bands at the top and bottom of the display for wide-screen movies;
- Scale to full icon **2208** that when activated (e.g., by a finger tap on the icon) sets the video player to fill the touch screen **112** with the video ("full screen mode");
- Cancel icon **2210** that when activated (e.g., by a finger tap on the icon) returns the device to the previous UI (e.g., UI **2200**A) without saving any changes selected by the user; and
- Done icon **2212** that when activated (e.g., by a finger tap on the icon) saves the setting selected by the user and returns the device to the previous UI (e.g., UI **2200**A);

In some embodiments, the settings in FIG. **22**A are incorporated into settings **412** (FIG. **4**B) and settings icon **2102** need not be displayed in the video application **145** (e.g., FIG. **21**A-**21**C). In some embodiments, the settings in FIG. **22**A are incorporated into the video player UI (e.g., as wide screen selector icon **2326** in FIG. **23**C and full screen selector icon **2328** in FIG. **23**D).

In some embodiments, a vertical bar analogous to the vertical bars described above, is displayed on top of a list of video categories (e.g., FIG. **21**A), a list of subcategories (e.g., FIG. **21**B), and/or a list of videos (e.g., FIG. **21**C) that helps a user understand what portion of the respective list is being displayed. In some embodiments, if an entire list can be displayed simultaneously on the touch screen **112**, the vertical bar is not displayed.

FIGS. **23**A-**23**D illustrate exemplary user interfaces for a video player in accordance with some embodiments. In some embodiments, user interfaces **2300**A-**2300**D include the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Video **2302**
- Play icon **2304** that when activated (e.g., by a finger tap on the icon) initiates playing the video **2302**, either from the beginning or from where the video was paused;
- Pause icon **2306** that when activated (e.g., by a finger tap on the icon) initiates pausing the video **2302**;
- Lapsed time **2308** that shows how much of the video has been played, in units of time;
- Progress bar **2310** that indicates what fraction of the video has been played and that may be used to help scroll through the video in response to a user gesture;
- Remaining time **2312** that shows how much of the video remains to be played, in units of time;
- Exit (Done) icon **2314** that when activated (e.g., by a finger tap on the icon) initiates exiting the video player UI (e.g., UI **2300**A) and returning to another UI (e.g., UI **2100**C, FIG. **2100**C);
- Enlarged lapsed time **2318** that may appear in response to a user gesture **2316** involving progress bar **2310**;
- Fast Reverse/Skip Backwards icon **2320** that when activated (e.g., by a finger tap on the icon) initiates reversing or skipping backwards through the video **2302**;
- Fast Forward/Skip Forward icon **2322** that when activated (e.g., by a finger tap on the icon) initiates forwarding or skipping forwards through the video **2302**;
- Volume adjustment slider icon **2324** that that when activated (e.g., by a finger tap on the icon) initiates adjustment of the volume of the video **2302**;
- Wide screen selector icon **2326** that when activated (e.g., by a finger tap on the icon) initiates display of the video in wide screen mode and toggles to icon **2328**; and
- Full screen selector icon **2328** that when activated (e.g., by a finger tap on the icon) initiates display of the video in full screen mode and toggles to icon **2326**.

In some embodiments, in response to user selection of a particular video (e.g., by a tap or other predefined gesture on the graphic, title, or anywhere **2112** in the row for a particular video in UI **2100**C), the device displays the selected video (e.g., King Kong) in a video player UI (e.g., UI **2300**A). In some embodiments, the device automatically displays the video in landscape mode on the touch screen, rather than in portrait mode, to increase the size of the image on the touch screen.

In some embodiments, graphics other than the video **2302** (e.g., graphics **2304**, **2306**, **2308**, **2310**, **2312**, **2314**, **2320**, **2322**, **2326** and/or **2328**) may fade out if there is no contact with the touch screen **112** for a predefined time. In some embodiments, these graphics may reappear if contact is made with the touch screen, thereby producing a "heads up display" effect for these graphics. In some embodiments, for wide screen movies displayed in fit-to-screen mode, graphics may be displayed in the black horizontal bands above and below the video **2302**, to avoid obscuring the video.

In some embodiments, in response to a user gesture, the lapsed time in the video can be modified. For example, in response to the user's finger touching **2316** at or near the end of the progress bar and then sliding along the progress bar, the lapsed time may be altered to correspond to the position of the user's finger along the progress bar. In some embodiments, enlarged lapsed time **2318** is displayed during this user gesture to indicate where the video will resume playing when the gesture is ended (FIG. **23**B). In some embodiments, one or more still images from the video **2302** that correspond to where the video will resume playing are displayed as the user's finger is moved along the progress bar. This user gesture on the progress bar makes it easy for a user to select a particular scene in a video for viewing.

Additional description of a video player and manager can be found in U.S. Provisional Patent Application Nos. 60/883,784, "Video Manager For Portable Multifunction Device," filed Jan. 6, 2007, and 60/946,973, "Video Manager For Portable Multifunction Device," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/850,008, "Video Manager For Portable Multifunction Device," filed Sep. 4, 2007, the contents of which are hereby incorporated by reference in their entirety.

Weather

FIGS. **24**A-**24**E illustrate an exemplary user interface for displaying and managing weather widgets in accordance with some embodiments.

In some embodiments, weather widgets **149-1** (FIG. **4**A) display the weather for particular locations (e.g., Santa Cruz, Calif. in UI **2400**A, FIG. **24**A or Cupertino, Calif. in UI **2400**E, FIG. **24**E). In response to the user activating settings icon **2402** (e.g., by a finger tap on the icon), the settings UI for the weather widgets is displayed (e.g., UI **2400**B, FIG. **24**B). In some embodiments, the user can select the particular location for display with a gesture (e.g., by touching the particular location in a list **2412** of locations, which may highlight the selected location). In some embodiments, the settings in FIG. **24**B are incorporated into settings **412** (FIG. **4**B) and settings icon **2402** need not be displayed in the weather widget (e.g., FIG. **24**A).

In some embodiments, in response to the user's finger contacting **2404** (FIG. **24**B) a text entry box, a keyboard (e.g., **616**) is displayed (UI **2400**C, FIG. **24**C). In some embodiments, a word suggestion area **622** is also displayed. In response to the user entering the new location and activating the add location icon **2406**, the new location is added to the list of locations.

In some embodiments, the highlighted location in the list of locations is removed if the user activates the remove icon **2408** (e.g., by a finger tap on the icon). In some embodiments, in response to the user activating the done icon **2410**, the device displays the weather for the selected location (e.g., UI **2400**A, FIG. **24**A).

In some embodiments, for each location in the list of locations, a corresponding icon **2414** is added to the UI that displays the weather for a particular location (e.g., UI **2400**A). For example, because there are four locations in the settings UI **2400**B, four icons **2414** are displayed in UI **2400**A, FIG. **24**A. In some embodiments, the icon **2414** that corresponds to the location whose weather is being displayed may be highlighted to distinguish it from the other icons. For example, Santa Cruz, the third of four locations set by the user, is highlighted in UI **2400**B and the weather for Santa Cruz is displayed in UI **2400**A. Thus, the third of four icons

2414 (i.e., **2414-3**) is highlighted in UI **2400**A. The icons **2414** let a user know at a glance how many locations are listed in the settings menu **2400**B and which location in the list is displayed.

In some embodiments, the user can initiate viewing of the previous location in the list (e.g., Cupertino, Calif.) by making a swipe gesture **2416** from left to right on the touch screen. In some embodiments, the user can initiate viewing of the next location in the list (e.g., New York, N.Y.) by making a swipe gesture **2416** from right to left on the touch screen. For this example, if the weather for Cupertino, Calif. is displayed, then icon **2414-2** is highlighted (FIG. **24**E). Similarly, if the weather for New York, N.Y. is displayed, then icon **2414-4** is highlighted.

The weather widgets **149-1** are an example of widgets with a single, shared settings/configuration page that provides settings for multiple widgets for display.

In some embodiments, a portable multifunction device displays a widget (e.g., Santa Cruz weather widget, FIG. **24**A) on a touch screen display. The displayed widget is one of a set of widgets that share a common configuration interface (e.g., FIG. **24**B). In some embodiments, widgets in the set of widgets are displayed one at a time (e.g., FIG. **24** A and FIG. **24**E).

One or more widget set indicia icons (e.g., icons **2414**, FIG. **24**A) are displayed. The widget set indicia icons provide information about the number of widgets in the set of widgets and a position of the displayed widget in the set of widgets. In some embodiments, the one or more widget set indicia icons are displayed concurrently with the displayed widget (e.g., FIG. **24**A).

A finger gesture is detected on the touch screen display. In some embodiments, the finger gesture is a swipe gesture (e.g., swipe **2416**, FIG. **24**A).

In response to the finger gesture, the displayed widget (e.g., Santa Cruz weather widget, FIG. **24**A) is replaced with another widget (e.g., Cupertino weather widget, FIG. **24**E) in the set of widgets, and information provided by the widget set indicia icons is updated to reflect the replacement of the displayed widget by another widget in the set of widgets. In some embodiments, the set of widget form a sequence and the displayed widget is replaced by an adjacent widget in the sequence of widgets.

A graphical user interface on a portable communications device with a touch screen display comprises a set of widgets that share a common configuration interface, and one or more widget set indicia icons (e.g., **2414**). At most one widget in the set of widgets is shown on the touch screen at any one time (e.g., Santa Cruz weather widget, FIG. **24**A). The widget set indicia icons provide information about the number of widgets in the set of widgets and a position of the displayed widget in the set of widgets. In response to detecting a finger gesture (e.g., **2416**) on the touch screen display, a displayed widget is replaced with another widget in the set of widgets, and the information provided by the widget set indicia icons is updated to reflect the replacement of the displayed widget by another widget in the set of widgets.

In some embodiments, a portable multifunction device (e.g., device **100**) displays a first widget on a touch screen display (e.g., Santa Cruz weather widget, FIG. **24**A).

A first gesture is detected on the touch screen on a settings icon (e.g., **2402**, FIG. **24**A) on the first widget. In some embodiments, the first gesture is a tap gesture by a finger of the user.

In response to the first gesture, settings are displayed that are adjustable by a user for a plurality of widgets, including settings for the first widget (e.g., FIG. **24**B). In some embodiments, in response to the first gesture, an animated transition from the first widget to the settings for the plurality of widgets is displayed. In some embodiments, the plurality of widgets provide weather information for a corresponding plurality of locations.

One or more additional gestures to change one or more settings for one or more widgets in the plurality of widgets are detected.

In response to the one or more additional gestures, one or more settings for one or more widgets in the plurality of widgets are changed, including changing one or more settings for a respective widget in the plurality of widgets other than the first widget.

A widget selection gesture and a finishing gesture are detected on the touch screen display. In some embodiments, the finishing gesture is a tap gesture on a finish icon (e.g., icon **2410**, FIG. **24**B). In some embodiments, the finish icon is a "done" icon, an "okay" icon, or a "save" icon. In some embodiments, the widget selection gesture and the finishing gesture are a single combined gesture. In some embodiments, the single combined gesture is a double tap gesture.

In response to the widget selection gesture and the finishing gesture, a second widget in the plurality of widgets other than the first widget is displayed (e.g., Cupertino weather widget, FIG. **24**E).

A graphical user interface on a portable multifunction device with a touch screen display comprises a plurality of widgets, wherein at most one widget is shown on the touch screen at any one time, and settings for the plurality of widgets. In response to a first gesture on a settings icon on a first widget in the plurality of widgets, settings that are adjustable by a user for the plurality of widgets are displayed, including settings for the first widget. In response to one or more additional gestures, one or more settings for one or more widgets in the plurality of widgets, including one or more settings for a respective widget in the plurality of widgets other than the first widget, are changed. In response to a widget selection gesture and a finishing gesture, the changed settings are saved and a second widget in the plurality of widgets other than the first widget is displayed.

In some embodiments, for weather and other applications with a location-based component, the device may automatically provide current location information (e.g., determined by GPS module **135**) to the application. Thus, in some embodiments, the weather widget may provide the weather information for the current location of the device, without the user having to explicitly input the name or zip code of the current location. Similarly, current location information may be automatically provided to widgets and other applications for finding and/or interacting with stores, restaurants, maps, and the like near the current location of the device.

Additional description of configuring and displaying widgets can be found in U.S. Provisional Patent Application No. 60/946,975, "Portable Multifunction Device, Method, and Graphical User Interface for Configuring and Displaying Widgets," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/850,010, "Portable Multifunction Device, Method, and Graphical User Interface for Configuring and Displaying Widgets," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

Stocks

FIGS. **25**A-**25**E illustrate an exemplary user interface for displaying and managing a stocks widget in accordance with some embodiments.

In some embodiments, stocks widget **149-2** displays information for a number of user-selected stocks (e.g., UI **2500**A, FIG. **25**A). In some embodiments, in response to a user gesture, the information displayed is changed. For example, in response to the user touching **2504** the column with absolute gains and losses (UI **2500**A, FIG. **25**A), the percentage gains and losses may be displayed instead (UI **2500**B, FIG. **25**B). For example, in response to the user touching "1 w", the one-week chart for the highlighted stock (INDU) may be displayed (not shown) instead of the six-month chart ("6 m").

In some embodiments, in response to the user activating settings icon **2502** (e.g., by a finger tap on the icon), the settings UI for the stocks widget is displayed (e.g., UI **2500**C, FIG. **25**C).

In some embodiments, in response to the user's finger contacting **2506** a text entry box, a keyboard (e.g., **616**) is displayed (UI **2500**D, FIG. **25**D). In some embodiments, a word suggestion area **622** is also displayed. In response to the user entering the symbol or name of the new stock and activating the add stock icon **2508**, the new stock is added to the list of stocks.

In some embodiments, the highlighted stock in the list of stocks **2510** is removed if the user activates the remove icon **2512** (e.g., by a finger tap on the icon). In some embodiments, in response to the user activating the done icon **2514**, the device displays the stock information for the selected stocks (e.g., UI **2500**A, FIG. **25**A).

Telephone

FIGS. **26**A-**26**P illustrate an exemplary user interface for displaying and managing contacts in accordance with some embodiments.

In some embodiments, in response to the user activating phone icon **138** in UI **400** (FIG. **4**) (e.g., by a finger tap on the icon), the user's contact list is displayed (e.g., UI **2600**A, FIG. **26**A).

As described in U.S. patent application Ser. No. 11/322,547, "Scrolling List With Floating Adjacent Index Symbols," filed Dec. 23, 2005, which is hereby incorporated by reference in its entirety, the user may scroll through the contact list using vertically upward and/or vertically downward gestures **2602** on the touch screen.

In some embodiments, in response to the user activating add new contact icon **2604** (e.g., by a finger tap on the icon), the touch screen displays a user interface for editing the name of the contact (e.g., UI **2600**B, FIG. **26**B).

In some embodiments, in response to the user entering the contact name (e.g., entering "Ron Smith" via keyboard **616** in UI **2600**C, FIG. **26**C) and activating the save icon **2606** (e.g., by a finger tap on the icon), the contacts module creates and displays a new entry for the contact (e.g., UI **2600**D, FIG. **26**D).

In some embodiments, in response to the user activating add photo icon **2607** (e.g., by a finger tap on the icon), the touch screen displays a user interface for adding a photograph or other image to the contact (e.g., UI **2600**E, FIG. **26**E). In response to the user activating take photo icon **2670** (e.g., by a finger tap on the icon), the camera **143** is activated, and a photograph is taken and associated with the contact (e.g., using a process like that described with respect to FIG. **19**B above). In response to the user activating the choose existing photo icon **2672** (e.g., by a finger tap on the icon), the photo management application **144** is activated, and a photograph is selected, adjusted, and associated with the contact. In response to the user activating the cancel icon **2674** (e.g., by a finger tap on the icon), the process of associating a photograph or other image with the contact is stopped.

In some embodiments, in response to the user activating add new phone icon **2608** (e.g., by a finger tap on the icon or on the row containing the icon), the touch screen displays a user interface for editing the phone number(s) of the contact (e.g., UI **2600**F, FIG. **26**F). In some embodiments, a keypad selection key (e.g., the "+*#" key in FIG. **26**F) is used to toggle the UI to UI **2600**P (FIG. **26**P) so that the user may enter other symbols or a pause in the phone number. In some embodiments, a second keypad selection key (e.g., the "123" key in FIG. **26**P) is used to toggle UI **2600**P back to the numeric keypad in the previous UI (e.g., UI **2600**F, FIG. **26**F).

In some embodiments, in response to the user entering the phone number (e.g., via keyboard **2676** in UI **2600**F, FIG. **26**F); specifying the type of phone number (e.g., by a tap or other predefined gesture on home icon **2620** or selection icon **2624**); and activating the save icon **2626** (FIG. **26**P) (e.g., by a finger tap on the icon), the contacts module creates a phone number for the corresponding contact.

In some embodiments, the user can select additional phone number types. For example, in response to the user activating selection icon **2624** (e.g., by a finger tap on the icon), the touch screen displays a phone label UI (e.g., UI **2600**G, FIG. **26**G). In some embodiments, in response to the user activating a label in UI **2600**G, the chosen label is displayed in place of home icon **2620** in UI **2600**F. In some embodiments, the chosen label is also highlighted in UI **2600**F to indicate to the user that the phone number being entered will be given the chosen label.

In some embodiments, the user can add custom phone labels to UI **2600**F by activating the add labels icon **2628** (FIG. **26**G) and entering the via label via a soft keyboard (e.g., **616**, not shown).

In some embodiments, the user can delete one or more of the labels in UI **2600**G. In some embodiments, only the user's custom labels may be deleted. For example, in response to the user activating the edit icon **2630** (e.g., by a finger tap on the icon), the touch screen displays a delete icon **2632** next to the labels that may be deleted (e.g., UI **2600**H, FIG. **26**H). If a user activates a delete icon (e.g., by tapping it with a finger), the icon may rotate 90 degrees (e.g., **2634**, FIG. **26**I) or otherwise change its appearance and/or a second icon may appear (e.g., remove/confirm delete icon **2636**, FIG. **26**I). If the user activates the second icon, the contact module deletes the corresponding label. This deletion process is analogous to the process described above with respect to FIG. **7**. As noted above, a deletion process that requires multiple gestures by the user on different parts of the touch screen (e.g., delete icon **2634** and remove/confirm delete icon **2636** are on opposite sides of the touch screen in UI **2600**I) greatly reduces the chance that a user will accidentally delete a label or other similar item. The user activates the done icon **2638** (e.g., by tapping on it with a finger) when the user has finished deleting labels and the device returns to UI **2600**G.

In some embodiments, in response to the user activating add new email icon **2610** in UI **2600**D, FIG. **26**D (e.g., by a finger tap on the icon or on the row containing the icon), the touch screen displays a user interface for editing the email address(es) of the contact (e.g., UI **2600**J, FIG. **26**J). In some embodiments, the keyboard **2601** (FIG. **26**J) for entering an email address has no space bar (because email addresses do not contain spaces). Instead, the area in the keyboard that would typically contain a space bar contains an "@" key **2603**, a period key **2605**, and a ".com" key **2609**. Because all email addresses contain "@" and ".", and many email addresses include ".com", including these keys in keyboard **2601** makes entering email addresses faster and easier.

In some embodiments, in response to the user entering the email address (e.g., via keyboard **2601** in UI **2600**J, FIG. **26**J); specifying the type of email address (e.g., by a tap or other predefined gesture on home icon or selection icon **2646**); and activating the save icon **2648** (e.g., by a finger tap on the icon), the contacts module creates an email address for the corresponding contact.

In some embodiments, the user can select additional email address types by activating selection icon **2646**; add custom email address types, and/or delete email address types using processes and UIs analogous to those described for phone number types (FIGS. **26**G-**26**I).

In some embodiments, in response to the user activating add new URL icon **2611** in UI **2600**D, FIG. **26**D (e.g., by a finger tap on the icon or on the row containing the icon), the touch screen displays a user interface for editing the URLs of the contact (e.g., UI **2600**K, FIG. **26**K).

In some embodiments, in response to the user entering the URL (e.g., via keyboard **616** in UI **2600**K, FIG. **26**K); specifying the type of URL (e.g., by a tap or other predefined gesture on home page icon **2678** or selection icon **2680**); and activating the save icon **2648** (e.g., by a finger tap on the icon), the contacts module creates a URL for the corresponding contact.

In some embodiments, the user can select additional URL types by activating selection icon **2680**; add custom URL types, and/or delete URL types using processes and UIs analogous to those described for phone number types (FIGS. **26**G-**26**I).

In some embodiments, in response to the user activating add new address icon **2612** in UI **2600**D, FIG. **26**D (e.g., by a finger tap on the icon or on the row containing the icon), the touch screen displays a user interface for editing the physical address(es) of the contact (e.g., UI **2600**L, FIG. **26**L).

In some embodiments, in response to the user entering the address (e.g., via keyboard **616** in UI **2600**L, FIG. **26**L); specifying the type of address (e.g., by a tap or other predefined gesture on work icon **2652** or selection icon **2656**); and activating the save icon **2658** (e.g., by a finger tap on the icon), the contacts module creates an address for the corresponding contact. In some embodiments, in response to detecting a gesture on the zip code field **2654**, display of keyboard **616** is ceased and a numerical keyboard **624** (FIG. **6**C) is displayed, to allow the user to provide numerical input to the zip code field **2654**.

In some embodiments, the user can select additional address types by activating selection icon **2656**; add custom address types, and/or delete address types using processes and UIs analogous to those described for phone number types (FIGS. **26**G-**26**I).

FIG. **26**M, UI **2600**M, illustrates an exemplary user interface for an existing contact list entry in accordance with some embodiments. In response to the user selecting edit icon **2664** (e.g., by a finger tap on the icon), the touch screen displays a user interface for editing the contact (e.g., UI **2600**O, FIG. **26**O). In response to user selections, the contact list module may delete one or more items of existing contact information, add new phone numbers, add new email addresses, add new physical addresses, and/or add new URLs using the processes and UIs described above (e.g., FIGS. **26**E-**26**L).

In response to the user selecting text message icon **2682** in FIG. **26**M (e.g., by a finger tap on the icon), the touch screen displays a user interface (e.g., UI **2600**N, FIG. **26**N) for choosing a phone number associated with the contact for a text message or other instant message, such as the contact's work number **2686** or home number **2688**. In response to the user selecting one of the contact's phone numbers, the touch screen displays a UI for creating and sending a message to the selected phone number (e.g., UI **600**A in FIG. **6**A).

In response to the user selecting add to favorites icon **2684** in FIG. **26**M (e.g., by a finger tap on the icon), the contact is added to the list of favorites (e.g., UI **2700**A, FIG. **27**A)

FIGS. **27**A-**27**F illustrate an exemplary user interface for displaying and managing favorite contacts in accordance with some embodiments. UI **2700**A displays an exemplary list of favorites. In some embodiments, each row in the list that corresponds to a favorite includes the name **2702** of the favorite, the type of phone number **2704** for the favorite that will be called, and an additional information icon **2706**. In some embodiments, in response to the user activating icon **2706** for a particular favorite (e.g., by a finger tap on the icon), the touch screen displays the corresponding contact list entry for that favorite (e.g., UI **2600**M, FIG. **26**M). In some embodiments, in response to a user tap or other predefined gesture elsewhere (i.e., a tap or gesture other than on icon **2702**) in the row corresponding to a particular favorite, the phone module dials the corresponding phone number **2704** for that particular favorite.

In some embodiments, in response to the user activating add favorite icon **2708** (e.g., by a finger tap on the icon), the device displays the user's contact list, from which the user selects the contact list entry for a new favorite and a phone number in the entry for the new favorite.

In some embodiments, in response to the user activating the edit icon **2710** (e.g., by a finger tap on the icon), the touch screen displays a delete icon **2712** and/or a moving-affordance icon **2720** next to the favorites (e.g., UI **2700**B, FIG. **27**B).

If a user activates a delete icon (e.g., by tapping it with a finger), the icon may rotate 90 degrees (e.g., **2714**, FIG. **27**C) or otherwise change its appearance and/or a second icon may appear (e.g., remove/confirm delete icon **2716**, FIG. **27**C). If the user activates the second icon, the corresponding favorite is deleted. This deletion process is analogous to the process described above with respect to FIGS. **7** and **26**H and **26**I. As noted above, a deletion process that requires multiple gestures by the user on different parts of the touch screen (e.g., delete icon **2714** and remove/confirm delete icon **2716** are on opposite sides of the touch screen in UI **2700**C) greatly reduces the chance that a user will accidentally delete a favorite or other similar item. The user activates the done icon **2718** (e.g., by tapping on it with a finger) when the user has finished deleting favorites and the device returns to UI **2700**A.

If a user activates a moving-affordance icon **2720** icon (e.g., by contacting it with a finger **2722**), the corresponding favorite may be repositioned in the list of favorites, as illustrated in FIGS. **27**D-**27**F. The user activates the done icon **2718** (e.g., by tapping on it with a finger) when the user has finished reordering the favorites and the device returns to UI **2700**A.

Additional description of the reordering of user-configurable lists can be found in U.S. Provisional Patent Application No. 60/883,808, "System And Method For Managing Lists," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/770,725, "System and Method for Managing Lists," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIGS. **28**A-**28**D illustrate an exemplary user interface for displaying and managing recent calls in accordance with some embodiments.

In some embodiments, in response to the user activating All icon **2810**, the touch screen displays a list of all recent calls (e.g., UI **2800**A, FIG. **28**A). In some embodiments, in response to the user activating Missed icon **2812**, the touch screen displays a list of recent missed calls (e.g., UI **2800**B, FIG. **28**B).

In some embodiments, each row in a list corresponds to a call or a consecutive sequence of calls involving the same person or the same number (without an intervening call involving another person or another phone number). In some embodiments, each row includes: the name **2802** of the other party (if available via the contact module) or the phone number (if the name of the other party is not available); the number **2804** of consecutive calls; the date and/or time **2806** of the last call; and an additional information icon **2808**. In some embodiments, in response to the user activating icon **2808** for a particular row (e.g., by a finger tap on the icon), the touch screen displays the corresponding contact list entry for the other party (e.g., UI **2800**C, FIG. **28**C) or UI **2800**D (FIG. **28**D) if the phone number cannot be associated with an entry in the user's contact list. In some embodiments, in response to a user tap or other predefined gesture elsewhere (i.e., a tap or gesture other than on icon **2808**) in a given row, the phone module dials the corresponding phone number for that row.

In some embodiments, some rows may include icons indicating whether the last call associated with the row was missed or answered.

If the list of recent calls fills more than the screen area, the user may scroll through the list using vertically upward and/or vertically downward gestures **2814** on the touch screen.

In some embodiments, UI **2800**C highlights (e.g., with color, shading, and/or bolding) the phone number associated with the recent call (e.g., the two recent incoming calls from Bruce Walker in UI **2800**A came from Bruce Walker's work number **2816**). In some embodiments, in response to a user tap or other predefined gesture on the highlighted number **2816**, the phone module dials the highlighted number (e.g., **2816**). In some embodiments, in response to a user tap or other predefined gesture on another number in the contact list entry (e.g., home number **2818**), the phone module dials the corresponding number. In some embodiments, in response to a user tap or other predefined gesture on an email address in the contact list entry (e.g., either work email **2820** or home email **2822**), the email module prepares an email message with the selected email address, ready for text input by the user. Thus, by selecting icon **2808** (FIG. **28**A), the user may then easily respond to a caller using the same number involved in the previous call (e.g., **2816**), another number associated with the same caller (e.g., **2818**), or another mode of communication besides the phone (e.g., an email to the caller's work **2820** or home **2822** email address).

In some embodiments, UI **2800**D provides one or more options for a user to make use of a phone number in a recent call that is not associated with an entry in the user's contact list. In some embodiments, in response to a tap or other predefined user gesture, the device may: call the phone number (e.g., if the gesture is applied to icon **2824**); initiate creation of a text message or other instant message to the phone number (e.g., if the gesture is applied to icon **2825**); create a new contact with the phone number (e.g., if the gesture is applied to icon **2826**); or add the phone number to an existing contact (e.g., if the gesture is applied to icon **2828**).

In some embodiments, in response to detecting a gesture on the clear icon **2832** (e.g., a single finger tap on the icon **2832**), one or more recent calls selected by the user are deleted from the list of recent calls.

Additional description of missed call management can be found in U.S. Provisional Patent Application No. 60/883,782, "Telephone Call Management For A Portable Multifunction Device," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/769,694, "Missed Telephone Call Management for a Portable Multifunction Device," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIG. **29** illustrates an exemplary dial pad interface for calling in accordance with some embodiments. In response to the user activating the number keys in dial pad **2902** (e.g., by finger taps on the number icons), the touch pad displays the selected digits **2904**. In some embodiments, the phone module automatically adds the parentheses and dashes to the selected digits to make the number easier to read. In response to the user activating the call icon **2906**, the phone module dials or transmits the selected digits. In response to the user activating the create contact icon **2908**, numbers entered with the touchpad may be used in a new contact or added to an existing contact.

In some embodiments, the device performs location-based dialing, which simplifies dialing when the user is located outside his/her home country and/or is trying to dial a destination number outside his/her home country.

Additional description of location-based dialing can be found in U.S. Provisional Patent Application No. 60/883,800, "Method, Device, And Graphical User Interface For Location-Based Dialing," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/769,692, "Method, Device, and Graphical User Interface for Location-Based Dialing," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIGS. **30**A-**30**R illustrate exemplary user interfaces displayed during a call in accordance with some embodiments. In some embodiments, a UI indicates that a call is being attempted **3002** (UI **3000**A, FIG. **30**A) and then indicates the connection time **3004** after the connection is made (UI **3000**B, FIG. **30**B).

In some embodiments, in response to a tap or other predefined user gesture, the device may: mute the call (e.g., if the gesture is applied to icon **3006**); place the call on hold (e.g., if the gesture is applied to icon **3008**); swap between two calls, placing one call on hold to continue another call (e.g., if the gesture is applied to icon **3009** in FIG. **30**E); place the call on a speaker (e.g., if the gesture is applied to icon **3010**); add a call (e.g., if the gesture is applied to icon **3018**); display a numeric keypad for number entry (e.g., if the gesture is applied to icon **3016**, UI **3000**N in FIG. **30**N is displayed); display the user's contact list (e.g., if the gesture is applied to icon **3020**); or end the call (e.g., if the gesture is applied to icon **3014**).

In some embodiments, if the device receives an incoming call while the user is on another call (e.g., with someone at (650) 132-2234 in FIG. **30**B), then an incoming call UI is displayed, such as UI **3000**C (FIG. **30**C) for a known caller (e.g., Arlene Brown **3024**, an entry in the user's contact list) or UI **3000**K (FIG. **30**K) for an unknown caller. In some embodiments, the incoming call UI includes icons which, when activated by a user tap or other gesture, cause the device to: (1) terminate the incoming call or send the caller to voice mail (e.g., ignore icon **3026**); (2) place the current call on hold and answer the incoming call (e.g., hold+answer icon **3028**); and/or (3) end the current call and answer the incoming call (e.g., end+answer icon **3030**).

In this example, in response to activation of the end+answer icon **3030** (e.g., by a finger tap on the icon), the call with (650) 132-2234 is ended, the call from Arlene Bascom is answered, and phone call UI **3000**D (FIG. **30**D) is displayed, which includes information **3031** identifying the caller (Arlene Bascom).

In this example, in response to activation of the hold+answer icon **3028** (e.g., by a finger tap on the icon), the call with (650) 132-2234 is put on hold, the call from Arlene Bascom is answered, and phone call UI **3000**E (FIG. **30**E) is displayed, which includes information **3034** identifying the caller (Arlene Bascom) and information **3032** indicating that the other call is suspended. In some embodiments, in response to a user gesture on the information **3032** indicating that the other call is on hold (e.g., a finger tap **3036**) or in response to a user gesture on the swap icon **3009**, the active call is suspended, the suspended call is made active, and phone call UI **3000**F is displayed, which includes information **3033** and **3035** indicating the status of the two calls.

In some embodiments, if the merge icon **3038** (FIG. **30**E or **30**F) is activated (e.g., by a finger tap **3040** on the icon), the active call and the call on hold are merged into a conference call and a conference call UI is displayed (e.g., UI **3000**G, FIG. **30**G). The conference call UI includes information **3042** about the conference call and a conference call management icon **3044**.

In some embodiments, in response to activation of the conference call management icon **3044** (e.g., by a finger tap **3046** on the icon), a conference call management UI is displayed (e.g., UI **3000**H, FIG. **30**H), which includes an end call icon **3050** and a private call icon **3056** for each entry in the management UI. In some embodiments, in response to activation of the end call icon **3050** (e.g., by a finger tap **3052** on the icon), a confirmation icon is displayed (e.g., end call icon **3062**, FIG. **30**I) to prevent accidental deletion of a party to the conference call.

In some embodiments, in response to activation of the private call icon **3056** (e.g., by a finger tap **3058** on the icon), the conference call is suspended and a phone call UI is displayed (e.g., UI **3000**J, FIG. **30**J), which includes information **3033** about the private call and information **3035** about the suspended conference call. In this example, because only one other party in the conference call is on hold (Arlene Bascom in this example), the information **3035** about the suspended conference call is just information about the one party on hold. In some embodiments, if more than one party in the conference call is put on hold, then the information **3035** about the suspended conference call may be less specific, such as “conference on hold” or the like (e.g., information **3068** in UI **3000**M, FIG. **30**M).

If an incoming call is not from a caller known to the user (e.g. the phone number is not in the user’s contact list), then an incoming call UI such as UI **3000**K (FIG. **30**K) is displayed, rather than an incoming call UI such as UI **3000**C (FIG. **30**C) with the caller’s name **3024** and/or associated image **3022**.

In some embodiments, in response to activation of the add call icon **3018** (e.g., by a finger tap on the icon in FIG. **30**B, **30**D, or **30**G), the user’s contact list is displayed (UI **3000**O, FIG. **30**O), which typically includes a plurality of entries that correspond to a plurality of third parties. In some embodiments, in response to activation of an entry of a third party in the contact list (e.g., by a finger tap on the entry), an outgoing phone call is initiated to the third party if there is only one phone number associated with the entry. If there is more than one phone number associated with the entry, these numbers are displayed (e.g., UI **3000**P, FIG. **30**P displays two phone numbers associated with one entry for Bruce Walker). In response to user selection of one of these numbers (e.g., by a finger tap on the desired number for the third party), an outgoing phone call is initiated. In some embodiments, in response to activation of an entry of a third party in the contact list (e.g., by a finger tap on the entry), the information for the corresponding entry is displayed independent of the number of phone numbers associated with the entry and, in response to user selection of a phone number in the entry, an outgoing phone call is initiated to the third party.

In some embodiments, in response to activation of the keypad icon **3016** (e.g., by a finger tap on the icon), a keypad UI for entering digits during a call is displayed (e.g., UI **3000**N, FIG. **30**N), which includes a dial pad **2902**, a hide keypad icon **3074**, and an end call icon **3071**. In some embodiments, in response to activation of icon **3074** (e.g., by a finger tap or other gesture on the icon), the UI that was being displayed immediately prior to the display of the keypad UI is displayed again.

Creating a Conference Call from Two Existing Calls

In some embodiments, the device **100** displays a phone call user interface (e.g., UI **3000**E, FIG. **30**E) on the touch screen display. The phone call user interface includes a first informational item associated with an active phone call between a user of the device and a first party (e.g., **3034**), a second informational item associated with a suspended phone call between the user and a second party (e.g., **3032**), and a merge call icon (e.g., **3038**).

Upon detecting a user selection of the merge call icon, (1) the active phone call and the suspended phone call are merged into a conference call between the user, the first party, and the second party; and (2) the phone call user interface is replaced with a conference call user interface (e.g., UI **3000**G, FIG. **30**G). The conference call user interface includes: a third informational item associated with the conference call (e.g., **3042**) in replacement of the first and second informational items, and a conference call management icon (e.g., **3044**).

Managing a Conference Call

In some embodiments, upon detecting a user selection (e.g., gesture **3046**) of the conference call management icon **3044**, the conference call user interface (e.g., UI **3000**G) is replaced with a conference call management user interface (e.g., UI **3000**H, FIG. **30**H). The conference call management user interface includes a first management entry corresponding to the first party (e.g., **3060**) and a second management entry corresponding to the second party (e.g., **3054**), each management entry including an end call icon (e.g., **3050**) and a private call icon (e.g., **3056**), and a back (or previous screen) icon (e.g., **3048**). If additional parties were also participating in the conference call (e.g., by a user adding caller(s) and then merging the added caller(s)), then management entries for these additional parties would also appear in the conference call management user interface (e.g., UI **3000**H, FIG. **30**H).

In some embodiments, upon detecting a user selection (e.g., gesture **3052**) of the end call icon in the first management entry, a confirmation icon (e.g., **3062**, FIG. **3000**I) is displayed on the touch screen display. Upon detecting a user selection of the confirmation icon, the first party is excluded from the conference call; and the first management entry is removed from the touch screen display.

In some embodiments, upon detecting a user selection (e.g., gesture **3058**) of the private call icon in the second management entry, the conference call is suspended and the conference call management user interface is replaced with the phone call user interface (e.g., UI **3000**J, FIG. **30**J). The phone call user interface includes a fourth informational item associated with a suspended phone call between the user and the first party (e.g., **3035**), a fifth informational item associated with an active phone call between the user and the second party (e.g., **3033**), and the merge call icon (e.g., **3038**).

In some embodiments, the conference call is resumed upon detecting a second user selection of the merge call icon; and the phone call user interface (e.g., UI **3000**J, FIG. **30**J), including the fourth and fifth informational items, is replaced with the conference call user interface (e.g., UI **3000**G, FIG. **30**G).

Receive an Incoming Call During a Conference Call

In some embodiments, upon detecting an incoming phone call from a third party, the conference call user interface or the conference call management user interface (i.e., whichever interface is being displayed when the incoming call is detected) is replaced with an incoming phone call user interface (e.g., UI **3000**C, FIG. **30**C for a known caller or UI **3000**K, FIG. **30**K for an unknown caller). The incoming phone call user interface includes an ignore incoming phone call icon (e.g., **3026**), a suspend current phone call and answer incoming phone call icon (e.g., **3028**), and an end current phone call and answer incoming phone call icon (e.g., **3030**).

In some embodiments, upon detecting a user selection of the ignore incoming phone call icon (e.g., **3026**), the incoming phone call from the third party is terminated or sent to voice mail; the conference call with the first and second parties is continued; and the incoming phone call user interface is replaced with the conference call user interface or the conference call management user interface (i.e., whichever interface was being displayed when the incoming call was detected).

In some embodiments, upon detecting a user selection of the end current phone call and answer incoming phone call icon (e.g., **3030**), the conference call with the first and second parties is terminated; a phone call between the user and the third party is activated; and the incoming phone call user interface is replaced with a phone call user interface (e.g., UI **3000**L, FIG. **30**L). The phone call user interface includes a sixth informational item associated with the phone call between the user and the third party (e.g., **3066**).

In some embodiments, upon detecting a user selection of the suspend current phone call and answer incoming phone call icon (e.g., **3028**), the conference call with the first and second parties is suspended; a phone call between the user and the third party is activated; and the incoming phone call user interface is replaced with a phone call user interface (e.g., UI **3000**M, FIG. **30**M). The phone call user interface includes a sixth informational item associated with the phone call between the user and the third party (e.g., **3066**), a seventh informational item associated with the suspended conference call between the user and the first and second parties (e.g., **3068**), and a merge call icon (e.g., **3038**).

In some embodiments, upon detecting a user selection of the suspend current phone call and answer incoming phone call icon, a phone call between the user and the third party is activated and the incoming phone call user interface is replaced with a phone call user interface (e.g., UI **3000**M, FIG. **30**M). The phone call user interface includes a sixth informational item associated with the phone call between the user and the third party (e.g., **3066**), a seventh informational item associated with the suspended conference call between the user and the first and second parties (e.g., **3068**), and a merge call icon (e.g., **3038**).

Adding a Caller During a Conference Call

In some embodiments, the conference call user interface includes an add caller icon (e.g., **3018**, FIG. **30**G). Upon detecting a user selection of the add caller icon, the conference call with the first and second parties is suspended and a contact list is displayed (e.g., UI **3000**O, FIG. **30**O).

An outgoing phone call is initiated to a third party using a phone number from an entry in the contact list or a phone number input by a user (e.g., using dial pad **2902**, FIG. **29**).

Upon detecting an acceptance of the outgoing phone call, a phone call user interface is displayed (e.g., UI **3000**M, FIG. **30**M, where (987) 654-3210 now corresponds to an outbound call rather than an inbound call) that includes an eighth informational item associated with the suspended conference call (e.g., **3068**), a ninth informational item associated with the outgoing phone call between the user and the third party (e.g., **3066**), and a merge call icon (e.g., **3038**).

Upon detecting a user selection of the merge call icon, (1) the outgoing phone call between the user and the third party and the suspended conference call are merged into a conference call between the user, the first party, the second party, and the third party; and (2) the phone call user interface is replaced with a conference call user interface (e.g., UI **3000**G, FIG. **30**G).

Additional description of conference calling can be found in U.S. Provisional Patent Application No. 60/947,133, "Portable Multifunction Device, Method, and Graphical User Interface for Conference Calling," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,673, "Portable Multifunction Device, Method, and Graphical User Interface for Conference Calling," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

In some embodiments, the multifunction device **100** permits a user to conduct a phone call while simultaneously using other functions of the device in an intuitive manner. In some embodiments, in response to activation of a menu icon or button (e.g., home **204**, FIG. **4**A) while a user is on a phone call, a menu of application icons is displayed on the touch screen. In some embodiments, an icon for the phone application (e.g., **3076**, FIG. **30**Q) is highlighted (or otherwise changed in appearance as compared to when the phone application is not in use) to indicate that the phone application is in use. In response to activation of an application icon in the menu other than the phone application icon (e.g., by a finger tap or other gesture on the application icon), the corresponding application is displayed along with a switch application icon (e.g., the "press here to return to call" icon **3078**, FIG. **30**R). The user may operate the other non-phone application in essentially the same manner as when the phone application is not simultaneously being used. However, in response to activation of the switch application icon (e.g., by a finger tap on icon **3078** in FIG. **30**R), the device displays the phone application.

Additional description of application switching can be found in U.S. Provisional Patent Application No. 60/883,809, "Portable Electronic Device Supporting Application Switching," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/969,908, "Portable Electronic Device Supporting Application Switching," filed Jan. 6, 2008, the content of which is hereby incorporated by reference in its entirety.

FIGS. **31**A and **31**B illustrate an exemplary user interface displayed during an incoming call in accordance with some embodiments.

In some embodiments, if the incoming call is from a phone number that is associated with a person or other entry in the user's contact list, then the touch screen may display: the name **3102** of the person or entry; a graphic **3104** associated with the person or entry; a Decline icon **3106** that when activated (e.g., by a finger tap on the icon) causes the phone module to decline the call and/or initiate voicemail for the call; and an answer icon **3108** that when activated (e.g., by a finger tap on the icon) causes the phone module to answer the call (e.g., UI **3100**A, FIG. **31**A).

In some embodiments, if the incoming call is from a phone number that is not associated with a person or other entry in the user's contact list, then the touch screen may display: the phone number of the other party **3110**; a Decline icon **3106** that when activated (e.g., by a finger tap on the icon) causes the phone module to decline the call and/or initiate voicemail for the call; and an answer icon **3108** that when activated (e.g., by a finger tap on the icon) causes the phone module to answer the call (e.g., UI **310**B, FIG. **31**B).

In some embodiments, the device pauses some other applications (e.g., the music player **146**, video player, and/or slide show) when there is an incoming call; displays UI **3100**A or UI **3100**B prior to the call being answered; displays user interfaces like UI **3000**B (FIG. **30**B) during the call; and terminates the pause on the other applications if the incoming call is declined or the call ends. In some embodiments, there is a smooth transition into and out of a pause (e.g., a smooth lowering and raising of the sound volume for the music player).

Additional description of user interfaces for handling incoming calls can be found in U.S. Provisional Patent Application No. 60/883,783, "Incoming Telephone Call Management For A Portable Multifunction Device," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/769,695, "Incoming Telephone Call Management For A Portable Multifunction Device," filed Jun. 27, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIGS. **32**A-**32**H illustrate exemplary user interfaces for voicemail in accordance with some embodiments. In some embodiments, user interfaces **3200**A-**3200**D include the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- backup icon **3202** that when activated (e.g., by a finger tap on the icon) initiates a process that backs up and replays the preceding few seconds of the voicemail message;
- Progress bar **3204** that indicates what fraction of a voicemail message has been played and that may be used to help scroll through the message in response to a user gesture **3206**;
- Speed up icon **3208** that when activated (e.g., by a finger tap on the icon) initiates a process that speeds up playback of the voicemail message, which may also adjust the sound frequency or pitch of the fast playback so that the words, although spoken quickly, are still easy to understand;
- Names **3210** of the people (associated with incoming phone numbers via the user's contact list) who have left voicemail messages (e.g., Aaron Jones **3210-1**) or the phone number if the person's name is not available (e.g., 408-246-8101 **3210-2**);
- Date **3212** and/or time of the voicemail;
- Additional information icon **3214** that when activated (e.g., by a finger tap on the icon) initiates transition to the corresponding contact list entry (e.g., UI **2800**C, FIG. **28**C) or to a UI for unknown phone numbers (e.g., UI **2800**D, FIG. **28**D);
- Speaker icon **3216** that when activated (e.g., by a finger tap on the icon) initiates playback of the voicemail through a speaker;
- Options icon **3218** that when activated (e.g., by a finger tap on the icon) initiates display of a menu of additional voicemail options;
- Pause icon **3220** that when activated (e.g., by a finger tap on the icon) initiates pausing of the voicemail, which may be displayed apart from individual messages (FIG. **32**A) or adjacent to a selected message (FIG. **32**C);
- Delete symbol icon **3222** that when activated (e.g., by a finger tap on the icon) initiates display of a UI to confirm that the user wants to delete the corresponding voicemail (e.g. UI **3200**B, FIG. **32**B or UI **3200**D, FIG. **32**D).
- Cancel icon **3226** that when activated (e.g., by a finger tap on the icon) changes the display from UI **3200**B to UI **3200**A (or from UI **3200**D to UI **3200**C) without deleting the corresponding voicemail;
- Confirm delete icon **3228** that when activated (e.g., by a finger tap on the icon) deletes the corresponding voicemail and changes the display from UI **3200**B to UI **3200**A (or from UI **3200**D to UI **3200**C);
- Play icon **3230** that when activated (e.g., by a finger tap on the icon) initiates or continues playback of the voicemail, which may be displayed apart from individual messages (FIG. **32**B) or adjacent to a selected message (FIG. **32**C);
- Not heard icon **3232** that indicates that the corresponding voicemail has not been heard;
- Downloading icon **3234** that indicates that the corresponding voicemail is being downloaded to the device **100**; and
- Call icon **3240** that when activated (e.g., by a finger tap on the icon) initiates a call to the phone number associated with the selected voicemail.

If the list of voicemail messages fills more than the screen area, the user may scroll through the list using vertically upward and/or vertically downward gestures **3224** on the touch screen.

In some embodiments, a vertical bar **3260** (FIG. **32**C), analogous to the vertical bars described above, is displayed on top of the list of voicemails that helps a user understand what portion of the list is being displayed.

In some embodiments, in response to a user tap or other predefined gesture in the row corresponding to a particular voicemail (but other than a tap or gesture on icon **3214**), the phone module initiates playback of the corresponding voicemail. Thus, there is random access to the voicemails and the voicemails may be heard in any order.

In some embodiments, in response to a user gesture, the playback position in the voicemail can be modified. For example, in response to the user's finger touching **3206** at or near the end of the progress bar and then sliding along the progress bar, the playback position may be altered to correspond to the position of the user's finger along the progress bar. This user gesture on the progress bar (which is analogous to the gesture **2316** in UI **2300**B for the video player, which also creates an interactive progress bar) makes it easy for a user to skip to and/or replay portions of interest in the voicemail message.

In some embodiments, user interfaces **3200**E-**3200**H for setting up voicemail include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, and **2902** as described above;
- instructions **3242** that assist the user in the setup process;
- initiation icon **3244** that when activated (e.g., by a finger tap on the icon) initiates the set up process;
- password set up icon **3246** that when activated (e.g., by a finger tap on the icon) displays a key pad **2902** for entering a voicemail password in input field **3249**;
- greeting set up icon **3248** that when activated (e.g., by a finger tap on the icon) displays icons (e.g., **3250**, **3252**, **3254**, and **3256**) for creating a voice mail greeting;
- record icon **3250** that when activated (e.g., by a finger tap on the icon) initiates recording of the voicemail greeting;
- play icon **3252** that when activated (e.g., by a finger tap on the icon) initiates playback of the voicemail greeting;
- speaker icon **3254** that when activated (e.g., by a finger tap on the icon) initiates playback of the voicemail greeting through a speaker;

reset icon **3256** that when activated (e.g., by a finger tap on the icon) initiates resetting of the voicemail greeting (e.g., to a default system greeting, rather than a user-created greeting); and

stop icon **3258** that when activated (e.g., by a finger tap on the icon) initiates stopping the playback of the voicemail greeting.

User interfaces **3200**E-**3200**H provide visual cues that make it easy for a user to setup voicemail.

In some embodiments, a portable multifunction device (e.g., device **100**) displays a voicemail setup user interface on a touch screen display (e.g., display **112**). The user interface includes a password setup icon (e.g., icon **3246**, FIG. **32**F) and a greeting setup icon (e.g., icon **3248**, FIG. **32**F).

A user selection of the password setup icon is detected. Upon detecting user selection of the password setup icon **3246**, an input field (e.g., **3249**) and a key pad (e.g., **2902**) are displayed. In some embodiments, one or more copies of a predefined character are added in the input field in response to a finger contact with the key pad.

A user selection of the greeting setup icon is detected. Upon detecting user selection of the greeting setup icon, a record icon (e.g., icon **3250**, FIG. **32**G), a play icon (e.g., icon **3252**), and a reset icon (e.g., icon **3256**) are displayed.

In some embodiments, in response to detection of a selection of the record icon, recording of an audio stream is started and the play icon is replaced with a stop icon (e.g., icon **3258**, FIG. **32**H). In response to detection of a selection of the stop icon, recording of the audio stream is stopped and the stop icon is replaced with the play icon. In some embodiments, in response to detection of a selection of the play icon, the recorded audio stream is played and the play icon is replaced with the stop icon. In response to detection of a selection of the stop icon, playing of the recorded audio stream is stopped and the stop icon is replaced with the play icon.

In some embodiments, in response to detection of a selection of the reset icon, a default message is assigned. In response to detection of a selection of the play icon, the default message is played and the play icon is replaced with the stop icon. In response to detection of a selection of the stop icon, playing of the default message is stopped and the stop icon is replaced with the play icon. In some embodiments, the default message includes a telephone number associated with the portable multifunction device. In some embodiments, the default message comprises a synthesized audio stream.

Additional description of the voicemail system can be found in U.S. Provisional Patent Application No. 60/883,799, "Voicemail Manager For Portable Multifunction Device," filed Jan. 7, 2007; U.S. patent application Ser. No. 11/770,720, "Voicemail Manager for Portable Multifunction Device," filed Jun. 28, 2007; and 60/947,348, "Voicemail Set-Up on a Portable Multifunction Device," filed Jun. 29, 2007; and U.S. patent application Ser. No. 11/961,716, "Voicemail Set-Up on a Portable Multifunction Device," filed Dec. 20, 2007, the contents of which are hereby incorporated by reference in their entirety.

Email

FIG. **33** illustrates an exemplary user interface for organizing and managing email in accordance with some embodiments. In some embodiments, user interface **3300** includes the following elements, or a subset or superset thereof:

402, **404**, and **406**, as described above;

a set of mailboxes, such as inbox **3302**, which may be organized in rows with a selection icon **3306** for each row;

an unread messages icon **3304** that indicates the number of unread messages;

a settings icon **3308** that when activated (e.g., by a finger tap on the icon) initiates display of a UI to input mailbox settings (e.g. UI **3600**, FIG. **36**); and

a create email icon **3310** that when activated (e.g., by a finger tap on the icon) initiates display of a UI for creating a new email message (e.g. UI **3400**, FIG. **34**).

If the set of mailboxes fills more than the screen area, the user may scroll through the mailboxes using vertically upward and/or vertically downward gestures **3312** on the touch screen.

In some embodiments, a vertical bar, analogous to the vertical bars described above, is displayed on top of the list of mailboxes that helps a user understand what portion of the list is being displayed.

FIGS. **34**A-**34**C illustrate an exemplary user interface for creating emails in accordance with some embodiments.

In response to the user activating create email icon **3310** (FIG. **33**), the device displays UI **3400**A.

In some embodiments, if the user makes a tap or other predefined gesture on the subject line **3408** or in the body of the email **3412** (FIG. **34**A), a letter keyboard **616** appears and the user may input the subject and/or body text (FIG. **34**C). In some embodiments, to enter the email address, the user makes a tap or other predefined gesture on the To: line **3406** of the email; the user's contact list appears (e.g., FIG. **18**J); the user makes a tap or other predefined gesture on the desired recipient/contact; and the device places the corresponding email address in the email message (FIG. **34**C). If others need to be copied on the email, the user makes a tap or other predefined gesture on the CC: line **3407** of the email; the user's contact list appears (FIG. **18**J); the user makes a tap or other predefined gesture on the desired recipient/contact (e.g., tapping on Janet Walker in the contact list); and the device places the corresponding email address in the email message (FIG. **34**C).

In some embodiments, to enter the email address, the user makes a tap or other predefined gesture on the To: line **3406** of the email (FIG. **34**A). Add recipient icon **3422** appears, which when activated (e.g., by a finger tap on the icon **3422**) initiates the display of a scrollable list of contacts (e.g., **3426**, FIG. **34**B) that match the input, if any, in the To: field. For example, if the letter "B" is input, then contacts with either a first name or last name beginning with "B" are shown. If the letters "Br" are input in the To: field, then the list of contacts is narrowed to contacts with either a first name or last name beginning with "Br", and so on until one of the displayed contacts is selected (e.g., by a tap on a contact in the list **3426**). If others need to be copied on the email, the user makes a tap or other predefined gesture on the CC: line **3407** of the email and follows an analogous procedure to that used for inputting addresses in the To: field. In some embodiments, the scrollable list **3426** also includes names and/or email addresses that are in emails previously sent or received by the user, even if those names and/or email addresses are not in the user's contact list. In some embodiments, the order in which email addresses are displayed in the scrollable list **3426** is based on the amount of prior email messaging with each email address. In other words, for the names and/or email addresses that match the letters input by the user, the names and/or email addresses that have had more recent and/or more frequent email exchanges with the user are placed ahead of the names and/or email addresses that have had less recent and/or less frequent email exchanges with the user. In some embodiments, the order in which email addresses are displayed in the scrollable list **3426** is based on the amount of prior communications with a potential addressee for a plurality of communications modalities. For example, a potential addressee that is frequently in phone and/or instant message conversations with the user (in addition to email exchanges with the user) may be placed ahead of other potential addressees.

In some embodiments, a user can scroll through the list **3426** by applying a vertical swipe gesture **3428** to the area displaying the list **3426**. In some embodiments, a vertically downward gesture scrolls the list downward and a vertically upward gesture scrolls the list upward,

In some embodiments, a vertical bar **3430** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list **3426**). In some embodiments, the vertical bar **3430** has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **3430** has a vertical length that corresponds to the portion of the list being displayed.

In some embodiments, the user may also enter the email address using one or more keyboards (e.g., **616** and **624**, not shown).

The device sends the email message in response to the user activating the send icon **3404** (FIG. **34**C) (e.g., by a finger tap on the icon). Alternatively, if the user activates the cancel icon **3402**, the device may display a save draft icon (e.g., **1810**, FIG. **18**I) and a don't save (or delete message) icon (e.g., **1812**, FIG. **18**I). The device saves the draft if the user activates the save draft icon **1810**, e.g., in a drafts folder in email client **140** (FIG. **33**). The device deletes the draft if the user activates the don't save icon **1812**.

In some embodiments, in response to the user activating the attach icon **3410** (e.g., by a finger tap on the icon), the touch screen displays a UI for adding attachments (not shown).

FIGS. **35**A-**35**O illustrate exemplary user interfaces for displaying and managing an inbox in accordance with some embodiments. Analogous user interfaces may be used to display and manage the other mailboxes (e.g., drafts, sent, trash, personal, and/or work in UI **3300**). In some embodiments, user interfaces **3500**A-**3500**I include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, and **3310**, as described above;
- mailboxes icon **3502** that when activated (e.g., by a finger tap on the icon) initiates the display of mailbox UI **3300** (FIG. **33**);
- unread messages icon **3504** that displays the number of unread messages in the inbox;
- names **3506** of the senders of the email messages;
- subject lines **3508** for the email messages;
- dates **3510** of the email messages;
- unread message icons **3512** that indicate messages that have not been opened;
- preview pane separator **3518** that separates the list of messages from a preview of a selected message in the list;
- settings icon **3520** that when activated (e.g., by a finger tap on the icon) initiates the display of settings UI **3600** (FIG. **36**);
- move message icon **3522** that when activated (e.g., by a finger tap on the icon) initiates the display of move message UI **3800**A (FIG. **38**A);
- Delete symbol icon **3524** that when activated (e.g., by a finger tap on the icon) initiates display of a UI to confirm that the user wants to delete the selected email (e.g. UI **3500**E, FIG. **35**E);
- Reply/Forward icon **3526** that when activated (e.g., by a finger tap on the icon) initiates display of a UI to select how to reply or forward the selected email (e.g. UT **3500**F, FIG. **35**F or UI **3500**I, FIG. **35**I);
- Preview pane **3528** that displays a portion of the selected email message;
- Details icon **3530** that when activated (e.g., by a finger tap on the icon) initiates display of email addressing details (e.g., **3534-1**, FIG. **35**C or **3534-2** FIG. **35**L);
- Hide details icon **3531** (FIG. **35**L) that when activated (e.g., by a finger tap on the icon) ceases display of email addressing details (e.g., **3534-2** FIG. **35**K);
- Cancel icon **3540** (FIG. **35**E) that when activated (e.g., by a finger tap on the icon) returns the device to the previous user interface (e.g. UI **3500**D);
- Confirm delete icon **3542** (FIG. **35**E) that when activated (e.g., by a finger tap on the icon) deletes the selected email;
- Reply icon **3544** (FIG. **35**F) that when activated (e.g., by a finger tap on the icon) initiates creation of an email replying to the sender;
- Reply All icon **3546** (FIG. **35**F) that when activated (e.g., by a finger tap on the icon) initiates creation of an email replying to the sender and the other parties included in the selected email (e.g., by cc:);
- Forward icon **3548** (FIG. **35**F) that when activated (e.g., by a finger tap on the icon) initiates creation of an email to be forwarded;
- Show preview pane icon **3550** (FIG. **35**G) that when activated (e.g., by a finger tap on the icon) initiates display of preview pane **3528**;
- Don't show preview pane icon **3552** (FIG. **35**G) that when activated (e.g., by a finger tap on the icon) stops display of preview pane **3528**;
- Vertical bar **3554** (FIG. **35**H) for the list of email messages that helps a user understand what portion of the list of email messages is being displayed;
- Vertical bar **3556** (FIG. **35**H) for the email message in the preview pane that helps a user understand what portion of the message is being displayed;
- Horizontal bar **3558** (FIG. **35**H) for the email message in the preview pane that helps a user understand what portion of the message is being displayed;
- Refresh mailbox icon **3560** (FIG. **35**H) that when activated (e.g., by a finger tap on the icon) initiates downloading of new email messages, if any, from a remote server;
- Edit icon **3562** (FIG. **35**J) that when activated (e.g., by a finger tap on the icon) initiates display of a user interface for deleting emails (e.g., as described in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642, "Deletion Gestures On A Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety);
- text body lines **3564** (FIG. **35**J) for the email messages;
- Previous email message icon **3566** (FIG. **35**K) that when activated (e.g., by a finger tap on the icon) initiates display of the previous email message in the corresponding mailbox;
- Next email message icon **3568** (FIG. **35**K) that when activated (e.g., by a finger tap on the icon) initiates display of the next email message in the corresponding mailbox;
- Attachment icon **3570** (FIG. **35**K) that when activated (e.g., by a finger tap on the icon) initiates display of the corresponding attachment **3572**, either as part of the email message (e.g., activating **3570-1**, FIG. **35**K ini-

tiates display of **3572-1**, FIG. **35**L) or apart from the email message (e.g., activating **3570-3**, FIG. **35**M initiates display of **3572-3**, FIG. **35**N);

Attachment **3572** (FIG. **35**K) (e.g., a digital image, a PDF file, a word processing document, a presentation document, a spreadsheet, or other electronic document); and

Return to email message icon **3574** (FIG. **35**N) that when activated (e.g., by a finger tap on the icon) initiates display of the email message that included the attachment.

If the set of emails fill more than the screen area (or more than the screen area above the preview pane), the user may scroll through the emails using vertically upward and/or vertically downward gestures **3514** on the touch screen.

In some embodiments, vertical bar **3554** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the list of email messages). In some embodiments, the vertical bar **3554** has a vertical position on top of the displayed portion of the email list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar **3554** has a vertical length that corresponds to the portion of the email list being displayed. For example, in FIG. **35**H, the vertical position of the vertical bar **3554** indicates that the middle of the email list is being displayed and the vertical length of the vertical bar **3554** indicates that roughly one third of the e-mail list is being displayed.

In some embodiments, the email subjects **3508** are not displayed if the preview pane **3528** is used. In some embodiments, the position of the preview pane separator can be adjusted by the user making contact **3516** at or near the preview pane separator and moving the separator to the desired location by dragging the finger contact **3538**. In some embodiments, arrows **3539** or other graphics appear during the positioning of the preview pane separator (e.g., UI **3500**D, FIG. **35**D) to help guide the user.

In some embodiments, text body lines **3564** for the email messages are displayed (e.g., UI **3500**J, FIG. **35**J). In some embodiments, a user may choose the amount of each email message (e.g., the sender name **3506**, subject **3508**, and/or number of text body lines) that is displayed in the list of email messages (e.g., as part of settings **412**). In some embodiments, a user can select the number of text body lines **3564** that are displayed for each email message in the list of email messages (e.g., as part of settings **412**). In some embodiments, the displayed text from the body of the email message is text that has been extracted by the email client **140** from the HTML version of the selected message. Thus, if the email message body has both plain text and HTML portions, the portion used for generating the text body lines to be displayed is the HTML portion.

In some embodiments, when an attachment icon **3570** is activated (e.g., by a finger tap on the icon) display of the corresponding attachment **3572** is initiated. In some embodiments, the attachment is shown as part of the email message (e.g., activating **3570-1**, FIG. **35**K initiates display of **3572-1**, FIG. **35**L). In some embodiments, the attachment is shown apart from the email message (e.g., activating **3570-3**, FIG. **35**M initiates display of **3572-3**, FIG. **35**N). In some embodiments, when Return to email message icon **3574** (FIG. **35**N) is activated (e.g., by a finger tap on the icon) display of the email message that included the attachment is initiated.

In some embodiments, in response to a tap or other predefined gesture by the user in a row containing information (e.g., **3506**, **3510**, and/or **3508**) about a particular email message, some or all of the text in the row is highlighted (e.g., by coloring, shading, or bolding) and the corresponding message is displayed in the preview pane area. In some embodiments, in response to a tap or other predefined gesture by the user in a row containing information (e.g., **3506**, **3510**, and/or **3508**) about a particular email message, the email message is displayed on the full screen if the preview pane is not being used.

In some embodiments, if the selected email fills more than the preview pane area, the user may scroll through the email using two-dimensional gestures **3532** (FIG. **35**B) in the preview pane with vertical and/or horizontal movement of the email on the touch screen.

In some embodiments, vertical bar **3556** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the email message in the preview pane **3528**). In some embodiments, the vertical bar **3556** has a vertical position on top of the displayed portion of the email message that corresponds to the vertical position in the email of the displayed portion of the email. In some embodiments, the vertical bar **3556** has a vertical length that corresponds to the portion of the email being displayed. For example, in FIG. **35**H, the vertical position of the vertical bar **3556** indicates that the top of the email is being displayed and the vertical length of the vertical bar **3556** indicates that a portion from the top quarter of the email is being displayed.

In some embodiments, horizontal bar **3558** is displayed temporarily after an object is detected on or near the touch screen display (e.g., a finger touch is detected anywhere on the email message in the preview pane **3528**). In some embodiments, the horizontal bar **3558** has a horizontal position on top of the displayed portion of the email that corresponds to the horizontal position in the email of the displayed portion of the email. In some embodiments, the horizontal bar **3558** has a horizontal length that corresponds to the portion of the email being displayed. For example, in FIG. **35**H, the horizontal position of the horizontal bar **3558** indicates that a portion of the left side of the email is being displayed and the horizontal length of the horizontal bar **3558** indicates that a portion from the left half of the email is being displayed. Together, vertical bar **3556** and horizontal bar **3558** indicate that the northwest corner of the email message in the preview pane is being displayed.

In some embodiments, an email message is displayed such that only vertical scrolling is needed, in which case horizontal bar **3558** is not used.

In some embodiments, in response to user activation of an additional information icon (e.g., ">") on the detail information **3534** in FIG. **35**C (e.g., by a finger tap **3536** on the icon), the touch screen may display contact list information for the corresponding party, if available (e.g., UI **2800**C, FIG. **28**C) or a UI analogous to UI **2800**D, FIG. **28**D.

In some embodiments, in response to detecting a horizontal swipe gesture (e.g., **3576**, FIG. **35**O) on a particular email message in a the list of emails messages, a process for deleting the particular email message is initiated (e.g., as described in U.S. Provisional Patent Application Nos. 60/883,814, "Deletion Gestures On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/936,755, "Deletion Gestures On A Portable Multifunction Device," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/850,642, "Deletion Gestures On A Portable Multifunction Device," filed Sep. 5, 2007, the contents of which are hereby incorporated by reference in their entirety).

FIG. **36** illustrates an exemplary user interface for setting email user preferences in accordance with some embodiments. In some embodiments, user interface **3600** includes the following elements, or a subset or superset thereof:

402, **404**, and **406**, as described above;

Done icon **3602** that when activated (e.g., by a finger tap on the icon) returns the device to the previous UI;

- Accounts **3604** for entering email account information;
- Message list displays **3606** for selecting whether sender **3506** and/or subject **3508** information is displayed in the emails lists;
- Display newest messages **3608** for selecting whether the newest messages are displayed at the top or bottom of the screen;
- Message display locations **3610** for selecting whether the messages are displayed in the preview pane or full screen;
- Preferred message format **3612** for selecting how the messages are formatted (e.g., HTML or plain text);
- Rules **3614** for creating rules for managing email messages (e.g., using UI **3700**A, FIG. **37**A, and UI **3700**B, FIG. **37**B);
- Selection icons **3616** that when activated (e.g., by a finger tap on the icon) show choices for the corresponding settings.

In some embodiments, a user may tap anywhere in the row for a particular setting to initiate display of the corresponding setting choices.

In some embodiments, the settings in FIG. **36** are incorporated into settings **412** (FIG. **4**B) and settings icon **3520** need not be displayed in the email application **140** (e.g., FIG. **35**G).

FIGS. **37**A and **37**B illustrate an exemplary user interface for creating and managing email rules in accordance with some embodiments. In some embodiments, user interface **3700**A includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Settings icon **3702** that when activated (e.g., by a finger tap on the icon) returns the device to the settings UI **3600** (FIG. **3600**);
- Rules **3704**;
- Selection icons **3706** that when activated (e.g., by a finger tap on the icon) show choices for the corresponding rules.
- Add icon **3708** that when activated (e.g., by a finger tap on the icon) displays a UI for creating a new rule (e.g., UI **3700**B, FIG. **37**B);
- Done icon **3710** that when activated (e.g., by a finger tap on the icon) returns the device to the settings UI **3600** (FIG. **3600**);

In some embodiments, a user may tap anywhere in the row for a particular rule to initiate display of the corresponding rule (e.g., UI **3700**B, FIG. **37**B).

FIGS. **38**A and **38**B illustrate an exemplary user interface for moving email messages in accordance with some embodiments.

In response to the user activating create move message icon **3522**, the device displays UI **3800**A, with some information **3804** for the selected message displayed.

In some embodiments, if the user makes a tap **3802** or other predefined gesture on a row corresponding to a particular mailbox or other folder, the message is moved to the corresponding mailbox or folder (e.g., Work in FIG. **38**A). In some embodiments, the selected row is highlighted and an animation appears to move the message information **3804** into the selected row (as illustrated schematically in FIG. **38**B).

Additional description of an email client can be found in U.S. Provisional Patent Application No. 60/883,807, "Email Client For A Portable Multifunction Device," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/850,630, "Email Client For A Portable Multifunction Device," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

Methods for efficiently fetching email messages can be found in U.S. Provisional Patent Application No. 60/947,395, "Email Fetching System and Method in a Portable Electronic Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,070, "Email Fetching System and Method in a Portable Electronic Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

Methods for automatically selecting email ports and email security can be found in U.S. Provisional Patent Application No. 60/947,396, "Port Discovery and Message Delivery in a Portable Electronic Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,076, "Port Discovery and Message Delivery in a Portable Electronic Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

Browser

FIGS. **39**A-**39**M illustrate exemplary user interfaces for a browser in accordance with some embodiments.

In some embodiments, user interfaces **3900**A-**3900**M include the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Previous page icon **3902** that when activated (e.g., by a finger tap on the icon) initiates display of the previous web page;
- Web page name **3904**;
- Next page icon **3906** that when activated (e.g., by a finger tap on the icon) initiates display of the next web page;
- URL (Uniform Resource Locator) entry box **3908** for inputting URLs of web pages;
- Refresh icon **3910** that when activated (e.g., by a finger tap on the icon) initiates a refresh of the web page;
- Web page **3912** or other structured document, which is made of blocks **3914** of text content and other graphics (e.g., images and inline multimedia);
- Settings icon **3916** that when activated (e.g., by a finger tap on the icon) initiates display of a settings menu for the browser;
- Bookmarks icon **3918** that when activated (e.g., by a finger tap on the icon) initiates display of a bookmarks list or menu for the browser;
- Add bookmark icon **3920** that when activated (e.g., by a finger tap on the icon) initiates display of a UI for adding bookmarks (e.g., UI **3900**F, FIG. **39**F, which like other UIs and pages, can be displayed in either portrait or landscape view);
- New window icon **3922** that when activated (e.g., by a finger tap on the icon) initiates display of a UI for adding new windows (e.g., web pages) to the browser (e.g., UI **3900**G, FIG. **39**G), and which may also indicate the number of windows (e.g., "4" in icon **3922**, FIG. **39**A);
- Vertical bar **3962** (FIG. **39**H), analogous to the vertical bars described above, for the web page **3912** or other structured document that helps a user understand what portion of the web page **3912** or other structured document is being displayed;
- Horizontal bar **3964** (FIG. **39**H), analogous to the horizontal bars described above, for the web page **3912** or other structured document that helps a user understand what portion of the web page **3912** or other structured document is being displayed;
- Share icon **3966** (FIG. **39**I) that when activated (e.g., by a finger tap on the icon) initiates display of a UI for sharing information with other users (e.g., UI **3900**K, FIG. **39**K);

URL clear icon **3970** (FIG. **39**H) that when activated (e.g., by a finger tap on the icon) clears any input in URL entry box **3908**;

Search term entry box **3972** (FIG. **39**H) for inputting search terms for web searches;

URL suggestion list **3974** (FIG. **39**H) that displays URLs that match the input in URL entry box **3908** (FIG. **39**I), wherein activation of a suggested URL (e.g., by a finger tap on the suggested URL) initiates retrieval of the corresponding web page;

URL input keyboard **3976** (FIGS. **39**I and **39**M) with period key **3978**, backslash key **3980**, and ".com" key **3982** that make it easier to enter common characters in URLs;

Search term clear icon **3984** that when activated (e.g., by a finger tap on the icon) clears any input in search term entry box **3972**;

Email link icon **3986** (FIG. **39**K) that when activated (e.g., by a finger tap or other gesture on the icon) prepares an email that contains a link to be shared with one or more other users;

Email content icon **3988** (FIG. **39**K) that when activated (e.g., by a finger tap or other gesture on the icon) prepares an email that contains content to be shared with one or more other users;

IM link icon **3990** (FIG. **39**K) that when activated (e.g., by a finger tap or other gesture on the icon) prepares an IM that contains a link to be shared with one or more other users; and

Cancel icon **3992** (FIG. **39**K) that when activated (e.g., by a finger tap or other gesture on the icon) cancels the sharing UI and displays the previous UI.

In some embodiments, in response to a predefined gesture by the user on a block **3914** (e.g., a single tap gesture or a double tap gesture), the block is enlarged and centered (or substantially centered) in the web page display. For example, in response to a single tap gesture **3923** on block **3914-5**, block **3914-5** may be enlarged and centered in the display, as shown in UI **3900**C, FIG. **39**C. In some embodiments, the width of the block is scaled to fill the touch screen display. In some embodiments, the width of the block is scaled to fill the touch screen display with a predefined amount of padding along the sides of the display. In some embodiments, a zooming animation of the block is displayed during enlargement of the block. Similarly, in response to a single tap gesture **3925** on block **3914-2**, block **3914-2** may be enlarged with a zooming animation and two-dimensionally scrolled to the center of the display (not shown).

In some embodiments, the device analyzes the render tree of the web page **3912** to determine the blocks **3914** in the web page. In some embodiments, a block **3914** corresponds to a render node that is: replaced; a block; an inline block; or an inline table.

In some embodiments, in response to the same predefined gesture by the user on a block **3914** (e.g., a single tap gesture or a double tap gesture) that is already enlarged and centered, the enlargement and/or centering is substantially or completely reversed. For example, in response to a single tap gesture **3929** (FIG. **39**C) on block **3914-5**, the web page image may zoom out and return to UI **3900**A, FIG. **39**A.

In some embodiments, in response to a predefined gesture (e.g., a single tap gesture or a double tap gesture) by the user on a block **3914** that is already enlarged but not centered, the block is centered (or substantially centered) in the web page display. For example, in response to a single tap gesture **3927** (FIG. **39**C) on block **3914-4**, block **3914-4** may be centered (or substantially centered) in the web page display. Similarly, in response to a single tap gesture **3935** (FIG. **39**C) on block **3914-6**, block **3914-6** may be centered (or substantially centered) in the web page display. Thus, for a web page display that is already enlarged, in response to a predefined gesture, the device may display in an intuitive manner a series of blocks that the user wants to view. This same gesture may initiate different actions in different contexts (e.g., (1) zooming and/or enlarging in combination with scrolling when the web page is reduced in size, UI **3900**A and (2) reversing the enlargement and/or centering if the block is already centered and enlarged).

In some embodiments, in response to a multi-touch **3931** and **3933** de-pinching gesture by the user (FIG. **39**C), the web page may be enlarged. Conversely, in response to a multi-touch pinching gesture by the user, the web page may be reduced.

In some embodiments, in response to a substantially vertical upward (or downward) swipe gesture by the user, the web page (or, more generally, other electronic documents) may scroll one-dimensionally upward (or downward) in the vertical direction. For example, in response to an upward swipe gesture **3937** by the user that is within a predetermined angle (e.g., 27°) of being perfectly vertical, the web page may scroll one-dimensionally upward in the vertical direction.

Conversely, in some embodiments, in response to a swipe gesture that is not within a predetermined angle (e.g., 27°) of being perfectly vertical, the web page may scroll two-dimensionally (i.e., with simultaneous movement in both the vertical and horizontal directions). For example, in response to an upward swipe gesture **3939** (FIG. **39**C) by the user that is not within a predetermined angle (e.g., 27°) of being perfectly vertical, the web page may scroll two-dimensionally along the direction of the swipe **3939**.

In some embodiments, in response to a multi-touch **3941** and **3943** rotation gesture by the user (FIG. **39**C), the web page may be rotated exactly 90° (UI **3900**D, FIG. **39**D) for landscape viewing, even if the amount of rotation in the multi-touch **3941** and **3943** rotation gesture is substantially different from 90°. Similarly, in response to a multi-touch **3945** and **3947** rotation gesture by the user (UI **3900**D, FIG. **39**D), the web page may be rotated exactly 90° for portrait viewing, even if the amount of rotation in the multi-touch **3945** and **3947** rotation gesture is substantially different from 90°.

Thus, in response to imprecise gestures by the user, precise movements of graphics occur. The device behaves in the manner desired by the user despite inaccurate input by the user. Also, note that the gestures described for UI **3900**C, which has a portrait view, are also applicable to UIs with a landscape view (e.g., UI **3900**D, FIG. **3900**D) so that the user can choose whichever view the user prefers for web browsing.

In some embodiments, a portable electronic device with a touch screen display (e.g., device **100**) displays at least a portion of a structured electronic document on the touch screen display. The structured electronic document comprises a plurality of boxes of content (e.g., blocks **3914**, FIG. **39**A).

In some embodiments, the plurality of boxes are defined by a style sheet language. In some embodiments, the style sheet language is a cascading style sheet language. In some embodiments, the structured electronic document is a web page (e.g., web page **3912**, FIG. **39**A). In some embodiments, the structured electronic document is an HTML or XML document.

In some embodiments, displaying at least a portion of the structured electronic document comprises scaling the document width to fit within the touch screen display width independent of the document length.

In some embodiments, the touch screen display is rectangular with a short axis and a long axis; the display width corresponds to the short axis when the structured electronic document is seen in portrait view (e.g., FIG. **39**C); and the display width corresponds to the long axis when the structured electronic document is seen in landscape view (e.g., FIG. **39**D).

In some embodiments, prior to displaying at least a portion of a structured electronic document, borders, margins, and/or paddings are determined for the plurality of boxes and adjusted for display on the touch screen display. In some embodiments, all boxes in the plurality of boxes are adjusted. In some embodiments, just the first box is adjusted. In some embodiments, just the first box and boxes adjacent to the first box are adjusted.

A first gesture is detected at a location on the displayed portion of the structured electronic document (e.g., gesture **3923**, FIG. **39**A). In some embodiments, the first gesture is a finger gesture. In some embodiments, the first gesture is a stylus gesture.

In some embodiments, the first gesture is a tap gesture. In some embodiments, the first gesture is a double tap with a single finger, a double tap with two fingers, a single tap with a single finger, or a single tap with two fingers.

A first box (e.g., Block **5 3914-5**, FIG. **39**A) in the plurality of boxes is determined at the location of the first gesture. In some embodiments, the structured electronic document has an associated render tree with a plurality of nodes and determining the first box at the location of the first gesture comprises: traversing down the render tree to determine a first node in the plurality of nodes that corresponds to the detected location of the first gesture; traversing up the render tree from the first node to a closest parent node that contains a logical grouping of content; and identifying content corresponding to the closest parent node as the first box. In some embodiments, the logical grouping of content comprises a paragraph, an image, a plugin object, or a table. In some embodiments, the closest parent node is a replaced inline, a block, an inline block, or an inline table.

The first box is enlarged and substantially centered on the touch screen display (e.g., Block **5 3914-5**, FIG. **39**C). In some embodiments, enlarging and substantially centering comprises simultaneously zooming and translating the first box on the touch screen display. In some embodiments, enlarging comprises expanding the first box so that the width of the first box is substantially the same as the width of the touch screen display.

In some embodiments, text in the enlarged first box is resized to meet or exceed a predetermined minimum text size on the touch screen display. In some embodiments, the text resizing comprises: determining a scale factor by which the first box will be enlarged; dividing the predetermined minimum text size on the touch screen display by the scaling factor to determine a minimum text size for text in the first box; and if a text size for text in the first box is less than the determined minimum text size, increasing the text size for text in the first box to at least the determined minimum text size. In some embodiments, the first box has a width; the display has a display width; and the scale factor is the display width divided by the width of the first box prior to enlarging. In some embodiments, the resizing occurs during the enlarging. In some embodiments, the resizing occurs after the enlarging.

In some embodiments, text in the structured electronic document is resized to meet or exceed a predetermined minimum text size on the touch screen display. In some embodiments, the text resizing comprises: determining a scale factor by which the first box will be enlarged; dividing the predetermined minimum text size on the touch screen display by the scaling factor to determine a minimum text size for text in the structured electronic document; and if a text size for text in the structured electronic document is less than the determined minimum text size, increasing the text size for text in the structured electronic document to at least the determined minimum text size. In some embodiments, the text resizing comprises: identifying boxes containing text in the plurality of boxes; determining a scale factor by which the first box will be enlarged; dividing the predetermined minimum text size on the touch screen display by the scaling factor to determine a minimum text size for text in the structured electronic document; and for each identified box containing text, if a text size for text in the identified box is less than the determined minimum text size, increasing the text size for text in the identified box to at least the determined minimum text size and adjusting the size of the identified box.

In some embodiments, a second gesture (e.g., gesture **3929**, FIG. **39**C) is detected on the enlarged first box. In response to detecting the second gesture, the displayed portion of the structured electronic document is reduced in size. In some embodiments, the first box returns to its size prior to being enlarged.

In some embodiments, the second gesture and the first gesture are the same type of gesture. In some embodiments, the second gesture is a finger gesture. In some embodiments, the second gesture is a stylus gesture.

In some embodiments, the second gesture is a tap gesture. In some embodiments, the second gesture is a double tap with a single finger, a double tap with two fingers, a single tap with a single finger, or a single tap with two fingers.

In some embodiments, while the first box is enlarged, a third gesture (e.g., gesture **3927** or gesture **3935**, FIG. **39**C) is detected on a second box other than the first box. In response to detecting the third gesture, the second box is substantially centered on the touch screen display. In some embodiments, the third gesture and the first gesture are the same type of gesture. In some embodiments, the third gesture is a finger gesture. In some embodiments, the third gesture is a stylus gesture.

In some embodiments, the third gesture is a tap gesture. In some embodiments, the third gesture is a double tap with a single finger, a double tap with two fingers, a single tap with a single finger, or a single tap with two fingers.

In some embodiments, a swipe gesture (e.g., gesture **3937** or gesture **3939**, FIG. **39**C) is detected on the touch screen display. In response to detecting the swipe gesture, the displayed portion of the structured electronic document is translated on the touch screen display. In some embodiments, the translating comprises vertical, horizontal, or diagonal movement of the structured electronic document on the touch screen display. In some embodiments, the swipe gesture is a finger gesture. In some embodiments, the swipe gesture is a stylus gesture.

In some embodiments, a fifth gesture (e.g., multi-touch gesture **3941**/**3943**, FIG. **39**C) is detected on the touch screen display. In response to detecting the fifth gesture, the displayed portion of the structured electronic document is rotated on the touch screen display by 90°. In some embodiments, the fifth gesture is a finger gesture. In some embodiments, the fifth gesture is a multifinger gesture. In some embodiments, the fifth gesture is a twisting multifinger gesture.

In some embodiments, a change in orientation of the device is detected. In response to detecting the change in orientation of the device, the displayed portion of the structured electronic document is rotated on the touch screen display by 90°.

In some embodiments, a multi-finger de-pinch gesture (e.g., multi-touch gesture **3931**/**3933**, FIG. **39**C) is detected on the touch screen display. In response to detecting the multi-finger de-pinch gesture, a portion of the displayed portion of the structured electronic document is enlarged on the touch screen display in accordance with a position of the multi-finger de-pinch gesture and an amount of finger movement in the multi-finger de-pinch gesture.

A graphical user interface (e.g., UI **3900**A, FIG. **39**A) on a portable electronic device with a touch screen display comprises at least a portion of a structured electronic document (e.g., web page **3912**, FIG. **39**A). The structured electronic document comprises a plurality of boxes of content (e.g., blocks **3914**, FIG. **39**A). In response to detecting a first gesture (e.g., gesture **3923**, FIG. **39**A) at a location on the portion of the structured electronic document, a first box (e.g., Block **5 3914-5**, FIG. **39**A) in the plurality of boxes at the location of the first gesture is determined and the first box is enlarged and substantially centered on the touch screen display (e.g., Block **5 3914-5**, FIG. **39**C).

Additional description of displaying structured electronic documents (e.g., web pages) can be found in U.S. Provisional Patent Application No. 60/946,715, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Structured Electronic Documents," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/850,013, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Structured Electronic Documents," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

In some embodiments, if a link in a web page in the browser **147** is activated that corresponds to an online video (e.g., a YouTube video), the corresponding online video is shown in the online video application **155**, rather than in the browser **147**. Similarly, in some embodiment, if a URL is input in the browser **147** that corresponds to an online video (e.g., a YouTube video), the corresponding online video is shown in the online video application **155**, rather than in the browser **147**. Redirecting the online video URL to the online video application **155** provides an improved viewing experience because the user does not need to navigate on a web page that includes the requested online video.

In some embodiments, if a link in a web page in the browser **147** is activated that corresponds to an online map request (e.g., a Google map request), the corresponding map is shown in the map application **154**, rather than in the browser **147**. Similarly, in some embodiment, if a URL is input in the browser **147** that corresponds to an online map request (e.g., a Google map request), the corresponding map is shown in the map application **154**, rather than in the browser **147**. Redirecting the map request URL to the map application **154** provides an improved viewing experience because the user does not need to navigate on a web page that includes the requested map.

In some embodiments, in response to a tap or other predefined user gesture on URL entry box **3908**, the touch screen displays an enlarged entry box **3926** and a keyboard **616** (e.g., UI **3900**B, FIG. **3900**B in portrait viewing and UI **3900**E, FIG. **39**E in landscape viewing). In some embodiments, the touch screen also displays:

- Contextual clear icon **3928** that when activated (e.g., by a finger tap on the icon) initiates deletion of all text in entry box **3926**;
- a search icon **3930** that when activated (e.g., by a finger tap on the icon) initiates an Internet search using the search terms input in box **3926**;
- Go to URL icon **3932** that when activated (e.g., by a finger tap on the icon) initiates acquisition of the web page with the URL input in box **3926**; and
- Cancel icon **3924** that when activated (e.g., by a finger tap on the icon) replaces display of the enlarged entry box **3926** and keyboard **616** with URL entry box **3908** and no keyboard (e.g., FIG. **39**D).

Thus, the same entry box **3926** may be used for inputting both search terms and URLs. In some embodiments, whether or not clear icon **3928** is displayed depends on the context.

UI **3900**G (FIG. **39**G) is a UI for adding new windows to an application, such as the browser **147**. UI **3900**G displays an application (e.g., the browser **147**), which includes a displayed window (e.g., web page **3912-2**) and at least one hidden window (e.g., web pages **3912-1** and **3912-3** and possibly other web pages that are completely hidden offscreen). UI **3900**G also displays an icon for adding windows to the application (e.g., new window or new page icon **3936**). In response to detecting activation of the icon **3936** for adding windows, the browser adds a window to the application (e.g., a new window for a new web page **3912**).

In response to detecting a gesture on the touch screen display, a displayed window in the application is moved off the display and a hidden window is moved onto the display. For example, in response to detecting a tap gesture **3949** on the left side of the screen, the window with web page **3912-2** is moved partially or fully off-screen to the right, the window with web page **3912-3** is moved completely off-screen, partially hidden window with web page **3912-1** is moved to the center of the display, and another completely hidden window with a web page (e.g., **3912-0**) may be moved partially onto the display. Alternatively, detection of a left-to-right swipe gesture **3951** may achieve the same effect.

Conversely, in response to detecting a tap gesture **3953** on the right side of the screen, the window with web page **3912-2** is moved partially or fully off-screen to the left, the window with web page **3912-1** is moved completely off-screen, partially hidden window with web page **3912-3** is moved to the center of the display, and another completely hidden window with a web page (e.g., **3912-4**) may be moved partially onto the display. Alternatively, detection of a right-to-left swipe gesture **3951** may achieve the same effect.

In some embodiments, in response to a tap or other predefined gesture on a delete icon **3934**, the corresponding window **3912** is deleted. In some embodiments, in response to a tap or other predefined gesture on Done icon **3938**, the window in the center of the display (e.g., **3912-2**) is enlarged to fill the screen.

Additional description of adding windows to an application can be found in U.S. patent application Ser. No. 11/620,647, "Method, System, And Graphical User Interface For Viewing Multiple Application Windows," filed Jan. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

FIGS. **40**A-**40**F illustrate exemplary user interfaces for playing an item of inline multimedia content in accordance with some embodiments.

In some embodiments, user interfaces **4000**A-**4000**F include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **3902**, **3906**, **3910**, **3912**, **3918**, **3920**, **3922**, as described above;

inline multimedia content **4002**, such as QuickTime content (**4002-1**), Windows Media content (**4002-2**), or Flash content (**4002-3**);

other types of content **4004** in the structured document, such as text;

Exit icon **4006** that when activated (e.g., by a finger tap on the icon) initiates exiting the inline multimedia content player UI (e.g., UI **4000**B or **4000**F) and returning to another UI (e.g., UI **4000**A, FIG. **40**A);

Lapsed time **4008** that shows how much of the inline multimedia content **4002** has been played, in units of time;

Progress bar **4010** that indicates what fraction of the inline multimedia content **4002** has been played and that may be used to help scroll through the inline multimedia content in response to a user gesture;

Remaining time **4012** that shows how much of the inline multimedia content **4002** remains to be played, in units of time;

Downloading icon **4014** that indicates when inline multimedia content **4002** is being downloaded or streamed to the device;

Fast Reverse/Skip Backwards icon **4016** that when activated (e.g., by a finger tap on the icon) initiates reversing or skipping backwards through the inline multimedia content **4002**;

Play icon **4018** that when activated (e.g., by a finger tap **4026** (FIG. **40**C) on the icon) initiates playing the inline multimedia content **4002**, either from the beginning or from where the inline multimedia content was paused;

Fast Forward/Skip Forward icon **4020** that initiates forwarding or skipping forwards through the inline multimedia content **4002**;

Volume adjustment slider icon **4022** that that when activated (e.g., by a finger tap on the icon) initiates adjustment of the volume of the inline multimedia content **4002**; and

Pause icon **4024** that when activated (e.g., by a finger tap on the icon) initiates pausing the inline multimedia content **4002**.

In some embodiments, a portable electronic device (e.g., **100**) displays at least a portion of a structured electronic document on a touch screen display. The structured electronic document comprises content (e.g., **4002** and **4004**). In some embodiments, the structured electronic document is a web page (e.g. **3912**). In some embodiments, the structured electronic document is an HTML or XML document.

A first gesture (e.g., **4028**, FIG. **40**A) is detected on an item of inline multimedia content (e.g., **4002-1**, FIG. **40**A) in the displayed portion of the structured electronic document. In some embodiments, the inline multimedia content comprises video and/or audio content. In some embodiments, the content can be played with a QuickTime, Windows Media, or Flash plug in.

In response to detecting the first gesture, the item of inline multimedia content is enlarged on the touch screen display and other content (e.g., **4004** and other **4002** besides **4002-1**, FIG. **4000**A) in the structured electronic document besides the enlarged item of inline multimedia content ceases to be displayed (e.g., UI **4000**B, FIG. **40**B or UI **4000**F, FIG. **40**F).

In some embodiments, enlarging the item of inline multimedia content comprises animated zooming in on the item. In some embodiments, enlarging the item of inline multimedia content comprises simultaneously zooming and translating the item of inline multimedia content on the touch screen display. In some embodiments, enlarging the item of inline multimedia content comprises rotating the item of inline multimedia content by 90° (e.g., from UI **4000**A, FIG. **40**A to UI **4000**B, FIG. **40**B).

In some embodiments, the item of inline multimedia content has a full size; the touch screen display has a size; and enlarging the item of inline multimedia content comprises enlarging the item of inline multimedia content to the smaller of the full size of the item and the size of the touch screen display.

In some embodiments, enlarging the item of inline multimedia content comprises expanding the item of inline multimedia content so that the width of the item of inline multimedia content is substantially the same as the width of the touch screen display (e.g., UI **4000**B, FIG. **40**B or UI **4000**F, FIG. **40**F).

In some embodiments, ceasing to display other content in the structured electronic document besides the item of inline multimedia content comprises fading out the other content in the structured electronic document besides the item of inline multimedia content.

While the enlarged item of inline multimedia content is displayed, a second gesture is detected on the touch screen display (e.g., **4030**, FIG. **40**B).

In response to detecting the second gesture, one or more playback controls for playing the enlarged item of inline multimedia content are displayed. In some embodiments, the one or more playback controls comprise a play icon (e.g., **4018**), a pause icon (e.g., **4024**), a sound volume icon (e.g., **4022**), and/or a playback progress bar icon (e.g., **4010**).

In some embodiments, displaying one or more playback controls comprises displaying one or more playback controls on top of the enlarged item of inline multimedia content (e.g., playback controls **4016**, **4018**, **4020**, and **4022** are on top of enlarged inline multimedia content **4002-1** in FIG. **40**C). In some embodiments, the one or more playback controls are superimposed on top of the enlarged item of inline multimedia content. In some embodiments, the one or more playback controls are semitransparent.

In some embodiments, an instruction in the structured electronic document to automatically start playing the item of inline multimedia content is overridden, which gives the device time to download more of the selected inline multimedia content prior to starting playback.

A third gesture is detected on one of the playback controls (e.g., gesture **4026** on play icon **4018**, FIG. **40**C).

In response to detecting the third gesture, the enlarged item of inline multimedia content is played. In some embodiments, playing the enlarged item of inline multimedia content comprises playing the enlarged item of inline multimedia content with a plugin for a content type associated with the item of inline multimedia content.

In some embodiments, while the enlarged item of inline multimedia content is played, the one or more playback controls cease to be displayed (e.g., FIG. **40**D, which no longer displays playback controls **4016**, **4018**, **4020**, and **4022**, but still shows **4006**, **4008**, **4010**, and **4012**). In some embodiments, all of the playback controls cease to be displayed. In some embodiments, ceasing to display the one or more playback controls comprises fading out the one or more playback controls. In some embodiments, the display of the one or more playback controls is ceased after a predetermined time. In some embodiments, the display of the one or more playback controls is ceased after no contact is detected with the touch screen display for a predetermined time.

In some embodiments, a fourth gesture is detected on the touch screen display. In response to detecting the fourth gesture, at least the portion of the structured electronic document is displayed again (e.g., FIG. **40**A). In some embodiments, the fourth gesture comprises a tap gesture on a playback completion icon, such as a done icon (e.g., gesture **4032** on done icon **4006**, FIG. **40**D). In some embodiments, the item of inline multimedia content returns to its size prior to being enlarged.

In some embodiments, the first, second, and third gestures are finger gestures. In some embodiments, the first, second, and third gestures are stylus gestures.

In some embodiments, the first, second, and third gestures are tap gestures. In some embodiments, the tap gesture is a double tap with a single finger, a double tap with two fingers, a single tap with a single finger, or a single tap with two fingers.

A graphical user interface on a portable electronic device with a touch screen display, comprises: at least a portion of a structured electronic document, wherein the structured electronic document comprises content; an item of inline multimedia content in the portion of the structured electronic document; and one or more playback controls. In response to detecting a first gesture on the item of inline multimedia content, the item of inline multimedia content on the touch screen display is enlarged, and display of other content in the structured electronic document besides the enlarged item of inline multimedia content is ceased. In response to detecting a second gesture on the touch screen display while the enlarged item of inline multimedia content is displayed, the one or more playback controls for playing the enlarged item of inline multimedia content are displayed. In response to detecting a third gesture on one of the playback controls, the enlarged item of inline multimedia content is played.

Additional description of displaying inline multimedia content can be found in U.S. Provisional Patent Application No. 60/947,155, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Inline Multimedia Content," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,773, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Inline Multimedia Content," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

FIGS. **41**A-**41**E illustrate exemplary user interfaces for interacting with user input elements in displayed content in accordance with some embodiments.

In some embodiments, user interfaces **4100**A-**4100**E include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **616**, **618**, **620**, **3902**, **3906**, **3910**, **3912**, **3918**, **3920**, and **3922**, as described above;
- content **4112**, such as a web page; word processing, spreadsheet, email or presentation document; electronic form; or online form;
- user input elements **4102** in the content **4112**, such as radio buttons, text input fields, check boxes, pull down lists, and/or form fields;
- information **4108** about a chosen user input element **4102**;
- area **4114** that includes a chosen user input element **4102**;
- cancel icon **4116** (FIG. **41**B) that when activated (e.g., by a finger tap on the icon) cancels user input into the chosen element **4102**;
- input choices **4118** that when activated (e.g., by a finger tap on the icon) are used as input for the chosen element **4102**;
- done icon **4124** (FIG. **41**E) that when activated (e.g., by a finger tap on the icon) returns the device to the previous UI (e.g., UI **4100**D, FIG. **41**D); and
- submit icon **4126** (FIG. **41**E) that when activated (e.g., by a finger tap on the icon) sends the input to a remote server.

In some embodiments, a portable multifunction device (e.g., device **100**) displays content **4112** on a touch screen display. The content includes a plurality of user input elements **4102**.

In some embodiments, the content is a web page (e.g., page **3912**, FIG. **41**A). In some embodiments, the content is a word processing, spreadsheet, email or presentation document. In some embodiments, the content is an electronic form. In some embodiments, the content is an online form.

In some embodiments, the user input elements **4102** include one or more radio buttons, text input fields, check boxes, pull down lists (e.g., **4102-1**, FIG. **41**A), and/or form fields (e.g., user name **4102-3**, FIG. **41**A).

A contact by a finger (e.g., **4104**, FIG. **41**A) is detected with the touch screen display. The contact includes an area of contact.

A point (e.g., **4106**, FIG. **41**A) is determined within the area of contact. In some embodiments, the point within the area of contact is the centroid of the area of contact. In some embodiments, the point within the area of contact is offset from the centroid of the area of contact.

A user input element in the plurality of user input elements is chosen based on proximity of the user input element to the determined point (e.g., **4102-1**, FIG. **41**A). In some embodiments, the content on the touch screen display has an associated scale factor, and the choosing is limited to user input elements located within a distance from the determined point that is determined in accordance with the scale factor. In some embodiments, choosing is limited to user input elements located within the area of contact. In some embodiments, choosing is limited to user input elements that at least partially overlap with the area of contact. In some embodiments, choosing is limited to user input elements located within a predetermined distance from the determined point.

Information associated with the chosen user input element is displayed over the displayed content (e.g., Accounts Menu **4108-1**, FIG. **41**A). In some embodiments, the displayed information associated with the chosen user input element comprises a description of the chosen user input element.

In some embodiments, the information associated with the chosen user input element is displayed outside the area of contact. In some embodiments, the location of the information associated with the chosen user input element over the displayed content depends on the location of the contact. In some embodiments, the location of the information associated with the chosen user input element is displayed over the top half of the displayed content if the location of the contact is in the bottom half of the displayed content and the location of the information associated with the chosen user input element is displayed over the bottom half of the displayed content if the location of the contact is in the top half of the displayed content.

In some embodiments, the information associated with the chosen user input element is displayed after the contact is maintained for at least a predetermined time. In some embodiments, the displayed information associated with the chosen user input element is removed if the contact with the touch screen is maintained for greater than a predetermined time.

A break is detected in the contact by the finger with the touch screen display. In some embodiments, detecting the break in the contact comprises detecting the break in the contact while the information associated with the chosen user input element is displayed.

In some embodiments, in response to detecting the break in the contact by the finger with the touch screen display, an area is enlarged that includes the chosen user input element on the touch screen display (e.g., for element **4102-1**, area **4114-1** in FIG. **41**A is enlarged in FIG. **41**B; similarly, for elements **4102-3** and **4102-4**, area **4114-2** in FIG. **41**D is enlarged in FIG. **41**E).

In some embodiments, in response to detecting the break in the contact by the finger with the touch screen display prior to expiration of a predetermined time, the chosen user input element is enlarged on the touch screen display (e.g., element **4102-1** in FIG. **41**A is enlarged in FIG. **41**B; similarly, elements **4102-3** and **4102-4** in FIG. **41**D are enlarged in FIG. **41**E).

Input is received for the chosen user input element. In some embodiments, receiving input comprises: receiving text input via a soft keyboard on the touch screen display (e.g., keyboard **616**, FIG. **41**E), detecting a finger contact with a radio button on the touch screen display, detecting a finger contact with a check box on the touch screen display, or detecting a finger contact with an item in a pull down list on the touch screen display (e.g., contact **4120** on input choice **4118-3**, FIG. **41**B).

In some embodiments, the received input is sent to a remote computer, such as a web server.

In some embodiments, movement of the contact is detected on the touch screen display (e.g., movement **4110-1**, FIG. **41**C); a second user input element (e.g., element **4102-2**, FIG. **41**C) in the plurality of user input elements is chosen based on proximity of the second user input element to the contact (e.g., contact **4104**, FIG. **41**C); the display of information associated with the first chosen user input element over the displayed content is ended; and information associated with the second chosen user input element is displayed over the displayed content (e.g., sign in button **4108-2**, FIG. **41**C).

In some embodiments, movement of the contact on the touch screen display is detected (e.g., movement **4110-1** in FIG. **41**C, and movement **4110-2** in FIG. **41**D); a series of user input elements in the plurality of user input elements are chosen based on the proximity of the user input elements to the contact (e.g., element **4102-2** in FIG. **41**C, and elements **4102-3** and **4102-4** in FIG. **41**D); and information associated with each user input element in the series of user input elements are successively displayed over the displayed content (e.g., information **4108-3** in FIG. **41**C, and information **4108-4** in FIG. **41**D).

A graphical user interface (e.g., UI **4100**A, FIG. **41**A) on a portable multifunction device with a touch screen display comprises (1) content **4112** that includes a plurality of user input elements **4102** and (2) information **4108-1** associated with a first user input element **4102-1** in the plurality of user input elements. In response to the detection of an area of contact **4104** of a finger with the touch screen display: a point **4106** is determined within the area of contact, the first user input element **4102-1** is chosen based on proximity of the first user input element to the determined point, and the information **4108-1** associated with the first user input element is displayed over the content.

Using interfaces such as **4100**A-**4100**E, a user may more easily view information associated with input elements and provide input on a portable device using finger contacts on a touch screen. The user is relieved of having to worry about the precision of his finger contact with respect to selection of input elements. Furthermore, the user can view information and provide input even if the input elements are initially displayed at such a small size that the elements are illegible or barely legible.

Additional description of interacting with user input elements can be found in U.S. Provisional Patent Application No. 60/947,127, "Portable Multifunction Device, Method, and Graphical User Interface for Interacting with User Input Elements in Displayed Content," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,394, "Portable Multifunction Device, Method, and Graphical User Interface for Interacting with User Input Elements in Displayed Content," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

FIG. **41**F illustrates an exemplary user interface for interacting with hyperlinks in displayed content in accordance with some embodiments.

In some embodiments, user interface UI **4100**F include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **3902**, **3906**, **3910**, **3912**, **3918**, **3920**, **3922**, **4112**, and **4102**, as described above;
- link **4122** that provides a link to other content; and
- information **4130** associated with link **4122**.

Additional description of displaying and activating hyperlinks using interfaces such as UI **4100**F can be found in U.S. patent application Ser. No. 11/620,644, "Method, System, And Graphical User Interface For Displaying Hyperlink Information," filed Jan. 5, 2007, and in U.S. patent application Ser. No. 11/620,646, "Method, System, And Graphical User Interface For Activating Hyperlinks," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIGS. **42**A-**42**C illustrate exemplary user interfaces for translating page content or translating just frame content within the page content in accordance with some embodiments.

In some embodiments, user interfaces **4200**A-**4200**C include the following elements, or a subset or superset thereof:

- **402**, **404**, **406**, **3902**, **3906**, **3910**, **3918**, **3920**, and **3922**, as described above;
- Portion **4202** of page content, such as web page content;
- Frame **4204** that displays a portion **4206** of frame content;
- Portion **4206** of frame content, such as a portion of a map or a scrollable list of items, that is displayed within frame **4204**;
- Other content **4208**, besides the portion **4206** of frame content, in portion **4202**;
- New portion **4212** of page content that is displayed in response to an N-finger translation gesture **4210**; and
- New portion **4216** of frame content that is displayed in response to an M-finger translation gesture **4214**, where M is a different number from N (e.g., N=1 and M=2).

In some embodiments, a portable multifunction device (e.g., device **100**) displays a portion (e.g., **4202**, FIG. **42**A) of page content on a touch screen display. The portion **4202** of page content includes a frame **4204** displaying a portion **4206** of frame content and other content **4208** of the page.

In some embodiments, the page content is web page content. In some embodiments, the page content is a word processing, spreadsheet, email or presentation document.

An N-finger translation gesture (e.g., **4210**) is detected on or near the touch screen display.

In response to detecting the N-finger translation gesture **4210**, the page content is translated to display a new portion (e.g., **4212**, FIG. **42**B) of page content on the touch screen display. Translating the page content includes translating the displayed portion **4206** of the frame content and the other content **4208** of the page.

In some embodiments, translating the page content comprises translating the page content in a vertical, horizontal, or diagonal direction. In some embodiments, translating the page content has an associated direction of translation that corresponds to a direction of movement of the N-finger translation gesture **4210**. In some embodiments, the direction of translation corresponds directly to the direction of finger movement; in some embodiments, however, the direction of translation is mapped from the direction of finger movement in accordance with a rule. For example, the rule may state that if the direction of finger movement is within X degrees of a standard axis, the direction of translation is along the standard axis, and otherwise the direction of translation is substantially the same as the direction of finger movement.

In some embodiments, translating the page content has an associated speed of translation that corresponds to a speed of movement of the N-finger translation gesture. In some embodiments, translating the page content is in accordance with a simulation of an equation of motion having friction.

An M-finger translation gesture (e.g., **4214**, FIG. **42**A) is detected on or near the touch screen display, where M is a different number than N. In some embodiments, N is equal to 1 and M is equal to 2.

In response to detecting the M-finger translation gesture **4214**, the frame content is translated to display a new portion (e.g., **4216**, FIG. **42**C) of frame content on the touch screen display, without translating the other content **4208** of the page.

In some embodiments, translating the frame content comprises translating the frame content in a vertical, horizontal, or diagonal direction. In some embodiments, translating the frame content comprises translating the frame content in a diagonal direction.

In some embodiments, translating the frame content has an associated direction of translation that corresponds to a direction of movement of the M-finger translation gesture **4214**. In some embodiments, the direction of translation corresponds directly to the direction of finger movement; in some embodiments, however, the direction of translation is mapped from the direction of finger movement in accordance with a rule. For example, the rule may state that if the direction of finger movement is within Y degrees of a standard axis, the direction of translation is along the standard axis, and otherwise the direction of translation is substantially the same as the direction of finger movement.

In some embodiments, translating the frame content has an associated speed of translation that corresponds to a speed of movement of the M-finger translation gesture. In some embodiments, translating the frame content is in accordance with a simulation of an equation of motion having friction.

In some embodiments, the frame content comprises a map. In some embodiments, the frame content comprises a scrollable list of items.

In some embodiments, the other content **4208** of the page includes text.

A graphical user interface (e.g., UI **4200**A, FIG. **42**A) on a portable multifunction device with a touch screen display comprises a portion **4202** of page content on the touch screen display, which includes: (1) a frame **4204** displaying a portion **4206** of frame content and (2) other content **4208** of the page. In response to detecting an N-finger translation gesture **4210** on or near the touch screen display, the page content is translated to display a new portion **4212** (FIG. **42**B) of page content on the touch screen display, wherein translating the page content includes translating the other content **4208** of the page. In response to detecting an M-finger translation gesture **4214** on or near the touch screen display, where M is a different number than N, the frame content is translated to display a new portion **4216** (FIG. **42**C) of frame content on the touch screen display, without translating the other content **4208** of the page.

Thus, depending on the number of fingers used in the gesture, a user may easily translate page content or just translate frame content within the page content.

Additional description of translating displayed content can be found in U.S. Provisional Patent Application No. 60/946,976, "Portable Multifunction Device, Method, and Graphical User Interface for Translating Displayed Content," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/960,675, "Portable Multifunction Device, Method, and Graphical User Interface for Translating Displayed Content," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

Music and Video Player

FIGS. **43**A-**43**DD illustrate exemplary user interfaces for a music and video player **152** in accordance with some embodiments.

In some embodiments, icons for major content categories (e.g., playlists **4308**, artists **4310**, songs **4312**, and video **4314**) are displayed in a first area of the display (e.g., **4340**, FIG. **43**A). In some embodiments, the first area also includes an icon (e.g., more icon **4316**) that when activated (e.g., by a finger tap on the icon) leads to additional content categories (e.g., albums, audiobooks, compilations, composers, genres, and podcasts in FIG. **43**J).

In some embodiments, the player **152** includes a now playing icon **4302** that when activated (e.g., by a finger tap on the icon) takes the user directly to a UI displaying information about the currently playing music (e.g., FIG. **43**S).

In some embodiments, in response to a series of gestures (e.g., finger taps) by the user, the device displays a series of content categories and sub-categories. For example, if the user activates selection icon **4306** (e.g., by a finger tap on the icon) or, in some embodiments, taps anywhere (e.g., tap **4304**) in the Top 25 row **4318**, the UI changes from a display of playlist categories (UI **4300**A, FIG. **43**A) to a display of the Top 25 sub-category (UI **4300**B, FIG. **43**B).

If just a portion of a category or sub-category is displayed, a vertical bar, analogous to the vertical bars described above, is displayed on top of the category/sub-category that helps a user understand what portion of the category/sub-category is being displayed (e.g., vertical bar **4320**, FIG. **43**B). In some embodiments, a user can scroll through the list of items in the category/sub-category by applying a vertical or substantially vertical swipe gesture **4322** to the area displaying the list. In some embodiments, a vertically downward gesture scrolls the list downward and a vertically upward gesture scrolls the list upward,

In some embodiments, if the user scrolls to the top of the list and then continues to apply a scrolling gesture (e.g., **4324**, FIG. **43**C), background **4326-1** appears and the vertical bar **4320-1** may start to reduce in length to indicate to the user that the top of the list has been reached. When the user's finger breaks contact with the touch screen display, the list may move back to the top of the display and the background **4326-1** shrinks to nothing. Similarly, if the user scrolls to the bottom of the list and then continues to apply a scrolling gesture (e.g., **4328**, FIG. **43**D), background **4326-2** appears and the vertical bar **4320-2** may start to reduce in length to indicate to the user that the bottom of the list has been reached. When the user's finger breaks contact with the touch screen display, the list may move back to the bottom of the display and the background **4326-2** shrinks to nothing. This "rubber band-like" behavior at the terminus of lists may be applied to many other types of lists and documents that have vertical scrolling. Similar behavior may be applied to all of the edges of documents that can be translated in two dimensions (e.g., web pages, word processing documents, and photographs and other images). Additional description of this "rubber band-like" scrolling and translation behavior can be found in U.S. Provisional Patent Application Nos. 60/883,801, "List Scrolling And Document Translation On A Touch-Screen Display," filed Jan. 7, 2007; 60/945,858, "List Scrolling and Document Translation on a Touch-Screen Display," filed Jun. 22, 2007, and 60/946,971, "List Scrolling and Document Translation on a Touch-Screen Display," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/956,969, "List Scrolling and Document Translation, Scaling, and Rotation on a Touch-Screen Display," filed Dec. 14, 2007, the contents of which are hereby incorporated by reference in their entirety.

In some embodiments, if the user activates artists icon **4310** (e.g., by a finger tap on the icon), the artists category will be displayed (FIG. **43**E). In some embodiments, such as when the artists list is arranged alphabetically, an index item/symbol (e.g., the letter A **4330-1**) may remain adjacent to a respective information item subset (e.g., artists **4332** whose name begins with the letter A). When scrolling up through the list of information items (e.g., in response to an upward swipe on the touch sensitive display by the user), the index item/symbol may move to the upper edge of a window (e.g., window **4336**, FIG. **43**F). As the scrolling continues (e.g., in response to gesture **4334**, FIG. **43**F), the index item/symbol may remain there until the end of the respective information item subset is reached, at which time the index item/symbol may be replaced with a subsequent index item/symbol (e.g., the letter B **4330-2**). An analogous scrolling effect is shown for the Movies **4330-3** and Music Videos **4330-4** index items in UI **4300**H and UI **43001** (FIGS. **43**H and **43**I). Additional description of such scrolling is described in U.S. patent application Ser. Nos. 11/322,547, "Scrolling List With Floating Adjacent Index Symbols," filed Dec. 23, 2005; 11/322,551, "Continuous Scrolling List With Acceleration," filed Dec. 23, 2005; and 11/322,553, "List Scrolling In Response To Moving Contact Over List Of Index Symbols," filed Dec. 23, 2005, which are hereby incorporated by reference in their entirety.

In some embodiments, if the user activates songs icon **4312** (e.g., by a finger tap on the icon), the songs category will be displayed (FIG. **43**G).

In some embodiments, if the user activates videos icon **4314** (e.g., by a finger tap on the icon), the video category will be displayed (FIG. **43**H).

In some embodiments, the major content categories that are displayed in the first area **4340** of the display can be rearranged by a user to correspond to the user's preferred (favorite) categories (e.g., as illustrated in FIGS. **43**J-**43**M and FIGS. **43**N-**43**P). In some embodiments, activation of add category icon **4344** (e.g., by a finger tap on the icon) initiates display of a UI with a soft keyboard for adding user specified categories (not shown). In some embodiments, activation of edit icon **4342** in FIG. **43**J (e.g., by a finger tap on the icon) initiates display of UI **4300**K (FIG. **43**K) with delete icons **4348** (which operate like delete icons **702**, FIG. **7**, as described above) and moving affordance icons **4360**. As described below, moving affordance icons **4360** may be used as control icons that assist in rearranging categories or other UI objects.

In some embodiments, a portable multifunction device with a touch screen display with a plurality of user interface objects displays a first user interface object (e.g., genres icon

4350, FIG. **43**K) and a second user interface object (e.g., artists icon **4310**, FIG. **43**K) on the touch screen display. In some embodiments, the first user interface object is one of a group of candidate icons (e.g., icons in the more list **4362**, FIG. **43**K, which are candidates for rearrangement) and the second user interface object is one of a group of user favorite icons (e.g., icons in area **4340**).

A finger-down event is detected at the first user interface object (e.g., contact **4346-1**, FIG. **43**K). In some embodiments, the first user interface object includes a control icon (e.g., the horizontal bars comprising a moving affordance icon **4360** in genres icon **4350**) and the finger-down event occurs at or near the control icon.

One or more finger-dragging events are detected on the touch screen display (e.g., the finger drag from **4346-1** (FIG. **43**K) to **4346-2** (FIG. **43**L) to **4346-3** via **4365** (FIG. **43**L)).

The first user interface object is moved on the touch screen display along a path determined by the finger-dragging events until the first user interface object at least in part overlaps the second user interface object.

In some embodiments, while moving the first user interface object on the touch screen display, the first user interface object is displayed in a manner visually distinguishable from other user interface objects on the touch screen display (e.g., the shading around genres icon **4350** in FIG. **43**L).

A finger-up event is detected at the second user interface object (e.g., ending contact at **4346-3**, FIG. **43**L).

The second user interface object (e.g., artists icon **4310**, FIG. **43**L) is visually replaced with the first user interface object (e.g., genres icon **4350**, FIG. **43**M).

In some embodiments, upon detecting the finger-up event, the first user interface object is displayed at a location formerly occupied by the second user interface object, and a movement of the second user interface object to a location formerly occupied by the first user interface object is animated (e.g., in FIG. **43**M, artists **4310** is now part of the list that used to include genres **4350**).

In some embodiments, the first user interface object is displayed in a first form before the finger-up event and in a second form after the finger-up event, and the second form is visually different from the first form. In some embodiments, the first form is a row including characters and at least one control icon (e.g., **4350**, FIG. **43**K) and the second form is an image or other graphic (e.g., **4350**, FIG. **43**M).

In some embodiments, the second user interface object is displayed in a first form before the finger-up event and in a second form after the finger-up event, and the second form is visually different from the first form. In some embodiments, the first form is an image or other graphic (e.g., **4310**, FIG. **43**K) and the second form is a row (e.g., **4310**, FIG. **43**M) including characters associated with at least one control icon (e.g., **4360-2**, FIG. **43**M). In some embodiments, the second form is a row including characters near, or within a predefined distance, corresponding to a hit region for the control icon.

In some embodiments, the first user interface object is one of a group of candidate icons and the second user interface object is one of a group of user favorite icons. In some embodiments, the remaining group of candidate icons is rearranged after moving the first user interface object away from its original location. The remaining group of candidate icons is the group of candidate icons excluding the first user interface object. Upon detecting the finger-up event, the first user interface object is displayed at a location formerly occupied by the second user interface object and a movement of the second user interface object to a location formerly occupied by one of the remaining group of candidate icons is animated.

FIGS. **43**N-**43**P illustrate another way the major content categories that are displayed in the first area **4340** of the display can be rearranged by a user to correspond to the user's preferred (favorite) categories. The categories that are included in area **4340** may also be listed in a first list area **4364** in the more list **4362** (e.g., above separator **4352** in the more list **4362**), with the candidate categories listed in a second list area **4366** in the more list **4362** (e.g., below separator **4352** in the more list **4362**). In response to detection of a finger down event (e.g., **4346-5**, FIG. **43**N); one or more finger dragging events (e.g., from **4346-5** to **4346-6** (FIG. **43**O) to **4346-7** (FIG. **43**P)); and a finger up event (e.g., at **4346-7**), a first user interface object (e.g., genres icon **4350**) may replace a second user interface object (e.g., artists icon **4310**) in both the first list area **4364** and in area **4340** (e.g., **4350-1** and **4350-2**, FIG. **43**P), with the second user interface object moving to the second list area **4366** (e.g., **4310**, FIG. **43**P).

In some embodiments, a portable multifunction device displays a first group of user interface objects on the touch screen display (e.g., icons in the more list **4362**, FIG. **43**K, which are candidates for rearrangement). A second group of user interface objects is displayed on the touch screen display (e.g., icons in area **4340**). A finger-down event is detected on the touch screen display (e.g., contact **4346-1**, FIG. **43**K). A first user interface object (e.g., genres icon **4350**, FIG. **43**K) in the first group at which the finger-down event occurs is identified. One or more finger-dragging events are detected on the touch screen display (e.g., the finger drag from **4346-1** (FIG. **43**K) to **4346-2** (FIG. **43**L) to **4346-3** via **4365** (FIG. **43**L)). The first user interface object on the touch screen display is moved in accordance with the finger-dragging events. A finger-up event is detected on the touch screen display (e.g., ending contact at **4346-3**, FIG. **43**L). A second user interface object (e.g., artists icon **4310**, FIG. **43**K) in the second group at which the finger-up event occurs is identified. The second user interface object is visually replaced with the first user interface object (e.g., artists icon **4310** in FIG. **43**L is visually replaced with genres icon **4350** in FIG. **43**M).

Additional description of user interface object reconfiguration can be found in U.S. Provisional Patent Application No. 60/937,990, "Portable Multifunction Device, Method, and Graphical User Interface Supporting User Navigations of Graphical Objects on a Touch Screen Display," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/969,809, "Portable Multifunction Device, Method, and Graphical User Interface Supporting User Navigations of Graphical Objects on a Touch Screen Display," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

U.S. Provisional Patent Application No. 60/936,562, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Jun. 20, 2007, and U.S. patent application Ser. No. 11/968,067, "Portable Multifunction Device, Method, and Graphical User Interface for Playing Online Videos," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety, describes a way that major online video content categories can be rearranged by a user to correspond to the user's preferred (favorite) categories. The teachings in that application are also applicable here to rearranging major music and/or video categories.

Referring again to the user interface **4300**J in FIG. **43**J, a list of content categories (e.g., Albums) is displayed on the touch screen display. FIGS. **43**Q-**43**T and **43**W-**43**AA are exemplary user interfaces illustrating these content categories in detail in accordance with some embodiments.

FIG. **43**Q is an exemplary user interface for Albums category **4371**, which is displayed in response to a user selection of the corresponding album category icon in FIG. **43**J. In some embodiments, user interface **4300**Q includes the following elements, or a subset or superset thereof:

More icon **4373**, which, if selected (e.g., by a finger tap on the icon), brings back display of user interface **4300**J;

Now Playing icon **4302** that when activated (e.g., by a finger tap on the icon) takes the user directly to a UI displaying information about the currently playing content (e.g., FIG. **43**S);

One or more alphabetic icons **4375-1**, **4375-2**;

One or more individual album icons **4377-1** to **4377-5**, which are grouped under different alphabetic icons; and

Alphabetic list **4379** that helps a user to navigate quickly through the list of albums to albums beginning with a particular letter.

FIG. **43**R is an exemplary user interface for presenting tracks (e.g., songs) within an album, which is displayed in response to a user selection **4370** of an individual album (e.g., "Abbey Road" **4377-1** in FIG. **43**Q). In some embodiments, user interface **4300**R includes the following elements, or a subset or superset thereof:

Albums icon **4374**, which, if selected (e.g., by a finger tap on the icon), brings back display of user interface **4300**Q;

Now Playing icon **4302**, described above;

Shuffle song playing order icon **4376**;

One or more individual song icons **4372-1** to **4372-7**; and

Vertical bar **4398**, analogous to the vertical bars described above, which is displayed on top of the list of tracks in the album and which helps a user understand what portion of the list of tracks is being displayed.

FIG. **43**S is an exemplary user interface for playing a track, which is displayed in response to a user selection (e.g., by gesture **4378** in FIG. **43**R) of an individual track (e.g., "Come together" **4372-1** in FIG. **43**R) or now playing icon **4302**. In some embodiments, user interface **4300**S includes the following elements, or a subset or superset thereof:

Back icon **4380-1**, which, if selected (e.g., by a finger tap on the icon), brings back display of the previous user interface (e.g., **4300**R);

Cover flip icon **4380-2**, which, if selected (e.g., by a finger tap on the icon), flips the album cover **4380-4** over and displays a list of tracks in the album;

Repeat track play icon **4380-7**, which, if selected (e.g., by a finger tap on the icon), repeats the currently playing track;

Shuffle track play icon **4380-8** which, if selected (e.g., by a finger tap on the icon), plays the tracks on the album in a random order;

Progress bar **4380-3** that indicates what fraction of the track has been played and that may be used to help scroll through the track in response to a user gesture;

Album Cover **4380-4** that corresponds to the track, which may be automatically generated by the device or imported into the device from a different source; and

Music play control icons **4380-5**, which may include a Fast Reverse/Skip Backwards icon, a Fast Forward/Skip Forward icon, a Volume adjustment slider icon, a Pause icon, and/or a Play icon (not shown, which toggles with the Pause icon) that behave in an analogous manner to icons **2320**, **2322**, **2324**, **2306**, and **2304** described above with respect to the video player (FIGS. **23**A-**23**D).

In some embodiments, the repeat track play icon **4380-7**, the progress bar **4380-3**, and the shuffle track play icon **4380-8** appear on the touch screen display in response to a finger gesture on the display.

In some embodiments, the music play control icons **4380-5** appear on the touch screen display whenever a finger contact with the display is detected. The icons **4380-5** may stay on the display for a predefined time period (e.g., a few seconds) and then disappear until the next finger contact with the touch screen display is detected.

FIG. **43**T is an exemplary user interface of an enlarged album cover, which may be displayed in response to a user selection **4381** of the album cover **4380-4** in FIG. **43**S. In some embodiments, user interface **4300**T includes the same elements shown in FIG. **43**S, except, user interface **4300**T includes an enlarged version **4380-6** of the album cover **4380-4**.

In light of the description above of the Album category, the operation of other content categories in the More list (FIG. **43**J) will be apparent to one skilled in the art.

For example, FIG. **43**W is an exemplary user interface for a Genres category, which is displayed in response to a user selection of the corresponding category icon in FIG. **43**J. Each music genre occupies one row on the touch screen. A user can scroll through the list by vertical finger swipes.

FIG. **43**X is an exemplary user interface for a particular genre, which is displayed in response to a user selection (e.g., by gesture **4383** in FIG. **43**W) of one individual album (e.g., "Rock" in FIG. **43**W). Exemplary information presented in UI **4300**X may include songs and albums, music bands and artists associated with the particular genre.

FIG. **43**Y is an exemplary user interface for a Composers category, which is displayed in response to a user selection of the corresponding category icon in FIG. **43**J.

FIG. **43**Z is an exemplary user interface for a Compilations category, which is displayed in response to a user selection of the corresponding category icon in FIG. **43**J.

FIG. **43**AA is an exemplary user interface for a particular compilation, which is displayed in response to a user selection (e.g., by gesture **4385** in FIG. **43**Z) of an individual compilation (e.g., "Gold" in FIG. **43**Z). Exemplary information presented in UI **4300**AA may include the songs associated with the particular compilation.

FIG. **43**BB is an exemplary user interface for a song currently being played in response to a user selection (e.g., by gesture **4387** in FIG. **43**AA) of the Now Playing icon **4302** in FIG. **43**AA. In this particular example, the song currently being played is still "Come Together" from the album "Abbey Road". Therefore, user interface **4300**BB is virtually the same as user interface **4300**S except that the played timestamp and remaining timestamp have been altered.

As illustrated in FIG. **43**U and FIG. **43**V, a user rating may be applied to an item of content with a finger gesture.

In some embodiments, a portable multifunction device displays a series of ratings indicia (e.g., **4382**, FIGS. **43**U and **43**V) on a touch screen display. The ratings indicia comprise a lowest rating indicia and one or more progressively higher rating indicia. In some embodiments, the ratings indicia comprise stars (e.g., **4382-2**, FIG. **43**V). In some embodiments, the series of ratings indicia consists of five stars.

A finger gesture (e.g., **4384**, FIG. **43**V) by a user is detected on one or more of the ratings indicia, wherein the finger gesture contacts a last rating indicia immediately prior to breaking contact with the touch screen display (e.g., the third rating indicia in FIG. **43**V). In some embodiments, the finger gesture contacts the lowest rating indicia prior to contacting one or more of the progressively higher rating indicia. In some embodiments, the finger gesture is a swipe gesture.

A rating corresponding to the last rating indicia contacted by the finger gesture is used as input to a function or application in the device. For example, the three-star rating for the song "Come Together" in FIG. **43**V may be used to sort this content versus other content in the device and/or to determine how often this content is heard when content is played in a random order (e.g., shuffle mode **4376**, FIG. **43**R).

In some embodiments, the rating corresponding to the last rating indicia contacted by the finger gesture is used to give a rating for an item of content that is playable with a content player application on the device. In some embodiments, the item of content is an item of music and the content player application is a music player application. In some embodiments, the item of content is a video and the content player application is a video player application.

In some embodiments, the rating corresponding to the last rating indicia contacted by the finger gesture is used to give a rating for content on a web page that is viewable with a browser application on the device.

A graphical user interface on a portable multifunction device with a touch screen display comprises a series of ratings indicia **4382** on the touch screen display. The ratings indicia comprise a lowest rating indicia and one or more progressively higher rating indicia. In response to detecting a finger gesture by a user on one or more of the ratings indicia, wherein the finger gesture contacts a last rating indicia immediately prior to breaking contact with the touch screen display, a rating corresponding to the last rating indicia contacted by the finger gesture is used as input to a function or an application in the device.

As illustrated in FIGS. **43**BB-**43**DD, an application may change modes in response to a change in orientation of the device, with the two modes differing by more than a mere change in display orientation.

In some embodiments, a portable multifunction device with a rectangular touch screen display, which includes a portrait view and a landscape view, detects the device in a first orientation.

While the device is in the first orientation, an application is displayed in a first mode on the touch screen display in a first view (e.g., a hierarchical list mode for selecting music as illustrated in FIG. **43**A, FIG. **43**J, FIG. **43**Q, FIG. **43**R, and FIG. **43**BB).

The device is detected in a second orientation. In some embodiments, the first orientation and the second orientation are detected based on an analysis of data from one or more accelerometers (e.g., **168**). In some embodiments, the first orientation is rotated substantially 90° from the second orientation (e.g., by rotation **4392**, FIG. **43**BB to FIG. **43**CC).

In response to detecting the device in the second orientation, the application is displayed in a second mode on the touch screen display in a second view (e.g., FIG. **43**CC).

The first mode of the application differs from the second mode of the application by more than a change in display orientation. The application displays distinct or additional information in one of the first and second modes relative to the other of the first and second modes.

In some embodiments, the first view is the portrait view (e.g., FIG. **43**A, FIG. **43**J, FIG. **43**Q, FIG. **43**R, or FIG. **43**BB) and the second view is the landscape view (e.g., FIG. **43**CC). In some embodiments, substantially vertical finger gestures on or near the touch screen display are used to navigate in the first mode and substantially horizontal finger gestures (e.g., swipe gesture **4399**, FIG. **43**CC) on or near the touch screen display are used to navigate in the second mode.

In some embodiments, the first view is the landscape view and the second view is the portrait view.

In some embodiments, the rectangular touch screen display has a long axis and a short axis; the first orientation comprises a substantially vertical orientation of the long axis;

the second orientation comprises a substantially vertical orientation of the short axis; the first view is the portrait view (e.g., UI **4300**BB, FIG. **43**BB); and the second view is the landscape view (e.g. UI **4300**CC, FIG. **43**CC).

In some embodiments, the application is a music player, the first mode is a hierarchical list mode for selecting music (e.g., FIG. **43**A to more list, FIG. **43**J, to albums list, FIG. **43**Q, to album content list FIG. **43**R, to content, FIG. **43**S/**43**BB), the first view is the portrait view, the second mode is a cover flow mode for selecting albums (e.g., FIG. **43**CC), and the second view is the landscape view. The cover flow mode and other image modes are described in U.S. Provisional Patent Application No. 60/843,832, "Techniques And Systems For Browsing Media Content," filed Sep. 11, 2006; U.S. patent application Ser. No. 11/519,460, "Media Manager With Integrated Browsers," filed Sep. 11, 2006; and U.S. Provisional Patent Application No. 60/878,746 "Electronic Device With Image Based Browsing," filed Jan. 5, 2007, which are hereby incorporated by reference in their entirety. In some embodiments, in response to detecting a finger gesture on an album cover (e.g., gesture **4388**, FIG. **43**CC) or on an information icon (e.g., **4389**, FIG. **43**CC), the album cover is flipped over and information about tracks on the album is displayed (FIG. **43**DD).

In some embodiments, the application is an address book, the first mode is a list mode for displaying entries in the address book, the first view is the portrait view, the second mode is an image mode for displaying images associated with corresponding entries in the address book, and the second view is the landscape view.

In some embodiments, the application is a world clock, the first mode is a list mode for displaying a list of time zones, the first view is the portrait view, the second mode is a map mode for displaying one or more time zones in the list of time zones on a map, and the second view is the landscape view.

In some embodiments, the application is a calendar. In some embodiments, the application is a photo management application. In some embodiments, the application is a data entry application.

A graphical user interface on a portable multifunction device with a rectangular touch screen display with a portrait view and a landscape view comprises a first mode of an application that is displayed in the portrait view and a second mode of the application that is displayed in the landscape view. In response to detecting the device in a first orientation, the first mode of the application is displayed in the portrait view. In response to detecting the device in a second orientation, the second mode of the application is displayed in the landscape view. The first mode of the application differs from the second mode of the application by more than a change in display orientation.

Such mode changes based on device orientation make the device easier to use because the user does not have to navigate through one or more display screens to get to a desired second mode or remember how to perform such navigation. Rather, the user merely needs to change the orientation of the device.

Additional description of mode changes based on device orientation can be found in U.S. Provisional Patent Application No. 60/947,300, "Modal Change Based on Orientation of a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/969,800, "Modal Change Based on Orientation of a Portable Multifunction Device," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

FIGS. **44**A-**44**J illustrate portrait-landscape rotation heuristics in accordance with some embodiments.

In some embodiments, information in some applications is automatically displayed in portrait view or landscape view in device **100** based on an analysis of data from the one or more accelerometers **168**. A user gesture (e.g. **4402**, FIG. **44**B), however, can override the view that is automatically chosen based on the accelerometer data. In some embodiments, the override ends when a second gesture (e.g., **4404**, FIG. **44**H) is detected (as described in Example 1 and Example 2 below, as illustrated by FIGS. **44**A-**44**E and **44**G-**44**J). In some embodiments, the override ends when the device is placed in an orientation where the displayed view matches the view recommended automatically based on the accelerometer data (as described in Example 3 and Example 4 below, as illustrated by FIGS. **44**A-**44**F). In some embodiments, the override ends after a predetermined time. In some embodiments, the override ends when the user changes applications or goes back to the menu screen (FIG. **4**A or **4**B). These override termination heuristics make the device easier to use because either a simple gesture is used to end the override or the override ends automatically based on predefined criteria.

Example 1

In some embodiments, a portable multifunction device with a rectangular touch screen display and one or more accelerometers displays information on the rectangular touch screen display in a portrait view (e.g., FIG. **44**A) or a landscape view (e.g., FIG. **44**B) based on an analysis of data received from the one or more accelerometers.

A first predetermined finger gesture (e.g., gesture **4402**, FIG. **44**B) is detected on or near the touch screen display while the information is displayed in a first view.

In response to detecting the first predetermined finger gesture, the information is displayed in a second view (e.g., FIG. **44**C) and the display of information is locked in the second view, independent of the orientation of the device (e.g., the display is locked in portrait view in FIGS. **44**C, **44**D, **44**E, and **44**G). In some embodiments, the first view is the landscape view (e.g., FIG. **44**B) and the second view is the portrait view (e.g., FIG. **44**A). In some embodiments, the first view is the portrait view and the second view is the landscape view.

A second predetermined finger gesture is detected on or near the touch screen display while the display of information is locked in the second view (e.g., gesture **4404**, FIG. **44**H).

In response to detecting the second predetermined finger gesture, the display of information in the second view is unlocked. For example, the display is unlocked in FIGS. **44**I and **44**J, so a portrait view is displayed when the long axis of the device is substantially vertical (FIG. **44**J) and a landscape view is displayed when the short axis of the device is substantially vertical (FIG. **44**I).

In some embodiments, the first and second predetermined finger gestures are multifinger gestures. In some embodiments, the first and second predetermined finger gestures are multifinger twisting gestures (e.g., gesture **4402**, FIG. **44**B and gesture **4404**, FIG. **44**H). In some embodiments, the first and second predetermined finger gestures occur on the touch screen display.

Example 2

In some embodiments, a portable multifunction device with a rectangular touch screen display, wherein the rectangular touch screen display includes a portrait view and a landscape view, detects the device in a first orientation (e.g., FIG. **44**A).

Information is displayed on the touch screen display in a first view while the device is in the first orientation.

The device is detected in a second orientation (e.g., FIG. **44**B).

In response to detecting the device in the second orientation, the information is displayed in a second view.

A first predetermined finger gesture (e.g., gesture **4402**, FIG. **44**B) is detected on or near the touch screen display while the information is displayed in the second view.

In response to detecting the first predetermined finger gesture, the information is displayed in the first view (e.g., FIG. **44**C) and the display of information is locked in the first view (e.g., the display is locked in portrait view in FIGS. **44**C, **44**D, **44**E, and **44**G).

A second predetermined finger gesture is detected on or near the touch screen display while the display of information is locked in the first view (e.g., gesture **4404**, FIG. **44**H).

In response to detecting the second predetermined finger gesture, the display of information in the first view is unlocked. For example, the display is unlocked in FIGS. **44**I and **44**J, so a portrait view is displayed when the long axis of the device is substantially vertical (FIG. **44**J) and a landscape view is displayed when the short axis of the device is substantially vertical (FIG. **44**I).

In some embodiments, the first view is the landscape view and the second view is the portrait view. In some embodiments, the first view is the portrait view (e.g., FIG. **44**A) and the second view is the landscape view (e.g., FIG. **44**B).

In some embodiments, the first and second predetermined finger gestures are multifinger gestures. In some embodiments, the first and second predetermined finger gestures are multifinger twisting gestures (e.g., gesture **4402**, FIG. **44**B and gesture **4404**, FIG. **44**H). In some embodiments, the first and second predetermined finger gestures occur on the touch screen display.

Example 3

In some embodiments, a portable multifunction device with a rectangular touch screen display and one or more accelerometers displays information on the rectangular touch screen display in a portrait view (e.g., FIG. **44**A) or a landscape view (e.g., FIG. **44**B) based on an analysis of data received from the one or more accelerometers.

A predetermined finger gesture (e.g., gesture **4402**, FIG. **44**B) is detected on or near the touch screen display while the information is displayed in a first view. In some embodiments, the predetermined finger gesture is a multifinger twisting gesture. In some embodiments, the predetermined finger gesture occurs on the touch screen display.

In response to detecting the predetermined finger gesture, the information is displayed in a second view (e.g., FIG. **44**C) and the display of information is locked in the second view.

The display of information in the second view is unlocked when the device is placed in an orientation where the second view is displayed based on an analysis of data received from the one or more accelerometers (e.g., FIG. **44**E). For example, the display is unlocked in FIGS. **44**E and **44**F, so a portrait view is displayed when the long axis of the device is substantially vertical (FIG. **44**E) and a landscape view is displayed when the short axis of the device is substantially vertical (FIG. **44**F).

In some embodiments, the first view is the landscape view (e.g., FIG. **44**B) and the second view is the portrait view (e.g., FIG. **44**A). In some embodiments, the first view is the portrait view and the second view is the landscape view.

Example 4

In some embodiments, a portable multifunction device with a rectangular touch screen display, wherein the rectangular touch screen display includes a portrait view and a landscape view, detects the device in a first orientation.

Information is displayed on the touch screen display in a first view while the device is in the first orientation (e.g., FIG. **44**A).

The device is detected in a second orientation.

In response to detecting the device in the second orientation, the information is displayed in a second view (e.g., FIG. **44**B).

A predetermined finger gesture (e.g., gesture **4402**, FIG. **44**B) is detected on or near the touch screen display while the information is displayed in the second view. In some embodiments, the predetermined finger gesture is a multifinger gesture. In some embodiments, the predetermined finger gesture occurs on the touch screen display.

In response to detecting the predetermined finger gesture, the information is displayed in the first view (e.g., FIG. **44**C) and the display of information is locked in the first view.

The display of information in the first view is unlocked when the device is returned to substantially the first orientation (e.g., FIG. **44**E). For example, the display is unlocked in FIGS. **44**E and **44**F, so a portrait view is displayed when the long axis of the device is substantially vertical (FIG. **44**E) and a landscape view is displayed when the short axis of the device is substantially vertical (FIG. **44**F).

In some embodiments, the first view is the landscape view and the second view is the portrait view. In some embodiments, the first view is the portrait view (e.g., FIG. **44**A) and the second view is the landscape view (e.g., FIG. **44**B).

In some embodiments, the first orientation and the second orientation are detected based on an analysis of data from one or more accelerometers. In some embodiments, the first orientation is rotated 90° from the second orientation.

Additional description of portrait-landscape rotation heuristics can be found in U.S. Provisional Patent Application No. 60/947,132, "Portrait-Landscape Rotation Heuristics for a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/960,671, "Portrait-Landscape Rotation Heuristics for a Portable Multifunction Device," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

Given the limited area on a touch screen display, one challenge is how to present various amount of information in a highly intuitive manner. FIGS. **45**A-**45**G are graphical user interfaces illustrating an adaptive approach for presenting information on the touch screen display in accordance with some embodiments. For illustrative purpose, the video folder in the music and video player module is shown. But it will be apparent to one skilled in the art that this approach is readily applicable to many other occasions with little or no modification (e.g., for displaying notification information for missed communications as described with respect to FIGS. **53**A-**53**D below).

For a given total number of user interface objects, the device may display information about at least two individual user interface objects if the total number meets a first predefined condition. In some embodiments, the device may display information about all the user interface objects on the touch screen display.

In some embodiments, the first predefined condition is that the total number of user interface objects is equal to or less than a predetermined threshold. In some other embodiments, the first predefined condition is that the total number of user interface objects is equal to or less than a maximum number of user interface objects that can be simultaneously displayed.

As shown in FIG. **45**A, the video folder has only four objects including two movies and two music videos. Since information about the four objects can fit into the touch screen display, a hierarchical approach of grouping the movies into one sub-folder and the music videos into another sub-folder is probably less preferred. Rather, the four objects are shown in a flat view with two labels **4510** and **4515** indicating the two media types.

In some embodiments, the device may present the information in a flat view if the total number of user interface objects is slightly more than what can fit into the display. A user can easily scroll the flat view up or down to see the hidden portion using a substantially vertical finger swipe gesture.

If the total number of user interface objects meets a second predefined condition, the device then divides the user interface objects into at least a first group of user interface objects and a second group of user interface objects. A first group icon is displayed for the first group of user interface objects. For the second group of user interface objects, at least one group member is shown on the touch screen display.

In some embodiments, the second predefined condition is that the total number of the first group of user interface objects is equal to or less than a predetermined threshold and the total number of the second group of user interface objects is greater than the predetermined threshold.

FIG. **45**B depicts that there are 30 music videos in the music video folder in total by four different artists or groups, 10 by the Beatles, 18 by U2, one by Bryan Adams, and one by Santana. Given the size of the touch screen display, a flat view of all the 30 music videos is probably less convenient because this may require multiple finger swipe gestures to scan through all the objects. Moreover, it is less intuitive to tell the artist for each individual music video. On the other hand, it is also inconvenient if the music videos by Santana and Bryan Adams each have their own sub-folder because a user has to open the sub-folder to see the music video's title while there is still blank space on the touch screen display.

Rather, FIG. **45**B is a hybrid view of information about the 30 music videos. A group icon **4520** is used for representing the Beatles' works and a group icon **4525** for U2's works. The group icon indicates the number of music videos in that sub-folder. A user can simply finger tap a group icon, e.g., **4525**, to learn more information about the 18 U2 music videos (FIG. **45**C). The other two music videos are displayed as two separate items, each including information about the artist and the music video's title.

If the total number of user interface objects meets a third predefined condition, the device divides the user interface objects into at least a third group of user interface objects and a fourth group of user interface objects. A third group icon is displayed for the third group of user interface objects. A fourth group icon is displayed for the fourth group of user interface objects.

In some embodiments, the third predefined condition is that the total number of the third group of user interface objects is greater than a predetermined threshold and the total number of the fourth group of user interface objects is greater than the predetermined threshold. In some embodiments, as shown in FIG. **45**D, a group icon (e.g., **4530** and **4535**) is displayed on the touch screen display even if the corresponding group is empty.

In some other embodiments, as shown in FIG. **45**E, only a group icon (e.g., **4540** and **4545**) whose associated group is not empty is displayed on the touch screen display. Each of the two groups has a sufficient number of objects that cannot fit into the touch screen display.

In some embodiments, the aforementioned information classification and presentation approach is an automatic and recursive process. Upon detecting a user selection of a respective group icon corresponding to the first, third or fourth groups of user interface objects, the device checks whether the user-selected group of user interface objects meet one of the first, second or third predefined conditions and then operates accordingly.

For example, in response to a user selection of the movies icon **4540**, a hybrid view of the movie information is displayed in FIG. **45**F. Like the hybrid view shown in FIG. **45**B, three movies are shown as individual items with detailed information and the other 17 movies are broken into two sub-groups, each having its own group icon Cartoon **(6) 4550** and Foreign **(11) 4555**.

In some embodiments, the user interface objects may be grouped by information type. For example, the objects in FIG. **45**A are broken into movie and music video. In some other embodiments, the user interface objects may be grouped by information source. For example, the objects in FIG. **45**D are broken into TV show and Podcast.

In some embodiments, a unique group identifier is assigned to each group of user interface objects in a flat view. For example, in FIG. **45**G the group labels **4510** and **4515** are exemplary group identifiers. When the user scrolls upward the list of user interface objects, the group identifier at the top of the list (e.g., movies **4510**) does not move until the last item in the movie group, i.e., The Shawshank Redemption, moves out of the screen (analogous to the scrolling described above with respect to FIGS. **43**E, **43**F, **43**H, and **43**I). At this time, the movies label **4510** is then replaced by the music videos label **4515**.

Additional description of adaptive user interface displays can be found in U.S. Provisional Patent Application No. 60/937,992, "Portable Multifunction Device, Method, and Graphical User Interface for Displaying User Interface Objects Adaptively," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,760, "Portable Multifunction Device, Method, and Graphical User Interface for Displaying User Interface Objects Adaptively," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

FIGS. **46**A-**46**C illustrate digital artwork created for a content file based on metadata associated with the content file in accordance with some embodiments.

Additional description of such artwork can be found in U.S. Provisional Patent Application No. 60/883,818, "Creating Digital Artwork Based On Content File Metadata," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,674, "Creating Digital Artwork Based On Content File Metadata," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

FIGS. **47**A-**47**E illustrate exemplary methods for moving a slider icon in accordance with some embodiments. Such slider icons have many uses, such as content progress bars (e.g., FIGS. **47**A and **47**B, and **2310** FIG. **23**B), volume and other level controls (e.g. **2324** FIG. **23**D), and switches (e.g., FIGS. **47**C-**47**E).

In some embodiments, a portable multifunction device (e.g., device **100**) with a touch screen display (e.g., display **112**) detects a finger contact (e.g., finger contact **4706**, FIG. **47**A, or **4734**, FIG. **47**C) with a predefined area (e.g., area **4702**, FIG. **47**A, or **4730**, FIG. **47**C) on the touch screen display. The predefined area includes an icon (e.g., icon **4732**, FIG. **47**C) that is configured to slide in a first direction in the predefined area on the touch screen display. In some embodiments, the predefined area comprises a slider bar (e.g., slider bar **4704**, FIG. **47**A). In some embodiments, the first direction is a horizontal direction on the touch screen display. In some embodiments, the first direction is a vertical direction on the touch screen display.

In some embodiments, the icon is moved to the finger contact upon detecting the finger contact with the predefined area. For example, slider bar **4704** moves to the finger contact **4706** upon detecting the finger contact **4706**, as shown in FIG. **47**A.

Movement of the finger contact is detected on the touch screen display from the predefined area to a location outside the predefined area. The movement of the finger contact on the touch screen display has a component parallel to the first direction and a component perpendicular to the first direction.

For example, in FIG. **47**B, movements **4710**, **4712**, and **4714** of the finger contact from finger contact location **4706** to finger contact location **4708** all have a component Adx **4716** parallel to the direction of motion of the slider bar **4704**. Similarly, movements **4710**, **4712**, and **4714** all have a component perpendicular to the direction of motion of the slider bar **4704** (not shown).

In another example, in FIG. **47**D, movements **4738**, **4740**, and **4742** of the finger contact from finger contact location **4734** to finger contact location **4736** all have a component Adx **4744** parallel to the direction of motion of the slider icon **4732**. Similarly, movements **4738**, **4740**, and **4742** all have a component perpendicular to the direction of motion of the slider icon **4732** (not shown). Additional movement of the finger contact from location **4736** to location **4738** has an additional component Adx **4746** (FIG. **47**E) parallel to the direction of motion of the slider icon **4732**.

The icon is slid in the predefined area in accordance with the component of the movement of the finger contact that is parallel to the first direction. In some embodiments, sliding of the icon is ceased if a break in the finger contact with the touch screen display is detected.

For example, in FIG. **47**B, the slider bar **4704** moves by a distance Δd_x equal to the parallel component Δd_x **4716** of movements **4710**, **4712**, and **4714**. In another example, in FIG. **47**D the slider icon **4732** moves by a distance Adx equal to the parallel component Δd_x **4744** of movements **4738**, **4740**, and **4742**. In FIG. **47**E, the slider icon **4732** moves by an additional distance $\Delta d_{x'}$ **4746** corresponding to additional movement of the finger contact from location **4736** to **4738**.

These methods for moving a slider icon permit a user to precisely position the slider icon without having the user's view of the slider icon obstructed by the user's finger.

Additional description of positioning a slider icon can be found in U.S. Provisional Patent Application No. 60/947,304, "Positioning a Slider Icon on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,064, "Positioning a Slider Icon on a Portable Multifunction Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

Notes Application

FIGS. **48**A-**48**C illustrate an exemplary user interface for managing, displaying, and creating notes in accordance with some embodiments. In some embodiments, user interface **4800**A (FIG. **48**A) includes the following elements, or a subset or superset thereof:

402, **404**, and **406**, as described above;

The number **4802** of existing notes;

Titles **4810** of existing notes;

Date **4812** and/or time of the note; and

Additional information icon **4814** that when activated (e.g., by a finger tap on the icon) initiates transition to the corresponding note (e.g., UI **4800**B, FIG. **48**B).

In some embodiments, detection of a user gesture **4816** anywhere in a row corresponding to a note initiates transition to the corresponding note (e.g., UI **4800**B, FIG. **48**B).

In some embodiments, user interface **4800**B (FIG. **48**B) includes the following elements, or a subset or superset thereof:

402, **404**, and **406**, as described above;

Notes icon **4820** that when activated (e.g., by a finger tap on the icon) initiates display of UI **4800**A;

title **4810-3** of the note;

a notepad **4824** for displaying text;

Previous note icon **4832** that when activated (e.g., by a finger tap on the icon) initiates display of the previous note;

Create email icon **4834** that when activated (e.g., by a finger tap on the icon) initiates transfer to the email application **140** and display of a UI for creating an email message (e.g., UI **3400**A, FIG. **34**A);

Trash icon **4836** that when activated (e.g., by a finger tap on the icon) initiates display of a UI for deleting the note; and

Next note icon **4838** that when activated (e.g., by a finger tap on the icon) initiates display of the next note.

In some embodiments, detection of a user gesture **4826** anywhere on the notepad **4824** initiates display of a contextual keyboard (e.g., UI **4800**C, FIG. **48**C) for entering text in the notepad **4824**.

In some embodiments, when a contextual keyboard is displayed, detection of a user gesture on text in the notepad **4824** initiates display of an insertion point magnifier **4830**, as described above with respect to FIGS. **6**I-**6**K.

In some embodiments, word suggestion techniques and user interfaces are used to make text entry easier. In some embodiments, a recommended word is put in the space bar (e.g., the recommended word "dinner" is in the space bar in FIG. **6**J) and detecting user contact with the space bar initiates acceptance of the recommended word. Additional description of word suggestion can be found in U.S. patent application Ser. No. 11/620,641, "Method And System For Providing Word Recommendations For Text Input," filed Jan. 5, 2007, and U.S. patent application Ser. No. 11/620,642, "Method, System, And Graphical User Interface For Providing Word Recommendations," filed Jan. 5, 2007, the contents of which are hereby incorporated by reference in their entirety.

Calendar

FIGS. **49**A-**49**N illustrate exemplary user interfaces for a calendar in accordance with some embodiments. Additional description of calendars can be found in U.S. Provisional Patent Application No. 60/883,820, "System And Method For Viewing And Managing Calendar Entries," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/969,786, "System and Method for Viewing And Managing Calendar Entries," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

In some embodiments, the use of date and time wheels simplifies the input of date and time information using finger gestures on a touch screen display (e.g. FIGS. **49**F, **49**G, **49**J, and **50**B).

In some embodiments, a portable multifunction device (e.g., device **100**) with a touch screen display (e.g., display **112**) displays: a month column (e.g., column **4990**, FIG. **49**J) comprising a sequence of month identifiers; a date column (e.g., column **4960**) comprising a sequence of date numbers; and a selection row (e.g., row **4968**) that intersects the month column and the date column and contains a single month identifier (e.g., "December" **4972**) and a single date number (e.g., "1" **4874**). In some embodiments, the month column, date column and selection row are simultaneously displayed.

A gesture (e.g., gesture **4992**) is detected on the month column. In some embodiments, the gesture on the month column is a finger gesture. In some embodiments, the gesture on the month column is a substantially vertical swipe. In some embodiments, the gesture on the month column is a substantially vertical gesture on or near the month column.

In response to detecting the gesture on the month column, the month identifiers in the month column are scrolled without scrolling the date numbers in the date column. In some embodiments, the month identifiers form a continuous loop in the month column.

A gesture (e.g., gesture **4982**) is detected on the date column. In some embodiments, the gesture on the date column is a finger gesture. In some embodiments, the gesture on the date column is a substantially vertical swipe. In some embodiments, the gesture on the date column is a substantially vertical gesture on or near the date column.

In response to detecting the gesture on the date column, the date numbers in the date column are scrolled without scrolling the month identifiers in the month column. In some embodiments, the date numbers form a continuous loop in the date column.

The single month identifier and the single date number in the selection row after scrolling the month identifiers and the date numbers, respectively, are used as date input for a function or application (e.g., calendar **148**) on the multifunction device.

A graphical user interface on a portable multifunction device with a touch screen display comprises: a month column comprising a sequence of month identifiers; a date column comprising a sequence of date numbers; and a selection row that intersects the month column and the date column and contains a single month identifier and a single date number. In response to detecting a gesture on the month column, the month identifiers in the month column are scrolled without scrolling the date numbers in the date column. In response to detecting a gesture on the date column, the date numbers in the date column are scrolled without scrolling the month identifiers in the month column. The single month identifier and the single date number in the selection row after scrolling the month identifiers and the date numbers, respectively, are used as date input for a function or application on the multifunction device.

Additional description of inputting date and time information can be found in U.S. Provisional Patent Application No. 60/947,146, "System, Method, and Graphical User Interface for Inputting Date and Time Information on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,051, "System, Method, and Graphical User Interface for Inputting Date and Time Information on a Portable Multifunction Device," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

Clock

FIGS. **50**A-**50**I illustrate exemplary user interfaces for a clock in accordance with some embodiments. In some embodiments, user interface **5000**A includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Names of locations **5010**;
- Clock icons **5012** and time and day information **5014** for each location **5010**;

- World clock icon **5020** that when activated in a UI other than UI **5000**A (e.g., by a finger tap on the icon) initiates display of a world clock (e.g., UI **5000**A);
- Alarm icon **5022** that when activated (e.g., by a finger tap on the icon) initiates display of an alarm clock (e.g., UI **5000**B, FIG. **50**B or UI **500**C, FIG. **5**C);
- Stopwatch icon **5024** that when activated (e.g., by a finger tap on the icon) initiates display of a stopwatch (e.g., UI **5000**E, FIG. **50**E); and
- Timer icon **5026** that when activated (e.g., by a finger tap on the icon) initiates display of a timer (e.g., UI **5000**H, FIG. **50**H).

FIG. **50**B illustrates an exemplary user interface for setting an alarm clock in accordance with some embodiments. In some embodiments, user interface **5000**B includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- alarm frequency setting icons **5036**, **5038**, **5040**, and **5042** for setting the frequency of the alarm;
- sound icon **5044** and beep icon **5046** for setting the sound associated with the alarm;
- additional setting options icon **5048** that when activated (e.g., by a finger tap on the icon) initiates display of a user interface for specifying additional alarm settings;
- wheels of time **5052** for displaying and setting the alarm time;
- enter icon **5060** for entering the alarm time displayed on the wheel of time **5052**;
- cancel icon **5032** that when activated (e.g., by a finger tap on the icon) returns the device to the previous user interface; and
- done icon **5034** that when activated (e.g., by a finger tap on the icon) saves the alarm settings specified by the user and returns the device to the previous user interface.

In some embodiments, the wheels of time **5052** are displayed in response to detection of a finger contact **5050**. The alarm time displayed on the wheels of time **5052** may be modified in response to detection of a substantially vertical swipe **5054** to change the hour setting, a substantially vertical swipe **5056** to change the minutes setting, and/or a substantially vertical swipe (e.g., **4988**, FIG. **49**F or **5058**, FIG. **50**B) to change the AM/PM setting. In some embodiments, in response to detection of a finger contact on the enter icon **5060**, the alarm time displayed on the wheels of time **5052** is saved and display of the wheels of time **5052** is ceased.

In some embodiments, the use of time wheels simplifies the input of time information using finger gestures on a touch screen display.

In some embodiments, a portable multifunction device (e.g., device **100**) with a touch screen display (e.g., display **112**) displays: an hour column (e.g., column **5062**, FIG. **50**B) comprising a sequence of hour numbers; a minute column (e.g., column **5064**, FIG. **50**B) comprising a sequence of minute numbers; and a selection row (e.g., row **5068**, FIG. **50**B) that intersects the hour column and the minute column and contains a single hour number (e.g., "6" **5076**) and a single minute number (e.g., "25" **5078**).

A gesture (e.g., gesture **5054**) is detected on the hour column. In some embodiments, the gesture on the hour column is a finger gesture. In some embodiments, the gesture on the hour column is a substantially vertical swipe.

In response to detecting the gesture on the hour column, the hour numbers in the hour column are scrolled without scrolling the minute numbers in the minute column. In some embodiments, the hour numbers form a continuous loop in the hour column.

A gesture (e.g., gesture **5056**) is detected on the minute column. In some embodiments, the gesture on the minute column is a finger gesture. In some embodiments, the gesture on the minute column is a substantially vertical swipe.

In response to detecting the gesture on the minute column, the minute numbers in the minute column are scrolled without scrolling the hour numbers in the hour column. In some embodiments, the minute numbers form a continuous loop in the minute column.

The single hour number and the single minute number in the selection row after scrolling the hour numbers and the date numbers, respectively, are used as time input for a function or application on the multifunction device.

A graphical user interface on a portable multifunction device with a touch screen display comprises: a hour column comprising a sequence of hour numbers; a minute column comprising a sequence of minute numbers; and a selection row that intersects the hour column and the minute column and contains a single hour number and a single minute number. In response to detecting a gesture on the hour column, the hour numbers in the hour column are scrolled without scrolling the minute numbers in the minute column. In response to detecting a gesture on the minute column, the minute numbers in the minute column are scrolled without scrolling the hour numbers in the hour column. The single hour number and the single minute number in the selection row after scrolling the hour numbers and the minute numbers, respectively, are used as time input for a function or application on the multifunction device.

In some embodiments, the date and time wheels are combined to make it easy to set a date and time with finger gestures. For example, FIG. **49**F shows date and time wheels with a single month and date column, an hour column, a minutes column, and an AM/PM column for inputting date and time information for calendar events.

In some embodiments, a portable multifunction device (e.g., device **100**) with a touch screen display (e.g., display **112**) displays a date column (e.g., column **4960**, FIG. **49**F) comprising a sequence of dates, an hour column (e.g., column **4962**) comprising a sequence of hour numbers; and a minute column (e.g., column **4964**) comprising a sequence of minute numbers. A respective date in the sequence of dates comprises a name of a month (e.g., "Dec." **4972**) and a date number (e.g., "18" **4974**) of a day within the month. In some embodiments, the respective date in the sequence of dates further comprises a day of the week (e.g., "Mon." **4970**) corresponding to the name of the month and the date number of the day within the month.

The device also displays a selection row (e.g., row **4968**) that intersects the date column, the hour column, and the minute column and contains a single date (e.g., **4970**, **4972**, and **4974**), a single hour number (e.g., "12" **4976**), and a single minute number (e.g., "35" **4978**).

A gesture (e.g., gesture **4982**) on the date column is detected. In response to detecting the gesture on the date column, the dates in the date column are scrolled without scrolling the hour numbers in the hour column or the minute numbers in the minute column. In some embodiments, the gesture on the date column is a finger gesture. In some embodiments, the gesture on the date column is a substantially vertical swipe.

A gesture (e.g., gesture **4984**) on the hour column is detected. In response to detecting the gesture on the hour column, the hour numbers in the hour column are scrolled without scrolling the dates in the date column or the minute numbers in the minute column. In some embodiments, the gesture on the hour column is a finger gesture. In some embodiments, the gesture on the hour column is a substantially vertical swipe. In some embodiments, the hour numbers form a continuous loop in the hour column.

A gesture (e.g., gesture **4986**) on the minute column is detected. In response to detecting the gesture on the minute column, the minute numbers in the minute column are scrolled without scrolling the dates in the date column or the hour numbers in the hour column. In some embodiments, the gesture on the minute column is a finger gesture. In some embodiments, the gesture on the minute column is a substantially vertical swipe. In some embodiments, the minute numbers form a continuous loop in the minute column.

The single date, the single hour number, and the single minute number in the selection row after scrolling the dates, the hour numbers and the minute numbers, respectively, are used as time input for a function or application (e.g., calendar **148**) on the multifunction device.

FIG. **50**D illustrates another exemplary user interface for setting an alarm in accordance with some embodiments

For the stopwatch (FIGS. **50**E-**50**G), in response to activation of a start icon **5001** (FIG. **50**E), an elapsed time **5003** (FIG. **50**F) is displayed. In response to each activation of a lap icon **5005** (FIG. **50**F), corresponding lap times **5007** (FIG. **50**G) are displayed.

For the timer (FIGS. **50**H-**50**I), in response to activation of a start icon **5009** (FIG. **50**H), a remaining time **5011** (FIG. **50**) is displayed.

Widget Creation Application

FIGS. **51**A-**51**B illustrate exemplary user interfaces for creating a widget in accordance with some embodiments.

Additional description of user created widgets can be found in U.S. Provisional Patent Application Nos. 60/883,805, "Web Clip Widgets On A Portable Multifunction Device," filed Jan. 7, 2007, and 60/946,712, "Web Clip Widgets on a Portable Multifunction Device," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/850,011, "Web Clip Widgets On a Portable Multifunction Device," filed Sep. 4, 2007, the contents of which are hereby incorporated by reference in their entirety.

Map Application

FIGS. **52**A-**52**H illustrate exemplary user interfaces for a map application in accordance with some embodiments.

Upon detecting a user selection of the map icon **154** in FIG. 4B, the device renders the user interface **5200**A on its touch screen display. The user interface **5200**A includes a text box **5202** for a user to enter search term(s) and a bookmark icon **5204**. A default map is displayed on the touch screen display.

In some embodiments, the default map is a large map (e.g., the continental portion of the United States in FIG. **52**A). In some other embodiments, the default map is the last map displayed when the map module was previously used. In some other embodiments, the default map is a map of the geographical area that the device is currently located. To generate this map, data about the current location of the device is retrieved from a remote data center or the GPS module built into the device. This data is then submitted to a remote map server to generate a map of the local area.

In some embodiments, the device, periodically or not, generates a new version of the local map to replace the old version. When the user activates the map module, the latest version of the local map is displayed as the default map.

The user interface **5200**A also includes several application icons. For example, a user selection of the direction icon **5212** replaces the user interface **5200**A with a new interface through which the user can enter a begin address and an end address. For a given pair of addresses, the device can display information about the driving direction from the begin address to the end address and also the return driving directions.

A map search result may be displayed in one of three different views: (i) map view **5206**, (ii) satellite view **5208**, and (iii) list view **5210**. As shown in FIG. **52**C, the map view **5206** displays a geographical map covering the map search result with one or more clickable icons corresponding to the entities matching a user-provided search query within the geographical area. The satellite view **5210** replaces the geographical map with a satellite image of the same geographical area. The list view **5210** arranges the matching entities in the map search result into a list and displays the list in a primarily text format.

As shown in FIG. **52**B, a user selection of the text box **5202** replaces the bookmark icon **5204** with a delete icon **5214**. A soft keyboard **5216** appears in the lower portion of the touch screen display. The user can enter a search query by finger taps on the key icons. For example, the user enters the term "Sunnyvale, Calif." into the text field and then hits the search icon at the lower right corner of the keyboard.

FIG. **52**C depicts a graphical user interface **5200**C illustrating the map search result associated with the search query "Sunnyvale, Calif.". Note that the map search result is displayed in a map view. There is an arrow in the central region of map pointing to the City of Sunnyvale.

In some embodiments, a user can move the map on the touch screen display by a single stationary finger contact with the map followed by finger movements on the touch screen display. Through this operation, the user can view the neighboring areas not shown initially on the touch screen display. Various finger gestures discussed above in connection with FIG. **39**C can be used here to manipulate the map. For example, a finger de-pinching gesture zooms into the map to display more details of the local geographical information. A finger pinching gesture zooms out of the map to provide a map of a broader area including the area covered by the map.

FIG. **52**D depicts a graphical user interface **5200**D illustrating the map search result associated with the query "Starbucks". The map search result includes the locations of Starbucks Coffee stores in the Sunnyvale area, each clickable balloon on the map representing one store in the area. One of the stores at approximately the center of the map is highlighted by a larger label icon **5217**. The label icon **5217** includes an arrow icon **5218**.

FIG. **52**E depicts a graphical user interface **5200**E illustrating the details of one Starbucks store, which are displayed in response to a user selection of the arrow icon **5218** in FIG. **52**D. A local map **5220** provides more details about this Starbucks store. There is a phone call icon **5222** including the store's phone number. User selection of the phone call icon (e.g., by a finger tap on the icon) initiates a phone call to the store and the user interface **5200**E is replaced with a phone call user interface (e.g., **3000**A in FIG. **30**A).

FIG. **52**F depicts a graphical user interface **5200**F that is displayed in response to a user selection of the local map **5220**. An enlarged version of the map **5224** occupies most of the touch screen display. In addition to the phone call icon **5222**, there may also be a URL link icon **5250** to the store's homepage. User selection of the URL link icon **5250** (e.g., by a finger tap on the icon) may initiate display of the corresponding web page in the browser application **147**.

FIG. **52**G depicts a graphical user interface **5200**G that is displayed in response to a user selection of the list view icon in FIG. **52**D. A user selection **5226** of a store address in the list brings the user back to interface **5200**D shown in FIG. **52**D. The label icon **5217** is next to the user-selected store in the list. A user selection **5228** of the more detail icon brings back the user interface **5200**E shown in FIG. **52**E for the corresponding store.

FIG. **52**H depicts a graphical user interface **5200**H with a list of user-specified address bookmarks, which is displayed in response to a user selection of the bookmark icon **5204** in FIG. **52**A. A finger tap on one bookmark item (e.g., Moscone West) causes the current user interface to be replaced by a map covering the bookmark item. For example, a user selection of Colosseum causes the device to display a map or satellite image of the area in Rome that includes the Colosseum.

Additional description of providing maps and directions can be found in U.S. Provisional Patent Application No. 60/936,725, "Portable Multifunction Device, Method, and Graphical User Interface for Providing Maps and Directions," filed Jun. 22, 2007, and U.S. patent application Ser. No. 11/969,211, "Portable Multifunction Device, Method, and Graphical User Interface for Providing Maps and Directions," filed Jan. 3, 2008, the content of which is hereby incorporated by reference in its entirety.

General Touch Screen/System UI Features

Start Up/Shut Down/Wake Up

FIGS. **53**A-**53**D illustrate exemplary user interfaces for displaying notification information for missed communications in accordance with some embodiments.

Additional description of displaying notification information for missed communications can be found in U.S. Provisional Patent Application No. 60/883,804, "System And Method For Displaying Communication Notifications," filed Jan. 7, 2007 and U.S. patent application Ser. No. 11/770,718, "Portable Multifunction Device, Method, and Graphical User Interface for Managing Communications Received While in a Locked State," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIG. **54** illustrates a method for silencing a portable device in accordance with some embodiments.

Additional description of methods for silencing a portable device can be found in U.S. Provisional Patent Application No. 60/883,802, "Portable Electronic Device With Alert Silencing," filed Jan. 7, 2007 and U.S. patent application Ser. No. 11/770,727, "Portable Electronic Device with Alert Silencing," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

FIGS. **55**A-**55**D illustrate a method for turning off a portable device in accordance with some embodiments.

Additional description of methods for turning off a portable device can be found in U.S. Provisional Patent Application No. 60/883,786, "Power-Off Methods For Portable Electronic Devices," filed Jan. 6, 2007, and U.S. patent application Ser. No. 11/770,722, "Power-Off Methods For Portable Electronic Devices," filed Jun. 28, 2007, the contents of which are hereby incorporated by reference in their entirety.

Cursor

FIGS. **56**A-**56**L illustrate exemplary methods for determining a cursor position in accordance with some embodiments.

In some embodiments, as shown in FIG. **56**A, the touch screen display displays multiple user interface objects **5602**-**5608**. Exemplary user interface objects include an open icon, a close icon, a delete icon, an exit icon, or soft keyboard key icons. Some of these icons may be deployed within a small region on the touch screen display such that one icon is adjacent to another icon.

When there is a finger contact with the touch screen display, unlike the conventional mouse click, the finger has a certain contact area (e.g., **5610** in FIG. **56**A) on the touch screen display. In some embodiments, a cursor position corresponding to the finger's contact area **5610** with the touch screen display needs to be determined. A user interface object at or near the cursor position may then be activated to perform a predefined operation.

As shown in FIGS. **59**A-**59**D, a finger contact with the touch screen display (e.g., a finger tap) is a process involving multiple actions including the finger approaching the display, the finger being in contact with the display, and the finger leaving the display. During this process, the finger's contact area increases from zero to a maximum contact area and then reduces to zero. In some embodiments, for a stationary finger contact with the display, the detected contact area **5610** corresponds to the maximum contact area of the finger with the display during a time period corresponding to the stationary contact.

A first position associated with the contact area **5610** is determined. As will be explained below, the first position may or may not be the cursor position corresponding to the finger contact. But the first position will be used to determine the cursor position.

In some embodiments, as shown in FIG. **56**B, the first position P_1 is the centroid of the contact area **5610**.

In some other embodiments, when a finger is in physical contact with the touch screen display, the finger's pressure on the display is detected, which varies from one position to another position. Sometimes, the position at which a user applies the maximum pressure may not be the centroid P_1 of the contact area. But the maximum pressure position P_2 is probably closer to the user's target. There is often a fixed distance between the centroid of the contact area and the corresponding maximum pressure's position. As shown in FIG. **56**H, the contact area **5610** is elliptical with a major axis, a minor axis perpendicular to the major axis, and a centroid P_1. Given that there is a substantially constant offset Δd' from the centroid P_1 to the maximum pressure position P_2 along the major axis, the first position or the maximum pressure position P_2 can be determined from P_1 and Δd'.

A cursor position P associated with the finger contact is determined based on one or more parameters, including the location of the first position, i.e., P_1 in FIG. **56**B or P_2 in FIG. **56**H, one or more distances between the first position and one or more of the user interface objects near the first position, and, in some embodiments, one or more activation susceptibility numbers associated with the user interface objects (e.g., W_1-W_4 in FIG. **56**C or FIG. **56**I).

In some embodiments, as shown in FIGS. **56**C and **56**I, the distance between the first position (P_1 in FIG. **56**C or P_2 in FIG. **56**I) and a respective user interface object (**5602**, **5604**, **5606**, or **5608**) is the distance between the first position and a point on the user interface object that is closest to the first position.

In some other embodiments, as shown in FIGS. **56**D and **56**J, the distance between the first position (P_1 in FIG. **56**D or P_2 in FIG. **56**L) and a user interface object (**5602**, **5604**, **5606**, or **5608**) is the distance between the first position and the center of the user interface object.

In some embodiments, the offset between the cursor position and the first position (e.g., Δd in FIGS. **56**E and **56**F) is given by the formula as follows:

$$\Delta\vec{d} = \sum_i \Delta\vec{d}_i = \sum_i \frac{W_i}{d_i^n}\vec{u}_i,$$

where:

$\Delta\vec{d}$ is the offset between the cursor position P and the first position P_1,

$\Delta\vec{d}_i$ is an offset component associated with a user interface object I along the direction between the first position and the user interface object i,

W_i is an activation susceptibility number associated with the user interface object i,

d_i is a distance between the first position and the user interface object i,

n is a real number (e.g., 1), and

$\vec{u}_i$ is a unit vector along the direction of $\Delta\vec{d}_i$.

If the determined cursor position P is on a particular user interface object (e.g., **5602** in FIG. **56**E), the user interface object is activated to perform a predefined operation such as playing a song, deleting an email message, or entering a character to an input field.

In some embodiments, the activation susceptibility numbers assigned to different user interface objects have different values and signs depending on the operation associated with each object.

For example, as shown in FIG. **56**E, if the operation associated with the user interface object **5602** is reversible or otherwise non-destructive (e.g., the user interface object **5602** is the play icon **2304** of the music and video player module in FIG. **23**C), an activation susceptibility number W_1' having a first sign (e.g., "+") is assigned to the object **5602** such that the determined cursor position P is drawn closer to the object **5602** than the first position P_1, rendering the object **5602** easier to be activated. In this context, "non-destructive" is defined to mean an action that will not cause a permanent loss of information.

In contrast, as shown in FIG. **56**F, if the operation associated with the user interface object **5602** is irreversible or destructive of user information (e.g., the user interface object **5602** is the delete icon **3542** of the email module in FIG. **35**E), an activation susceptibility number W_1" having a second sign (e.g., "-") opposite to the first sign is assigned to the object **5602** such that the determined cursor position P may be further away from the object **5602** than the first position P_1, rendering the object **5602** harder to activate. Thus, when an object's associated activation susceptibility number has the second sign, the contact must be relatively precisely positioned over the object in order to activate it, with larger values of the activation susceptibility number corresponding to higher degrees of precision.

In some embodiments, the cursor position P is determined based on the first position, the activation susceptibility number associated with a user interface object that is closest to the first position, and the distance between the first position and the user interface object that is closest to the first position. In these embodiments, the cursor position P is not affected by the parameters associated with other neighboring user interface objects. For example, as shown in FIG. **56**K, the first position P_1 is closest to the user interface object **5602** that has an associated activation susceptibility number W_1. The distance between the first position P_1 and the object **5602** is d_1.

The cursor position P to be determined is only affected by these parameters, not by other neighboring user interface objects **5604**, **5606** or **5608**.

In some embodiments, as shown in FIG. **56**L, the cursor position is the same as the first position, which may be P_1 in FIG. **56**B or P_2 in FIG. **56**H, if the first position is within a particular user interface object (e.g., **5604**) on the display. In this case, there is no need to further offset the cursor position from the first position.

In some embodiments, as shown in FIG. **56**E, a finger contact does not have to occur exactly at an object to activate the object. Rather, the user interface object is activated as long as the determined cursor position falls within the user interface object. In some embodiments, a user interface object is activated if the determined cursor position falls within a user interface object's hidden hit region. For more information about an object's hidden hit region, please refer to the description below in connection with FIGS. **58**A-**58**D.

In some embodiments, at least some of the user interface objects involved in determining the cursor position in the formula above are visible on the touch screen display.

In some embodiments, the activation susceptibility numbers associated with the user interface objects (e.g., W_1-W_4) are context-dependent in a specific application module and change from one context to another context within the specific application module. For example, an object may have a first activation susceptibility number that is attractive to a cursor position at a first moment (in a first context of a specific application module), but a second activation susceptibility number that is less attractive or even repulsive (e.g., if the second activation susceptibility number has an opposite sign) to the cursor position at a second moment (in a second context of the specific application module).

FIGS. **56**M-**56**O illustrate an exemplary method for dynamically adjusting activation susceptibility numbers associated with soft keyboard keys as a word is typed with the soft keyboard keys in accordance with some embodiments. The user interface includes an input field **5620** and a soft keyboard **5640**. A user selection of any key icon of the soft keyboard **5640** enters a corresponding user-selected character in the input field **5620**. For illustrative purposes, as shown in FIG. **56**M, all the key icons initially have the same activation susceptibility number, 5.

FIG. **56**N depicts the activation susceptibility numbers associated with different key icons after two characters "Go" are entered into the input field **5620**. The activation susceptibility numbers associated with the key icons have been adjusted in accordance with the previously entered characters. For example, the activation susceptibility number of key icon "D" changes from 5 to 10 because "God" is a common English word. Thus, the key icon "D" may be activated even if the next finger contact is closer to the key icon "F" than to the key icon "D" itself. Similarly, the activation susceptibility numbers associated with key icons "A" and "0" are also increased because each of the strings "Goa" and "Goo" leads to one or more legitimate English words such as "Goal", "Good", or "Goad." In contrast, the activation susceptibility number of key icon "K" drops to 3 because the string "Gok" is not found at the beginning of any common English words.

FIG. **56**O depicts the updated activation susceptibility numbers associated with different key icons after another character "a" is entered into the input field **5620**. Given the string "Goa" that has been entered, the user may be typing the word "Goal." Accordingly, the activation susceptibility number associated with the key icon "L" increases to 9 whereas the activation susceptibility number associated with the key icon "0" drops to 2 because the string "Goao" is not found at the beginning of any common English words.

Additional description of determining a cursor position from a finger contact can be found in U.S. Provisional Patent Application No. 60/946,716, "Methods for Determining a Cursor Position from a Finger Contact with a Touch Screen Display," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/850,015, "Methods for Determining a Cursor Position from a Finger Contact with a Touch Screen Display," filed Sep. 4, 2007, the content of which is hereby incorporated by reference in its entirety.

Vertical and Horizontal Bars

As noted above, vertical and horizontal bars help a user understand what portion of a list or document is being displayed.

Vertical Bar for a List of Items

In some embodiments, a portable multifunction device displays a portion of a list of items on a touch screen display. The displayed portion of the list has a vertical position in the list.

In some embodiments, the list of items is a list of contacts (e.g. FIG. **8**A), a list of instant message conversations (e.g. FIG. **5**), a list of instant messages (e.g. FIG. **6**A), a list of photo albums (e.g. FIG. **13**B), a list of audio and/or video content (e.g. FIG. **21**C), a list of calendar entries (e.g. FIG. **49**A), a list of recent calls (e.g. FIG. **28**B), a list of mailboxes (e.g. FIG. **33**), a list of emails (e.g. FIG. **35**A), a list of settings (e.g. FIG. **36**), or a list of voicemail messages (e.g. FIG. **32**A).

An object is detected on or near the displayed portion of the list. In some embodiments, the object is a finger.

In response to detecting the object on or near the displayed portion of the list, a vertical bar is displayed on top of the displayed portion of the list. See, for example, vertical bar **640** in FIG. **6**G, and vertical bar **1314** in FIG. **13**A. The vertical bar has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. In some embodiments, the vertical bar has a vertical length that corresponds to the portion of the list being displayed. In some embodiments, the vertical bar is located on the right hand side of the displayed portion of the list. In some embodiments, the vertical bar is translucent or transparent. The vertical bar has a major axis and a portion of the list along the major axis of the vertical bar is not covered by the vertical bar.

In some embodiments, a movement of the object is detected on or near the displayed portion of the list. In some embodiments, the movement of the object is on the touch screen display. In some embodiments, the movement is a substantially vertical movement.

In response to detecting the movement, the list of items displayed on the touch screen display is scrolled so that a new portion of the list is displayed and the vertical position of the vertical bar is moved to a new position such that the new position corresponds to the vertical position in the list of the displayed new portion of the list. In some embodiments, scrolling the list has an associated speed of translation that corresponds to a speed of movement of the object. In some embodiments, scrolling the list is in accordance with a simulation of an equation of motion having friction.

After a predetermined condition is met, the display of the vertical bar is ceased. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the touch screen display. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the touch screen display for a predetermined time period. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the displayed portion of the list.

A graphical user interface on a portable multifunction device with a touch screen display comprises a portion of a list of items displayed on the touch screen display, wherein the displayed portion of the list has a vertical position in the list, and a vertical bar displayed on top of the portion of the list of items. In response to detecting an object on or near the displayed portion of the list, the vertical bar is displayed on top of the portion of the list of items. The vertical bar has a vertical position on top of the displayed portion of the list that corresponds to the vertical position in the list of the displayed portion of the list. After a predetermined condition is met, the display of the vertical bar is ceased.

Vertical Bar for an Electronic Document

In some embodiments, a portable multifunction device displays a portion of an electronic document on a touch screen display. The displayed portion of the electronic document has a vertical position in the electronic document. In some embodiments, the electronic document is a web page. In some embodiments, the electronic document is a word processing, spreadsheet, email or presentation document.

An object is detected on or near the displayed portion of the electronic document. In some embodiments, the object is a finger.

In response to detecting the object on or near the displayed portion of the electronic document, a vertical bar is displayed on top of the displayed portion of the electronic document. See for example vertical bar **1222** in FIG. **12**A and vertical bar **3962** in FIG. **39**H. The vertical bar has a vertical position on top of the displayed portion of the electronic document that corresponds to the vertical position in the electronic document of the displayed portion of the electronic document. In some embodiments, the vertical bar has a vertical length that corresponds to the portion of the electronic document being displayed. In some embodiments, the vertical bar is located on the right hand side of the displayed portion of the electronic document. In some embodiments, the vertical bar is translucent or transparent. The vertical bar has a major axis and a portion of the electronic document along the major axis of the vertical bar is not covered by the vertical bar (see, for example, vertical bar **1222** in FIG. **12**, and vertical bar **3962** in FIG. **39**H).

In some embodiments, a movement of the object is detected on or near the displayed portion of the electronic document. In some embodiments, the movement of the object is on the touch screen display. In some embodiments, the movement is a substantially vertical movement.

In response to detecting the movement, the electronic document displayed on the touch screen display is scrolled so that a new portion of the electronic document is displayed, and the vertical position of the vertical bar is moved to a new position such that the new position corresponds to the vertical position in the electronic document of the displayed new portion of the electronic document. In some embodiments, scrolling the electronic document has an associated speed of translation that corresponds to a speed of movement of the object. In some embodiments, scrolling the electronic document is in accordance with a simulation of an equation of motion having friction.

After a predetermined condition is met, the display of the vertical bar is ceased. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the touch screen display. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the touch screen display for a predetermined time period. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the displayed portion of the electronic document.

A graphical user interface on a portable multifunction device with a touch screen display comprises a portion of an electronic document displayed on the touch screen display, wherein the displayed portion of the electronic document has a vertical position in the electronic document, and a vertical bar displayed on top of the portion of the electronic document. In response to detecting an object on or near the displayed portion of the electronic document, the vertical bar is displayed on top of the portion of the electronic document. The vertical bar has a vertical position on top of the displayed portion of the electronic document that corresponds to the vertical position in the electronic document of the displayed portion of the electronic document. After a predetermined condition is met, the display of the vertical bar is ceased.

Vertical Bar and Horizontal Bar for an Electronic Document

In some embodiments, a portable multifunction device displays a portion of an electronic document on a touch screen display. The displayed portion of the electronic document has a vertical position in the electronic document and a horizontal position in the electronic document. In some embodiments, the electronic document is a web page. See for example FIG. **39**A. In some embodiments, the electronic document is a word processing, spreadsheet, email or presentation document.

An object is detected on or near the displayed portion of the electronic document. In some embodiments, the object is a finger.

In response to detecting the object on or near the displayed portion of the electronic document, a vertical bar and a horizontal bar are displayed on top of the displayed portion of the electronic document. See for example vertical bar **3962** and horizontal bar **3964** in FIG. **39**H. In some embodiments, the vertical bar is located on the right hand side of the displayed portion of the electronic document and the horizontal bar is located on the bottom side of the displayed portion of the electronic document. In some embodiments, the vertical bar and the horizontal bar are translucent or transparent.

The vertical bar has a vertical position on top of the displayed portion of the electronic document that corresponds to the vertical position in the electronic document of the displayed portion of the electronic document. In some embodiments, the vertical bar has a vertical length that corresponds to the vertical portion of the electronic document being displayed. The vertical bar has a major axis and a portion of the electronic document along the major axis of the vertical bar is not covered by the vertical bar.

The horizontal bar has a horizontal position on top of the displayed portion of the electronic document that corresponds to the horizontal position in the electronic document of the displayed portion of the electronic document. In some embodiments, the horizontal bar has a horizontal length that corresponds to the horizontal portion of the electronic document being displayed. The horizontal bar has a major axis, substantially perpendicular to the major axis of the vertical bar, and a portion of the electronic document along the major axis of the horizontal bar is not covered by the horizontal bar.

In some embodiments, a movement of the object is detected on or near the displayed portion of the electronic document. In some embodiments, the movement of the object is on the touch screen display.

In response to detecting the movement, the electronic document displayed on the touch screen display is translated so that a new portion of the electronic document is displayed. In some embodiments, the electronic document is translated in a vertical direction, a horizontal direction, or a diagonal direction. In some embodiments, the electronic document is translated in accordance with the movement of the object. In some embodiments, translating the electronic document has an associated speed of translation that corresponds to a speed of movement of the object. In some embodiments, translating the electronic document is in accordance with a simulation of an equation of motion having friction.

In response to detecting the movement, the vertical position of the vertical bar is moved to a new vertical position such that the new vertical position corresponds to the vertical position in the electronic document of the displayed new portion of the electronic document.

In response to detecting the movement, the horizontal position of the horizontal bar is moved to a new horizontal position such that the new horizontal position corresponds to the horizontal position in the electronic document of the displayed new portion of the electronic document.

After a predetermined condition is met, the display of the vertical bar and the horizontal bar is ceased. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the touch screen display. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the touch screen display for a predetermined time period. In some embodiments, the predetermined condition comprises ceasing to detect the object on or near the displayed portion of the electronic document.

A graphical user interface on a portable multifunction device with a touch screen display comprises a portion of an electronic document displayed on the touch screen display. The displayed portion of the electronic document has a vertical position in the electronic document and a horizontal position in the electronic document. The GUI also comprises a vertical bar displayed on top of the portion of the electronic document, and a horizontal bar displayed on top of the portion of the electronic document. In response to detecting an object on or near the displayed portion of the electronic document, the vertical bar and the horizontal bar are displayed on top of the portion of the electronic document. The vertical bar has a vertical position on top of the displayed portion of the electronic document that corresponds to the vertical position in the electronic document of the displayed portion of the electronic document. The horizontal bar has a horizontal position on top of the displayed portion of the electronic document that corresponds to the horizontal position in the electronic document of the displayed portion of the electronic document. After a predetermined condition is met, the display of the vertical bar and the horizontal bar is ceased.

Vertical and horizontal bars may have, without limitation, a rectangular cross section, a rectangular cross section with rounded corners, or a racetrack oval cross section with two opposing flat sides and two opposing rounded sides.

Additional description of the horizontal and vertical bars can be found in U.S. Provisional Patent Application No. 60/947,386, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Electronic Documents and Lists," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/968,059, "Portable Electronic Device, Method, and Graphical User Interface for Displaying Electronic Documents and Lists," filed Dec. 31, 2007, the content of which is hereby incorporated by reference in its entirety.

Gestures

FIGS. **57**A-**57**C illustrate an exemplary screen rotation gesture in accordance with some embodiments.

In some embodiments, a portable multifunction device (e.g., device **100**) displays a first application **5702** on a touch screen display (e.g., **112**) in a portrait orientation (e.g., FIG. **57**A). In some embodiments, the first application is a browser, a photo manager, a music player, or a video player. In most implementations, but not necessarily all, the display is rectangular, or substantially rectangular (e.g., the display may have rounded corners, but otherwise have a rectangular shape).

Simultaneous rotation of two thumbs (e.g., **5704**-L and **5704**-R) in a first sense of rotation is detected on the touch screen display **112**. In some embodiments, the first sense of rotation is a clockwise rotation (e.g., FIG. **57**C).

In some embodiments, the sense of rotation for each thumb is detected by monitoring the change in orientation of the contact area of the thumb with the touch screen display. For example, if the contact area of the thumb is elliptical, the change in the orientation of an axis of the ellipse may be detected (e.g., from contact ellipse **5706**-L in FIG. **57**A to contact ellipse **5708**-L in FIG. **57**B, as shown on an enlarged portion of touch screen **112** in FIG. **57**C). In some embodiments, at least some of a user's other fingers (i.e., fingers other than thumbs **5704**-L and **5704**-R) support the device **100** by contacting the backside of the device.

In some embodiments, the first sense of rotation is a counterclockwise rotation. For example, if thumb **5704**-L is initially on the lower left side of touch screen **112** (rather than the upper left side in FIG. **57**A), thumb **5704**-R is initially on the upper right side of touch screen **112** (rather than the lower right side in FIG. **57**A), and the thumbs are moved apart from each other, then the sense of rotation detected by the touch screen **112** will be counterclockwise for both thumbs.

In response to detecting the simultaneous rotation of the two thumbs in the first sense of rotation, the first application **5702** is displayed in a landscape orientation.

In some embodiments, the simultaneous two-thumb rotation gesture is used to override automatic changes in portrait/landscape orientation based on analysis of data from accelerometers **168** until a predetermined condition is met. In some embodiments, any changes in orientation of the device that are detected after the simultaneous rotation of the two thumbs is detected are disregarded until the device displays a second application different from the first application. In some embodiments, any changes in orientation of the device that are detected after the simultaneous rotation of the two thumbs is detected are disregarded until the device is put in a locked state or turned off. In some embodiments, any changes in orientation of the device that are detected after the simultaneous rotation of the two thumbs is detected are disregarded for a predetermined time period.

In some embodiments, simultaneous rotation of the two thumbs is detected in a second sense of rotation that is opposite the first sense of rotation on the touch screen display. In response to detecting the simultaneous rotation of the two thumbs in the second sense of rotation, the first application is displayed in a portrait orientation.

In some embodiments, any changes in orientation of the device that are detected after the simultaneous rotation of the two thumbs in the first sense is detected are disregarded until the simultaneous rotation of the two thumbs in the second sense is detected.

A graphical user interface on a portable multifunction device with a touch screen display comprises an application that is displayed in either a first orientation or a second orientation, the second orientation being 90° from the first orientation. In response to detecting simultaneous rotation of two thumbs in a first sense of rotation on the touch screen display, the display of the application changes from the first orientation to the second orientation. In some embodiments, the first orientation is a portrait orientation (e.g., FIG. **57**A) and the second orientation is a landscape orientation (e.g., FIG. **57**B). In some embodiments, the first orientation is a landscape orientation and the second orientation is a portrait orientation.

Additional description of gestures can be found in U.S. Provisional Patent Application Nos. 60/883,817, "Portable Electronic Device Performing Similar Operations For Different Gestures," filed Jan. 7, 2007, and 60/946,970, "Screen Rotation Gestures on a Portable Multifunction Device," filed Jun. 28, 2007, and U.S. patent application Ser. Nos. 11/850, 638, "Portable Electronic Device Performing Similar Operations For Different Gestures," filed Sep. 5, 2007, and 11/960, 667, "Screen Rotation Gestures on a Portable Multifunction Device," filed Dec. 19, 2007, the contents of which are hereby incorporated by reference in their entirety.

As noted above in connection with FIGS. **56**A-**56**L, a cursor position for a finger contact with the touch screen display is adjusted in part based on the activation susceptibility numbers (or weights) assigned to user interface objects. Such cursor position adjustment helps to reduce the chance of selecting a user interface object by mistake. Another approach to improving the chance of hitting a user-desired object icon is to associate the object icon with a hidden hit region. The hidden hit region overlaps the object icon but is larger than the object icon.

An issue with the hidden hit region approach is how to choose one user interface object over another when the hit regions of the two objects partially overlap and a finger contact (as represented by its cursor position) happens to fall into the overlapping hit regions.

FIGS. **58**A-**58**D illustrate a method of identifying a user-desired user interface object when a finger contact's corresponding cursor position falls into overlapping hit regions in accordance with some embodiments.

Two user interface objects, e.g., a button control user interface object **5802** and a slide control user interface object **5806**, are deployed close to each other on the touch screen display. For example, the button control object **5802** may be the backup control icon **2320**, the play icon **2304**, or the forward icon **2322**, and the slide control user interface object **5806** may be the volume control icon **2324** in the music and video player module (see, e.g., FIG. **23**C).

The button control user interface object **5802** has a hidden hit region **5804** and the slide control user interface object **5806** has a hidden hit region **5816**. The two hidden hit regions overlap at region **5810**.

Initially, a finger-down event at a first position on the touch screen display is detected. As will be explained below in connection with FIGS. **59**A-**59**G, a finger-down event may be a finger-in-range event or a finger-in-contact event at or near the touch screen display.

In some embodiments, as shown in FIG. **58**A, the finger-down event occurs at a position **5805** in the overlapping hit region **5810**. From the single finger-down event, it is impossible to determine whether the user intends to activate the button control user interface object **5802** or the slide control user interface object **5806**.

In some embodiments, given the finger-down event position **5805**, which is also the current cursor position, all the user interface objects that are associated with the position are identified. A user interface object is associated with a position if the position is within the user interface object or its hidden hit region. For illustrative purposes, the button control user interface object **5802** and the slide control user interface object **5806** are identified as being associated with the first position **5805**. Note that the slide control user interface object **5806** includes a slide bar **5803** and a slide object **5801**.

Next, a finger-up event is detected at a second position on the touch screen display. As will be explained below in connection with FIGS. **59**A-**59**G, a finger-up event may be a finger-out-of-contact event or a finger-out-of-range event at or near the touch screen display.

In some embodiments, or in some contexts of a specific application, the finger-out-of-contact event is used as the finger-up event instead of the finger-out-of-range event if the button control user interface object is activated, because a user receives a more prompt response. This is because, as shown in FIG. **59**E, the finger-out-of-contact event occurs at an earlier time $t=t_4$ than the finger-out-of-range event, which occurs at time $t=t_5$.

In some embodiments, or in some contexts of a specific application, the finger-out-of-range event is used as the finger-up event instead of the finger-out-of-contact event if the slide control user interface object is activated because the pair of finger-in-range and finger-out-of-range events are often used to move the slide object along the slide bar.

Given the first and second positions corresponding to the finger-down and finger-up events, a distance between the two positions is determined. If the distance is equal to or less than a first predefined threshold, the device performs a first action with respect to a first user interface object. If the distance is greater than a second predefined threshold, the device performs a second action with respect to a second user interface object. The first user interface object is different from the second user interface object. In some embodiments, the first and second predefined thresholds are the same. In some other embodiments, the second predefined threshold is higher than the first predefined threshold. In the latter embodiments, if the distance is between the two positions is between the first and second thresholds, neither the first nor the second user interface object is activated (or more generally, no action is performed with respect to either object. As a result, the user will need to more clearly indicate his or her intent by performing another gesture.

In some contexts in which the user gesture activates the slide control user interface object **5806**, the second position is within the hit region **5816** of the slide control user interface object **5806** (**5808** in FIG. **58**A). In some other contexts in which the user gesture activates the slide control user interface object **5806**, the second position is outside hit region **5816** (**5809** in FIG. **58**B), but has a projection onto the slide bar. In either case, the device moves the slide object **5801** along the slide bar **5803** in accordance with the distance between the first position and the second position. In some embodiments, the distance between the two positions is projected onto the slide bar. As shown in FIGS. **58**A-**58**B, the projected distance Δd_x corresponds to the amount by which the slide object **5801** is moved along the slide bar **5803**.

In some contexts in which the user gesture activates the button control user interface object **5802**, the second position is also within the overlapping hit region (**5803** in FIG. **58**C). In some other contexts in which the user gesture activates the button control user interface object **5802**, the second position is within the hit region **5804** of the object **5802**, but not within the slide control user interface object **5806**'s hit region. In either case, the device activates the button control user interface object **5802** to perform a predefined operation.

In some embodiments, after the finger-down event and before the finger-up event, a series of finger-dragging events are detected at positions on the touch screen display, but outside the slide control user interface object **5806**'s hit region **5816**. In this case, the device moves the slide object **5801** along the slide bar **5803** from its current position to a different position determined at least in part by each finger-dragging event's associated position on the touch screen display. The slide object **5801** stops at the second position when the finger-up event is detect. Exemplary graphical user interfaces of this embodiment are in FIGS. **47**A-**47**E.

Additional description of interpreting a finger gesture can be found in U.S. Provisional Patent Application No. 60/946,977, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Gesture on a Touch Screen Display," filed Jun. 28, 2007, and U.S. patent application Ser. No. 11/969,796, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Gesture on a Touch Screen Display," filed Jan. 4, 2008, the content of which is hereby incorporated by reference in its entirety.

Two types of finger gestures that a user may apply to a touch screen display are: (i) a finger tap or (ii) a finger swipe. A finger tap often occurs at a button-style user interface object (e.g., a key icon of the soft keyboard) and a finger swipe is often (but not always) associated with a slide control user interface object (e.g., the volume control icon of the music and video player).

In some embodiments, a parameter is used to describe the process of a finger approaching a touch screen display, contacting the touch screen display, and leaving the touch screen display. The parameter can be a distance between the finger and the touch screen display, a pressure the finger has on the touch screen display, a contact area between the finger and the touch screen, a voltage between the finger and the touch screen, a capacitance between the finger and the touch screen display or a function of one or more of the physical parameters.

In some embodiments, depending on the magnitude of the parameter (e.g., capacitance) between the finger and the touch screen display, the finger is described as (i) out of range from the touch screen display if the parameter is below an in-range threshold, (ii) in-range but out of contact with the touch screen display if the parameter is above the in-range threshold but lower than an in-contact threshold, or (iii) in contact with the touch screen display if the parameter is above the in-contact threshold.

FIGS. **59**A-**59**E illustrate how a finger tap gesture activates a soft key icon on a touch screen display in accordance with some embodiments.

At $t=t_1$ (FIG. **59**A), a user's finger moves down to a distance d_1 away from the touch screen display **112** of the device **100**. As shown in FIG. **59**E, this distance d_1 is beyond the in-range distance threshold. Therefore, no key icon on the touch screen display gets highlighted.

At $t=t_2$ (FIG. **59**B), the finger moves further down to a distance d_2 away from the touch screen display. As shown in FIG. **59**E, this distance d_2 is at or slightly below (i.e., within) the in-range distance threshold. At this distance the user's finger is in-range of the touch screen display. As a result, the key icon "H" that is close to the finger on the touch screen display is highlighted. In some embodiments, an icon is highlighted by altering its color or altering its shape (e.g., magnifying the icon) or both to give an indication to the user of its status change.

At $t=t_3$ (FIG. **59**C), the finger is distance d_3 away from the touch screen display. As shown in FIG. **59**E, this distance d_3 is at or slightly below the in-contact distance threshold. At this distance, the user's finger is in-contact with the touch screen display. As a result, the key icon "H" is further highlighted. In some embodiments, an icon is further highlighted by displaying a magnified instance of the icon next to the icon. As shown in FIG. **59**C, the magnified instance (which may have an appearance like a balloon) has a visual link with the key icon "H" on the soft keyboard.

At $t=t_4$ (FIG. **59**D), the finger is lifted up to a distance d_4 away from the touch screen display. As shown in FIG. **59**E, this distance d_4 is at or slightly above the in-contact distance threshold. In other words, the finger is just out of contact with the touch screen. In some embodiments, the sequence of finger movements from t_1 to t_4 corresponds to a finger tap gesture on the key icon "H". As a result, the key icon "H" is selected and entered into an input field at another location on the touch screen display.

At $t=t_5$ (FIG. **59**E), the finger is further lifted up to a distance d_5 away from the touch screen display, indicating that the finger is just out of range from the touch screen. In some embodiments, the key icon is selected and entered into the input field at this moment.

In some embodiments, the in-contact threshold corresponds to a parameter such as capacitance between the finger and the touch screen display. It may or may not correlate with the event that the finger is in physical contact with the touch screen. For example, the finger may be deemed in contact with the screen if the capacitance between the two reaches the in-contact threshold while the finger has not physically touched the screen. Alternatively, the finger may be deemed out of contact with (but still in range from) the screen if the capacitance between the two is below the in-contact threshold while the finger has a slight physical contact the screen.

Note that the distances shown in FIG. **59**A-**59**E or for that matter in other figures described in the application are exaggerated for illustrative purposes.

Additional description of interpreting a finger swipe gesture can be found in U.S. Provisional Patent Application No. 60/947,140, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Swipe Gesture," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,700, "Portable Multifunction Device, Method, and Graphical User Interface for Interpreting a Finger Swipe Gesture," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

FIGS. **59**F-**59**H illustrate how a finger swipe gesture controls a slide control icon on a touch screen display in accordance with some embodiments.

At $t=t_6$ (FIG. **59**F), the finger is close enough to the touch screen display such that a finger-in-contact event (see the cross at position A in FIG. **59**H) is detected at a first position A on the touch screen display. A user interface object such as a slide control icon is identified at the position A. The slide control icon may include a slide bar and a slide object that can move along the slide bar. In some embodiments, the slide object is at position A and the finger-in-contact event causes the slide object at position A to be activated.

In some embodiments, the slide object is activated by a finger-in-range event (see the cross at position A in FIG. **59**G), not by a finger-in-contact event (see the cross at position E_1 in FIG. **59**G).

At $t=t_8$ (FIG. **59**F), the finger moves across the touch screen display until a finger-out-of-range event is detected at a second position C on the touch screen display (see, e.g., the crosses at position C in FIGS. **59**G and **59**H respectively).

Following the movement of the finger, the slide object on the touch screen display moves along the slide bar from the first position A to the second position C on the touch screen display. A distance between the first position A and the second position C on the touch screen display is determined.

In some embodiments, after the initial finger-in-contact or finger-in-range event at position A, the finger moves away from the slide control icon such that the finger is no longer in contact with the slide object when the finger-out-of-range event occurs. Please refer to the description in connection with FIGS. **47**A-**47**E for detail. In this case, the distance by which the slide object is moved along the slide bar is determined by projecting the distance between the first position A and the second position C onto the slide bar.

In some embodiments, as shown in FIG. **59**F, after the initial finger-in-contact event or finger-in-range event is detected, a finger-dragging event on or near the touch screen display is detected at $t=t_7$, which has an associated position on the touch screen display. Accordingly, the slide object is moved along the slide bar of the slider control icon from its first position A to position B, which is determined at least in part by the finger-dragging event's associated position on the touch screen display.

In some embodiments, the finger-dragging event is generated and detected repeatedly. Accordingly, the slide object is moved along the slide bar from one position to another position until the finger-out-of-range event is detected.

In some embodiments, as shown in FIGS. **59**G and **59**H, after the initial finger-in-contact or finger-in-range event is detected, the finger may be in contact with the touch screen display at one moment (see the cross at E_1 in FIGS. **59**G and **59**H), thereby generating a finger-in-contact event, and then out of contact with the display at another moment (see the cross at E_2 in FIGS. **59**G and **59**H), thereby generating a finger-out-contact event. But these pairs of finger-in-contact event and finger-out-of-contact event on the touch screen display have no effect on the movement of the slide object along the slide bar. In other words, during a particular finger swipe gesture on the display, the finger may be within a certain range from the touch screen display, but only in contact with the screen for a portion of the gesture (as shown in FIG. **59**G), or it may even be the case that it is never in contact with the screen.

In some embodiments, a time period t from the moment t_6 of the finger-in-contact event or finger-in-range event to the moment t_8 of the finger-out-of-range event is determined. This time period t, in combination with the distance from the first position A to the second position C, determines whether a finger swipe gesture occurs on the touch screen display and if true, the distance by which (and the speed at which) the slide object needs to moved along the slide bar until the finger-out-of-range event is detected.

Heuristics

In some embodiments, heuristics are used to translate imprecise finger gestures into actions desired by the user.

FIG. **64**A is a flow diagram illustrating a method **6400** of applying one or more heuristics in accordance with some embodiments. A computing device with a touch screen display detects (**6402**) one or more finger contacts with the touch screen display. In some embodiments, the computing device is a portable multifunction device. In some embodiments, the computing device is a tablet computer. In some embodiments, the computing device is a desktop computer.

The device applies one or more heuristics to the one or more finger contacts to determine (**6404**) a command for the device. The device processes (**6412**) the command.

The one or more heuristics comprise: a heuristic for determining that the one or more finger contacts (e.g., **3937**, FIG. **39**C) correspond to a one-dimensional vertical screen scrolling command (**6406**); a heuristic for determining that the one or more finger contacts (e.g., **1626**, FIG. **16**A; **3532**, FIG.

35B; or **3939**, FIG. **39**C) correspond to a two-dimensional screen translation command (**6408**); and a heuristic for determining that the one or more finger contacts (e.g., **1616** or **1620**, FIG. **16**A; **2416**, FIG. **24**A) correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items (**6410**).

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., **1616** or **1618**, FIG. **16**A; **2416**, FIG. **24**A) correspond to a command to transition from displaying a respective item in a set of items to displaying a previous item in the set of items.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts correspond to a command to display a keyboard primarily comprising letters. For example, in some embodiments, gestures **1802** and **1818** (FIGS. **18**D & **18**E) correspond to a command to display a letter keyboard **616** (FIG. **18**E). Similarly, in response to gestures **1804** and **1806** (FIGS. **18**D & **18**E), the letter keyboard **616** is displayed (FIG. **18**E). In another example, a gesture **2506** (FIG. **25**C) on a text entry box results in display of a letter keyboard **616** (FIG. **25**D).

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts correspond to a command to display a keyboard primarily comprising numbers. For example, a gesture activating other number icon **812** (FIG. **8**B) results in display of a numerical keyboard **624** (FIG. **9**). In another example, a gesture on the zip code field **2654** in FIG. **26**L results in display of a keyboard primarily comprising numbers (e.g., keyboard **624**, FIG. **6**C).

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., gesture **3951**, FIG. **39**G) correspond to a one-dimensional horizontal screen scrolling command.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., contacts **3941** and **3943**, FIG. **39**C; contacts **3945** and **3947**, FIG. **39**D; contact by thumbs **5704**-L and **5704**-R, FIGS. **57**A-**57**C) correspond to a 90° screen rotation command.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., gesture **1216** or **1218**, FIG. **12**A; gesture **1618** or **1620**, FIG. **16**A; gesture **3923**, FIG. **39**A) correspond to a command to zoom in by a predetermined amount.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., contacts **1910** and **1912**, FIG. **19**B; contacts **2010** and **2012**, FIG. **20**; contacts **3931** and **3933**, FIG. **39**C) correspond to a command to zoom in by a user-specified amount.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts correspond to a command to show a heads up display. For example, contact with the touch screen **112** detected while a video **2302** (FIG. **23**A) is playing results in showing the heads up display of FIG. **23**C. In another example, detection of gesture **4030** (FIG. **40**B) results in the display of one or more playback controls, as shown in FIG. **40**C. The heads up display or playback controls may be displayed or superimposed over other content displayed on the touch screen **112**.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., contact **2722**, FIG. **27**B) correspond to a command to reorder an item in a list.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., contact **4346**, FIG. **43**L) correspond to a command to replace a first user interface object with a second user interface object.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., contacts **4214**, FIGS. **42**A & **42**C) correspond to a command to translate content within a frame (e.g., frame **4204**) rather than translating an entire page that includes the frame.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts correspond to a command to operate a slider icon (e.g., slider bar **4704**, FIGS. **47**A-**47**B; icon **4732**, FIGS. **47**C-**47**E) with one or more finger contacts (e.g., movements **4710**, **4712**, and **4714**, FIG. **47**B; movements **4738**, **4740**, and **4742**, FIG. **47**D) outside an area that includes the slider icon.

In some embodiments, the one or more heuristics include a heuristic for determining that the one or more finger contacts (e.g., a gesture moving the unlock image **302** across the channel **306**, FIGS. **3** & **53**B) correspond to a user interface unlock command.

In some embodiments, the one or more heuristics include a heuristic for determining which user interface object is selected when two user interface objects (e.g., button control user interface object **5802** and slide control user interface object **5806**, FIGS. **58**A-D) have overlapping hit regions (e.g., hit regions **5804** and **5816**).

In some embodiments, in one heuristic of the one or more heuristics, a contact (e.g., contact **3937**, FIG. **39**C) comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly vertical with respect to the touch screen display corresponds to a one-dimensional vertical screen scrolling command.

In some embodiments, in one heuristic of the one or more heuristics, a contact (e.g., contact **3939**, FIG. **39**C) comprising a moving finger gesture that initially moves within a predefined range of angles corresponds to a two-dimensional screen translation command.

In some embodiments, in one heuristic of the one or more heuristics, a contact comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly horizontal with respect to the touch screen display corresponds to a one-dimensional horizontal screen scrolling command. For example, a finger swipe gesture that initially moves within 27° of being perfectly horizontal corresponds to a horizontal scrolling command, in a manner analogous to vertical swipe gesture **3937** (FIG. **39**C).

In some embodiments, in one heuristic of the one or more heuristics, a contact (e.g., gestures **1802** and **1818**, FIGS. **18**D & **18**E; gesture **2506**, FIG. **25**C) comprising a finger tap gesture on a text box corresponds to a command to display a keyboard (e.g., keyboard **616**) primarily comprising letters.

In some embodiments, in one heuristic of the one or more heuristics, a contact (e.g., contacting other number icon **812**, FIG. **8**B; contacting the zip code field **2654** in FIG. **26**L) comprising a finger tap gesture on a number field corresponds to a command to display a keyboard primarily comprising numbers (e.g., keyboard **624**, FIG. **6**C).

In some embodiments, in one heuristic of the one or more heuristics, a contact (e.g., gesture **3941** and **3943**, FIG. **39**C; gesture **3945** and **3947**, FIG. **39**D) comprising a multifinger twisting gesture corresponds to a 90° screen rotation command.

In some embodiments, in one heuristic of the one or more heuristics, a contact (e.g., by thumbs **5704**-L and **5704**-R, FIGS. **57**A-**57**C) comprising a simultaneous two-thumb twisting gesture corresponds to a 90° screen rotation command.

In some embodiments, in one heuristic of the one or more heuristics, a contact comprising a double tap gesture on a box of content in a structured electronic document (e.g., a double tap gesture on block **3914-5**, FIG. **39**A) corresponds to a command to enlarge and substantially center the box of content. In some embodiments, repeating the double tap gesture reverses the prior zoom-in operation, causing the prior view of the document to be restored.

In some embodiments, in one heuristic of the one or more heuristics, a multi-finger de-pinch gesture (e.g., gesture **3931** and **3933**, FIG. **39**C) corresponds to a command to enlarge information in a portion of the touch screen display in accordance with a position of the multi-finger de-pinch gesture and an amount of finger movement in the multi-finger de-pinch gesture.

In some embodiments, in one heuristic of the one or more heuristics, an N-finger translation gesture (e.g., **4210**, FIGS. **42**A-**42**B) corresponds to a command to translate an entire page of content and an M-finger translation gesture (e.g., **4214**, FIGS. **42**A & **42**C) corresponds to a command to translate content within a frame (e.g., frame **4204**, FIGS. **42**A-**42**C) rather than translating the entire page of content that includes the frame.

In some embodiments, in one heuristic of the one or more heuristics, a swipe gesture on an unlock icon (e.g., a gesture moving the unlock image **302** across the channel **306**, FIGS. **3** & **53**B) corresponds to a user interface unlock command.

These heuristics help the device to behave in the manner desired by the user despite inaccurate input by the user.

FIG. **64**B is a flow diagram illustrating a method **6430** of applying one or more heuristics in accordance with some embodiments. While the method **6430** described below includes a number of operations that appear to occur in a specific order, it should be apparent that the method **6430** can include more or fewer operations, that an order of two or more operations may be changed and/or that two or more operations may be combined into a single operation. For example, operations **6446-6456** may be performed prior to operations **6432-6444**.

A computing device with a touch screen display displays (**6432**) a web browser application (e.g., UI **3900**A, FIG. **39**A). In some embodiments, the computing device is a portable multifunction device. In some embodiments, the computing device is a tablet computer. In some embodiments, the computing device is a desktop computer.

While the computing device displays the web browser application, one or more first finger contacts with the touch screen display are detected (**6434**).

A first set of heuristics for the web browser application is applied (**6436**) to the one or more first finger contacts to determine a first command for the device. The first set of heuristics includes: a heuristic for determining that the one or more first finger contacts (e.g., **3937**, FIG. **39**C) correspond to a one-dimensional vertical screen scrolling command (**6438**); a heuristic for determining that the one or more first finger contacts (e.g., **1626**, FIG. **16**A; **3532**, FIG. **35**B; or **3939**, FIG. **39**C) correspond to a two-dimensional screen translation command (**6440**); and a heuristic for determining that the one or more first finger contacts (e.g., gesture **3951**, FIG. **39**G) correspond to a one-dimensional horizontal screen scrolling command (**6442**).

The first command is processed (**6444**). For example, the device executes the first command.

In some embodiments, the first set of heuristics includes a heuristic for determining that the one or more first finger contacts (e.g., contacts **3941** and **3943**, FIG. **39**C; contacts **3945** and **3947**, FIG. **39**D; contact by thumbs **5704**-L and **5704**-R, FIGS. **57**A-**57**C) correspond to a 90° screen rotation command.

In some embodiments, the first set of heuristics includes a heuristic for determining that the one or more first finger contacts (e.g., gesture **1216** or **1218**, FIG. **12**A; gesture **1618** or **1620**, FIG. **16**A; gesture **3923**, FIG. **39**A) correspond to a command to zoom in by a predetermined amount.

In some embodiments, the first set of heuristics includes a heuristic for determining that the one or more first finger contacts (e.g., contacts **1910** and **1912**, FIG. **19**B; contacts **2010** and **2012**, FIG. **20**; contacts **3931** and **3933**, FIG. **39**C) correspond to a command to zoom in by a user-specified amount.

In some embodiments, the first set of heuristics includes a heuristic for determining that the one or more first finger contacts (e.g., contact **3923** on block **3914-5**, FIG. **39**A) correspond to a command to enlarge and substantially center a box of content.

In some embodiments, the first set of heuristics includes a heuristic for determining that the one or more first finger contacts (e.g., contacts **4214**, FIGS. **42**A & **42**C) correspond to a command to translate content within a frame (e.g., frame **4204**) rather than translating an entire page that includes the frame.

In some embodiments, the first set of heuristics includes: a heuristic for determining that the one or more first finger contacts correspond to a command to zoom in by a predetermined amount; a heuristic for determining that the one or more first finger contacts correspond to a command to zoom in by a user-specified amount; and a heuristic for determining that the one or more first finger contacts correspond to a command to enlarge and substantially center a box of content. In some embodiments, the first set of heuristics (or another set of heuristics) include one or more heuristics for reversing the prior zoom in operation, causing the prior view of a document or image to be restored in response to a repeat of the gesture (e.g., a double tap gesture).

While the device displays (**6446**) a photo album application (e.g., UI **1200**A, FIG. **12**A; UI **1600**A, FIG. **16**A; or UI **4300**CC, FIG. **43**CC), one or more second finger contacts with the touch screen display are detected (**6448**).

A second set of heuristics for the web browser application is applied (**6450**) to the one or more second finger contacts to determine a second command for the device. The second set of heuristics includes: a heuristic for determining that the one or more second finger contacts (e.g., **1218** or **1220**, FIG. **12**A; **1616** or **1620**, FIG. **16**A; **4399**, FIG. **43**CC) correspond to a command to transition from displaying a first image in a set of images to displaying a next image in the set of images (**6452**) and a heuristic for determining that the one or more second finger contacts (e.g., **1216** or **1220**, FIG. **12**A; **1616** or **1618**, FIG. **16**A; **4399**, FIG. **43**CC) correspond to a command to transition from displaying the first image in the set of images to displaying a previous image in the set of images (**6454**).

The second command is processed (**6456**). For example, the device executes the second command.

In some embodiments, the second set of heuristics includes a heuristic for determining that the one or more second finger contacts correspond to a command to zoom in by a predetermined amount. In some embodiments, the second set of heuristics (or another set of heuristics) include one or more heuristics for reversing the prior zoom in operation, causing the prior view of an image to be restored in response to a repeat of the gesture (e.g., a double tap gesture).

In some embodiments, the second set of heuristics includes a heuristic for determining that the one or more second finger contacts correspond to a command to zoom in by a user-specified amount.

In some embodiments, the second set of heuristics includes: a heuristic for determining that the one or more second finger contacts correspond to a one-dimensional vertical screen scrolling command; a heuristic for determining that the one or more second finger contacts correspond to a two-dimensional screen translation command; and a heuristic for determining that the one or more second finger contacts correspond to a one-dimensional horizontal screen scrolling command.

In some embodiments, while the device displays an application that receives text input via the touch screen display (e.g., UI **1800**D and UI **1800**E, FIGS. **18**D & **18**E; UI **2600**L, FIG. **26**L), one or more third finger contacts with the touch screen display are detected. A third set of heuristics for the application that receives text input is applied to the one or more third finger contacts to determine a third command for the device. The third set of heuristics includes a heuristic for determining that the one or more third finger contacts (e.g., gestures **1802** and **1818**, FIGS. **18**D & **18**E) correspond to a command to display a keyboard primarily comprising letters (e.g., letter keyboard **616**, FIG. **18**E) and a heuristic for determining that the one or more third finger contacts (e.g., a gesture on the zip code field **2654**, FIG. **26**L) correspond to a command to display a keyboard primarily comprising numbers (e.g., numerical keyboard **624**, FIG. **9**). The third command is processed.

In some embodiments, while the device displays a video player application (e.g., UI **2300**A, FIG. **23**A), one or more fourth finger contacts with the touch screen display are detected. A fourth set of heuristics for the video player application is applied to the one or more fourth finger contacts to determine a fourth command for the device. The fourth set of heuristics includes a heuristic for determining that the one or more fourth finger contacts correspond to a command to operate a slider icon (e.g., slider bar **4704**, FIGS. **47**A-**47**B; icon **4732**, FIGS. **47**C-**47**E) with one or more finger contacts (e.g., movements **4710**, **4712**, and **4714**, FIG. **47**B; movements **4738**, **4740**, and **4742**, FIG. **47**D) outside an area that includes the slider icon. The fourth set of heuristics also includes a heuristic for determining that the one or more fourth finger contacts correspond to a command to show a heads up display. For example, contact with the touch screen **112** detected while a video **2302** (FIG. **23**A) is playing results in showing the heads up display of FIG. **23**C. The heads up display is superimposed over the video **2302** that is also being displayed on the touch screen **112**. In another example, detection of gesture **4030** (FIG. **40**B) results in the display of one or more playback controls, as shown in FIG. **40**C. En the example shown in FIG. **40**C, the playback controls are superimposed over inline multimedia content **4002-1** that is also being displayed on the touch screen **112**. The fourth command is processed.

The heuristics of method **6430**, like the heuristics of method **6400**, help the device to behave in the manner desired by the user despite inaccurate input by the user.

Additional description of heuristics can be found in U.S. Provisional Patent Application No. 60/937,991, "Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/850,635, "Touch Screen Device, Method, and Graphical User Interface for Determining Commands by Applying Heuristics," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

Keyboards

FIGS. **60**A-**60**M illustrate exemplary soft keyboards in accordance with some embodiments.

A brief description of finger tap and finger swipe gestures is provided above in connection with FIGS. **59**A-**59**H. The same model is used below to illustrate how the device responds to a continuous finger movement on its touch screen display.

FIGS. **60**A-**60**G illustrate exemplary user interfaces for displaying one or more key icons in response to a continuous finger movement on or near a soft keyboard on a touch screen display in accordance with some embodiments. The soft keyboard includes multiple key icons.

At time $t=t_1$ (FIG. **60**A), a finger-in-contact event is detected at the key icon "H" and the key icon "H" is highlighted.

In some embodiments, the key icon is highlighted by displaying a balloon-type symbol near the key icon. For example, as shown in FIG. **60**A, the symbol is a magnified instance of the key icon "H". There is a visual link between the magnified instance and the key icon "H" to further highlight their relationship.

In some embodiments, the highlighted key icon is activated if a finger-out-of-contact event is detected at the key icon. If so, the character "H" is entered into a predefined location on the display (e.g., in an input field).

Subsequently, when the finger moves away from the key icon "H", the key icon "H" is de-highlighted. As shown in FIG. **60**B, although the finger moves away from the key icon "H", it is still in contact with the touch screen display. In other words, no finger-out-of-contact event is detected yet after the initial finger-in-contact event at $t=t_1$.

In some embodiments, the key icon is de-highlighted by removing the balloon-type symbol near the key icon "H". Sometimes, there is a predefined time delay between moving the finger away from the key icon "H" and removing the adjacent symbol.

Next, while being in consistent contact with the touch screen display, the finger is detected to be in contact with a second key icon "C" at time $t=t_2$ and this key icon is highlighted accordingly.

In some embodiments, the second key icon "C" is highlighted by displaying a balloon-type symbol near the key icon. As shown in FIG. **60**A, the symbol is a magnified instance of the key icon "C" near the key icon. There is also a visual link between the magnified instance and the key icon "C".

When the finger moves away from the second key icon "C", the second key icon is de-highlighted. The aforementioned series of operations repeats until a finger-out-of-contact event is detected at a particular location (e.g., the location occupied by the key icon "N") on the touch screen at time $t=t_3$.

In some embodiments, the finger-out-of-contact event is triggered when the finger is lifted off the touch screen display, and this event causes the selection or activation of a corresponding object if the finger-out-of-contact event occurs over or within a predefined range of the object. Continuing with the exemplary user gesture shown in FIG. **60**C, as a result of the finger-out-of-contact event, not only is the key icon "N" de-highlighted by removing its magnified instance, but an instance of the character "N" is displayed at a predefined location on the touch screen display (e.g., in a text input field).

As noted above, the distances d_1 and d_2 shown in FIG. **60**A are exaggerated for illustrative purposes. In some embodiments, the finger is always in physical contact with the touch screen from time $t=t_1$ to time $t=t_3$. The distances may be correlated with the finger's contact area or contact pressure on the touch screen display or the voltage or capacitance between the finger and the display.

As noted above in connection with FIG. **59**B, a user interface object (e.g., a key icon) may be highlighted whenever a finger is within a predefined range from the object. Therefore, in some embodiments, as shown in FIGS. **60**C-**60**D, a key icon is highlighted by altering its original appearance (without showing the balloon-type symbol) when the finger is within a predefined distance d_4 from the key icon at time $t=t_4$.

When the finger moves outside the predefined distance from the key icon, but still within a predefined range from the display (as shown in FIG. **60**D), the key icon resumes its original appearance.

In some embodiments, an icon's appearance is altered by changing its color or shape or both. In some other embodiments, an icon's appearance is altered by covering it with a magnified instance of the same icon.

As shown in FIG. **60**C, when the finger is moved within a predefined distance from the second key icon "C" at time $t=t_5$, the second key icon's original appearance is altered accordingly and then resumes to its original appearance when the finger subsequently moves outside the predefined distance from the second key icon.

Note that a difference between the embodiment shown in FIGS. **60**A-**60**B and the embodiment shown in FIGS. **60**C-**60**D is that a character "N" is selected and entered into an input field at time $t=t_3$ in FIGS. **60**A-**60**B, whereas no key icon is selected at time $t=t_6$ in FIGS. **60**C-**60**D because no finger-in-contact event was detected in the latter case.

As noted above, a parameter is used to characterize the relationship between the finger and the touch screen display in some embodiments. This parameter may be a function of one or more other parameters such as a distance, a pressure, a contact area, a voltage, or a capacitance between the finger and the touch screen display.

In some embodiments, as shown in FIG. **60**D, a user interface object (e.g., a first key icon) is highlighted (e.g., by altering its original appearance) when the parameter associated with the finger and the touch screen display occupied by the first key icon reaches or passes a first predefined level (e.g., the in-range threshold in FIG. **60**D) in a first direction (e.g., in a decreasing direction).

In some embodiments, a highlighted key icon is then de-highlighted (e.g., by resuming its original appearance) when the parameter associated with the finger and the touch screen display occupied by the highlighted key icon reaches or passes the first predefined level (e.g., the in-range threshold in FIG. **60**D) in a second direction that is opposite to the first direction (e.g., in an increasing direction).

In some embodiments, the first key icon is further highlighted (e.g., by displaying a balloon-type symbol next to the key icon) when the parameter associated with the finger and the touch screen display occupied by the first key icon reaches or passes a second predefined level (e.g., the in-contact threshold in FIG. **60**B) in the first direction (e.g., in the decreasing direction).

In some embodiments, the highlighted key icon is de-highlighted (e.g., by removing the balloon-type symbol next to the key icon) when the parameter associated with the finger and the touch screen display occupied by the first key icon reaches or passes the second predefined level (e.g., the in-contact threshold in FIG. **60**B) in a second direction that is opposite to the first direction (e.g., in an increasing direction). In some embodiments, the key icon's associated character is selected and entered into a predefined text input field.

In some embodiments, as shown in FIGS. **60**B and **60**D, the first and second predefined levels are configured such that the parameter reaches the first predefined level before reaching the second predefined level in the first direction. But the parameter does not have to reach the second predefined level before reaching the first predefined level in the second direction that is opposite to the first direction. For example, the parameter has to first reach the in-range threshold before it reaches the in-contact threshold. But the parameter may never reach the in-contact threshold before it moves out of the range from the key icon.

As noted above, only one key icon is selected in the embodiment shown in FIGS. **60**A-**60**B when the finger-out-of-contact event is detected at the key icon "N". Alternatively, a series of key icons can be selected without any finger-out-of-contact event if the parameter associated with the finger and the display is compared against another threshold level.

As shown in FIG. **60**F, a new "selection" threshold is used to compare with the parameters. In this particular embodiment, the selection threshold is set to be below the in-contact threshold.

At time $t=t_7$, a key icon "H" is highlighted when the finger meets a first predefined condition.

In some embodiments, the first predefined condition is that the parameter associated with the finger and the touch screen display occupied by the key icon reaches or passes a first predefined level (e.g., the in-contact threshold) in a first direction (e.g., in an decreasing direction).

At time $t=t_8$, the key icon "H" is selected when the finger meets a second predefined condition and the finger stays within a predefined distance from the touch screen display.

In some embodiments, the second predefined condition is that the parameter associated with the finger and the touch screen display occupied by the key icon reaches or passes a second predefined level in a second direction that is opposite to the first direction while the finger is still within a predefined distance from the first icon. In some embodiments, an instance of the selected key icon is entered at a predefined location on the touch screen display.

At time $t=t_9$, a key icon "C" is highlighted when the finger meets the first predefined condition.

At time $t=t_{10}$, the key icon "C" is selected when the finger meets the second predefined condition and the finger stays within a predefined distance from the touch screen display.

The aforementioned operations repeat until a finger-out-of-contact event is detected at time $t=t_{12}$ and an instance of the character "N" is the last one entered into the corresponding text input field.

FIG. **60**G is an exemplary graphical user interface illustrating a character string "HCN" is entered into the text field **6008** when the finger moves from position **6002** to **6004** and then to **6006**. The three balloon-type symbols are displayed temporarily when the finger is in contact with their corresponding key icons on the soft keyboard. Advantageously, the aforementioned character input approach is faster than the approach as shown in FIGS. **59**A-**59**D.

In some embodiments, a plurality of icons including first and second icons are displayed on the touch screen display. When a finger is in contact with the first icon, its appearance is altered to visually distinguish the first icon from other icons on the touch screen display. When the finger subsequently moves away from the first icon while still being in contact with the touch screen display, the visual distinction associated with the first icon is removed. Subsequently, the second icon's appearance is altered to visually distinguish the second icon from other icons on the touch screen display when the finger is in contact with the second icon.

One challenge with entering characters through the soft keyboard shown in FIG. **60**G is that the size of the key icons may be too small to hit for some users. Accordingly, FIGS. **60**H-**60**M are exemplary graphical user interfaces illustrating different types of soft keyboards in accordance with some embodiments. These soft keyboards have larger key icons and are therefore more convenient for those users having difficulty with keyboards like that shown in FIG. **60**G.

In response to a user request for soft keyboard, a first keyboard is displayed on the touch screen display. The first keyboard includes at least one multi-symbol key icon.

In some embodiments (as shown in FIG. **60**H), the first soft keyboard includes multiple multi-symbol key icons. For example, the key icon **6010** includes five symbols "U", "V", "W", "X", and "Y".

Upon detecting a user selection of the multi-symbol key icon, the device replaces the first keyboard with a second keyboard. The second keyboard includes a plurality of single-symbol key icons and each single-symbol key icon corresponds to a respective symbol associated with the multi-symbol key icon.

FIG. **60**I depicts a second keyboard replacing the first keyboard shown in FIG. **60**H. Note that the top two rows of six multi-symbol key icons are replaced by two rows of five single-symbol key icons and a back key icon. Each of the five single-symbol key icons include one symbol from the multi-symbol key icon **6010**.

In response to a user selection of one of the single-symbol key icons, an instance of a symbol associated with the user-selected single-symbol key icon is displayed at a predefined location on the touch screen display.

As shown in FIG. **60**I, in response to a user selection of the single-symbol key icon **6017**, a letter "U" is entered into the text field **6019**. A user can easily tap any of the five single-symbol key icons because they are quite large. To return to the first keyboard with multi-symbol key icons, the user can tap the back key icon at the center of the top row of the second keyboard.

To enter a non-alphabetic character, the user can tap the keyboard switch icon **6015**. As shown in FIG. **60**J, a third soft keyboard replaces the second keyboard shown in FIG. **60**I. In particular, each of the top two rows is a multi-symbol key icon including multiple non-alphabetic characters. For example, the key icon **6020** includes five digit symbols "6", "7", "8", "9", and "0".

A user selection of the key icon **6020** replaces the third keyboard with the fourth keyboard shown in FIG. **60**K. Note that the top two rows of six multi-symbol key icons are now replaced by two rows of five single-symbol key icons and a back key icon. Each of the five single-symbol key icons include one digit symbol from the multi-symbol key icon **6020**. A finger tap of the keyboard switch icon **6025** brings back the alphabetic multi-symbol keyboard shown in FIG. **60**H.

In some embodiments, the top row of a soft keyboard is reserved for those single-symbol key icons and the second row of the keyboard displays multiple multi-symbol key icons.

As shown in FIG. **60**L, a user selection of the multi-symbol key icon **6030** causes the top row to display five single-symbol key icons, each icon including one character from the multi-symbol key icon **6030**.

In some embodiments, as shown in FIG. **60**L, the user-selected multi-symbol key icon **6030** is displayed in a manner visually distinguishable from other icons on the same soft keyboard. The manner may include changing its color, shape or the like that is known to one skilled in the art.

The keyboard shown in FIG. **60**L also includes a keyboard switch icon **6035**. Upon detecting a user selection of the keyboard switch icon **6035**, the device replaces the keyboard with another one as shown in FIG. **60**M. Note that the keyboard in FIG. **60**M includes another set of multi-symbol key icons such as **6040** in replacement of the multi-symbol key icons shown in the previous keyboard.

Additional description of soft keyboards can be found in U.S. Provisional Patent Application No. 60/946,714, "Portable Multifunction Device with Soft Keyboards," filed Jun. 27, 2007, and U.S. patent application Ser. No. 11/961,663, "Portable Multifunction Device with Soft Keyboards," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

FIG. **61** illustrates an exemplary finger contact with a soft keyboard in accordance with some embodiments.

In some embodiments, user interface **6100** (FIG. **61**) includes the following elements, or a subset or superset thereof:

- **402**, **404**, and **406**, as described above;
- Instant messages icon **602** that when activated (e.g., by a finger tap on the icon) initiates transition to a UI listing instant message conversations (e.g., UI **500**);
- Names **504** of the people a user is having instant message conversations with (e.g., Jane Doe **504-1**) or the phone number if the person's name is not available (e.g., 408-123-4567 (**504-3**, FIG. **5**);
- Instant messages **604** from the other party, typically listed in order along one side of UI **6100**;
- Instant messages **606** to the other party, typically listed in order along the opposite side of UI **6100** to show the back and forth interplay of messages in the conversation;
- Timestamps **608** for at least some of the instant messages;
- Text entry box **612**;
- Send icon **614** that when activated (e.g., by a finger tap on the icon) initiates sending of the message in text entry box **612** to the other party (e.g., Jane Doe **504-1**);
- Letter keyboard **616** for entering text in box **612**;
- Word suggestion boxes **6102** and/or **6104** that when activated (e.g., by a finger tap on the icon) initiate display of a suggested word in text entry box **612** in place of a partially entered word.

In some embodiments, a finger contact detected on letter keyboard **616** partially overlaps two or more key icons. For example, finger contact **6106** includes overlap with the letter "u" **6108**, with the letter "j" **6110**, with the letter "k" **6112**, and with the letter "i" **6114**. In some embodiments, the letter with the largest partial overlap with the detected finger contact (i.e., with the highest percentage of overlap) is selected. Based on this letter and on previously entered text corresponding to an incomplete word, a suggested word is displayed in word suggestion boxes **6102** and/or **6104**.

In some embodiments, in response to detecting a finger contact on letter keyboard **616**, a letter is selected based on the extent of partial overlap with key icons and on the previously entered text corresponding to an incomplete word. For example, if a finger contact overlaps with four letter key icons, but only two of the letters when added to the previously entered text produce a possible correctly spelled word, whichever of the two letters has the largest partial overlap is selected. Based on the selected letter and on the previously entered text, a suggested word is then displayed in word suggestion boxes **6102** and/or **6104**.

Although FIG. **61** illustrates an exemplary user interface for predicting words based on detecting contact with a keyboard and on previously entered text in the context of instant messaging, analogous user interfaces are possible for any application involving text entry.

Additional description of keyboards can be found in U.S. Provisional Patent Application No. 60/883,806, "Soft Keyboard Display For A Portable Multifunction Device," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/850,641, "Soft Keyboard Display For A Portable Multifunction Device," filed Sep. 5, 2007, the content of which is hereby incorporated by reference in its entirety.

Settings

FIGS. **62**A-**62**G illustrate exemplary user interfaces for displaying and adjusting settings in accordance with some embodiments.

In some embodiments, a portable multifunction device (e.g., device **100**) displays an airplane mode switch icon (e.g., icon **6202**, FIG. **62**A) on a touch screen display (e.g., display **112**). The airplane mode switch icon has an "on" position (e.g., **6206**, FIG. **62**B) and an "off" position (e.g., **6204**, FIG. **62**A).

If the airplane mode switch icon is at the "off" position, a communications signal strength icon (e.g., **402**) is displayed on the touch screen display.

Upon detecting a movement of a finger contact on or near the airplane mode switch icon from the "off" position to the "on" position, the communications signal strength icon is replaced with an airplane icon (e.g., **6208**, FIG. **62**B). In some embodiments, detecting the movement of the finger contact comprises detecting a finger-down event at or near the airplane mode switch icon at the "off" position, one or more finger-dragging events, and a finger-up event at or near the airplane mode switch icon at the "on" position.

For example, in UI **6200**A (FIG. **62**A), a swipe gesture from the "off" position **6204** to the "on" position **6206** may be detected. In response to detecting the swipe gesture, the communications signal strength icon **402** is replaced with the airplane icon **6208** (FIG. **62**B).

In some embodiments, replacing the communications signal strength icon with the plane icon includes moving the plane icon on the touch screen display towards the communications signal strength icon and then moving the plane icon over the communications signal strength icon. For example, the plane icon **6208** may appear at the edge of UI **6200**A (FIG. **62**A) and move toward the communications signal strength icon **402**. Upon reaching the communications signal strength icon **402**, the plane icon **6208** moves over the communications signal strength icon **402** until the icon **402** is no longer displayed, as shown in FIG. **62**B.

In some embodiments, the portable multifunction device includes a speaker and a sound is played while replacing the communications signal strength icon with the airplane icon.

In some embodiments, if the airplane mode switch icon is at the "on" position, upon detecting a finger-down event at or near the airplane mode switch icon at the "on" position, one or more finger-dragging events, and a finger-up event at or near the airplane mode switch icon at the "off" position, the airplane mode switch icon is moved from the "on" position to the "off" position and the plane icon is replaced with the communications signal strength icon.

For example, in UI **6200**B (FIG. **62**B), a swipe gesture from the "on" position **6206** to the "off" position **6204** may be detected. In response to detecting the swipe gesture, the airplane mode switch icon **6202** is displayed in the "off" position and the airplane icon **6208** is replaced with the communications signal strength icon **402**, as shown in FIG. **62**A.

Additional description of airplane mode indicators can be found in U.S. Provisional Patent Application No. 60/947,315, "Airplane Mode Indicator on a Portable Multifunction Device," filed Jun. 29, 2007, and U.S. patent application Ser. No. 11/961,743, "Airplane Mode Indicator on a Portable Multifunction Device," filed Dec. 20, 2007, the content of which is hereby incorporated by reference in its entirety.

FIG. **62**C illustrates exemplary user interfaces for displaying and adjusting sound settings in accordance with some embodiments. In some embodiments, if user selects to adjust sound settings, UI **6200**C (FIG. **62**C) is displayed.

In some embodiments, a portable multifunction device (e.g., device **100**) displays a vibrate mode switch icon (e.g., icon **6212**, FIG. **62**C) on a touch screen display (e.g., display **112**). The vibrate mode switch icon has an "on" position (not shown) and an "off" position (e.g., **6214**, FIG. **62**C).

For example, in UI **6200**C (FIG. **62**C), a swipe gesture from the "off" position **6214** to the "on" position is detected. In response to detecting the swipe gesture, the vibrate mode switch icon **6212** is displayed in the "on position" and the device is set to be on vibrate mode.

In some embodiments, a contact with the settings icon **6210** (FIG. **62**C) is detected. In response to detecting the contact, the list of settings is displayed (UI **6200**A, FIG. **62**A).

FIG. **62**D illustrates exemplary user interfaces for displaying and adjusting wallpaper settings in accordance with some embodiments. In some embodiments, if a user selects to adjust wallpaper settings (e.g., by a finger tap anywhere in the wallpaper row in UI **6200**A (FIG. **62**A)), UI **6200**D (FIG. **62**D) is displayed. A user may change the wallpaper displayed on the device by making the desired selections on UI **6200**D.

FIG. **62**E illustrates exemplary user interfaces for displaying and adjusting general settings in accordance with some embodiments. In some embodiments, if user selects to adjust general settings, UI **6200**E (FIG. **62**E) is displayed. Some general settings may include about, backlight, date and time, keyboard, network, touch, legal, and reset settings.

For example, FIG. **62**F illustrates exemplary user interfaces for displaying and adjusting touch settings in accordance with some embodiments. In some embodiments, if a user selects to adjust touch settings (by selecting "touch" in UI **6200**E in FIG. **62**E), UI **6200**F (FIG. **62**F) is displayed.

In some embodiments, a portable multifunction device (e.g., device **100**) displays a show touch setting switch icon (e.g., icon **6232**, FIG. **62**F) on a touch screen display (e.g., display **112**). The slow touch setting switch icon has an "on" position (not shown) and an "off" position (e.g., **6234**, FIG. **62**F).

For example, in UI **6200**F (FIG. **62**F), a swipe gesture from the "off" position **6234** to the "on" position is detected. In response to detecting the swipe gesture, the show touch setting icon switch **6232** is displayed in the "on" position and the device is set to a show touch mode in which a shaded area corresponding to a user's finger contact area is displayed on the touch screen to aid the user in interacting with the touch screen.

FIG. **62**G illustrates exemplary user interfaces for displaying and adjusting iPod (trademark of Apple Computer, Inc.) settings in accordance with some embodiments. In some embodiments, if user selects iPod (trademark of Apple Computer, Inc.) settings, UI **6200**G (FIG. **62**G) is displayed.

In some embodiments, a portable multifunction device (e.g., device **100**) displays a shuffle mode icon (e.g., icon **6242**, FIG. **62**F) on a touch screen display (e.g., display **112**). The shuffle mode icon has an "on" position (not shown) and an "off" position (e.g., **6244**, FIG. **62**G).

For example, in UI **6200**G (FIG. **62**G), a swipe gesture from the "off" position **6244** to the "on" position is detected. In response to detecting the swipe gesture, the shuffle mode switch **6242** is displayed in the "on" position and the iPod (trademark of Apple Computer, Inc.) feature of the device is set to a shuffle mode.

FIG. **63** illustrates an exemplary method for adjusting dimming timers in accordance with some embodiments. Additional description of dimming techniques can be found in U.S. Provisional Patent Application No. 60/883,821, "Portable Electronic Device With Auto-Dim Timers," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,677, "Portable Electronic Device With Auto-Dim Timers," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

Additional description of settings-related techniques can be found in U.S. Provisional Patent Application No. 60/883,812, "Portable Electronic Device With A Global Setting User Interface," filed Jan. 7, 2007, and U.S. patent application Ser. No. 11/960,669, "Portable Electronic Device With A Global Setting User Interface," filed Dec. 19, 2007, the content of which is hereby incorporated by reference in its entirety.

The foregoing description, for purpose of explanation, has been described with reference to specific embodiments. However, the illustrative discussions above are not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated.

What is claimed is:

1. A computing device, comprising:

a touch screen display;

one or more processors;

memory; and

one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the one or more processors, the one or more programs including:

instructions for detecting one or more finger contacts with the touch screen display;

instructions for applying one or more heuristics to the one or more finger contacts to determine a command for the device; and

instructions for processing the command;

wherein the one or more heuristics comprise:

a vertical screen scrolling heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command rather than a two-dimensional screen translation command based on an angle of initial movement of a finger contact with respect to the touch screen display;

a two-dimensional screen translation heuristic for determining that the one or more finger contacts correspond to the two-dimensional screen translation command rather than the one-dimensional vertical screen scrolling command based on the angle of initial movement of the finger contact with respect to the touch screen display; and

a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.

2. The computing device of claim **1**, wherein the one or more heuristics include a heuristic for determining that the one or more finger contacts correspond to a command to translate content within a frame rather than translating an entire page that includes the frame.

3. The computing device of claim **1**, wherein the one or more heuristics include a heuristic for determining which user interface object is selected when two user interface objects have overlapping hit regions.

4. The computing device of claim **1**, wherein, in one heuristic of the one or more heuristics, a contact comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly vertical with respect to the touch screen display corresponds to the one-dimensional vertical screen scrolling command.

5. The computing device of claim **1**, wherein, in one heuristic of the one or more heuristics, a contact comprising a moving finger gesture that initially moves within a predefined range of angles corresponds to the two-dimensional screen translation command.

6. The computing device of claim **1**, wherein, in one heuristic of the one or more heuristics, a contact comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly horizontal with respect to the touch screen display corresponds to a one-dimensional horizontal screen scrolling command rather than the two-dimensional screen translation command.

7. The computing device of claim **1**, wherein, in one heuristic of the one or more heuristics, a contact comprising a simultaneous two-thumb twisting gesture corresponds to a 90° screen rotation command.

8. The computing device of claim **1**, wherein, in one heuristic of the one or more heuristics, an N-finger translation gesture corresponds to a command to translate an entire page of content and an M-finger translation gesture corresponds to a command to translate content within a frame rather than translating the entire page of content that includes the frame.

9. The computing device of claim **1**, including:

instructions for detecting one or more first finger contacts with the touch screen display while a web browser application is displayed on the touch screen display;

instructions for applying a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device; and

instructions for processing the first command;

wherein the first set of heuristics comprises:

the vertical screen scrolling heuristic; and

the two-dimensional screen translation heuristic; and

instructions for detecting one or more second finger contacts with the touch screen display while a photo album application is displayed on the touch screen display;

instructions for applying a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device; and

instructions for processing the second command;

wherein the second set of heuristics comprises:

the next item heuristic, wherein the respective item in the set of items is a respective image in a set of images; and

a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the respective image in the set of images to displaying a previous image in the set of images.

10. The computing device of claim **9**, wherein the first set of heuristics comprises a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command rather than the two-dimensional screen translation command based on the angle of initial movement of the finger contact with respect to the touch screen display.

11. A computer-implemented method, comprising:

at a computing device with a touch screen display,

detecting one or more finger contacts with the touch screen display;

applying one or more heuristics to the one or more finger contacts to determine a command for the device; and

processing the command;

wherein the one or more heuristics comprise:

a vertical screen scrolling heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command rather than a two-dimensional screen translation command based on an angle of initial movement of a finger contact with respect to the touch screen display;

a two-dimensional screen translation heuristic for determining that the one or more finger contacts correspond to the two-dimensional screen translation command rather than the one-dimensional vertical screen scrolling command based on the angle of initial movement of the finger contact with respect to the touch screen display; and

a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.

12. The computer-implemented method of claim **11**, including:

while displaying a web browser application,

detecting one or more first finger contacts with the touch screen display;

applying a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device; and

processing the first command;

wherein the first set of heuristics comprises:

the vertical screen scrolling heuristic; and

the two-dimensional screen translation heuristic; and

while displaying a photo album application,

detecting one or more second finger contacts with the touch screen display;

applying a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device; and

processing the second command;

wherein the second set of heuristics comprises:

the next item heuristic, wherein the respective item in the set of items is a respective image in a set of images; and

a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the respective image in the set of images to displaying a previous image in the set of images.

13. The computer-implemented method of claim **12**, wherein the first set of heuristics comprises a heuristic for determining that the one or more first finger contacts correspond to a one-dimensional horizontal screen scrolling command rather than the two-dimensional screen translation command based on the angle of initial movement of the finger contact with respect to the touch screen display.

14. The computer-implemented method of claim **11**, wherein, in one heuristic of the one or more heuristics, a contact comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly vertical with respect to the touch screen display corresponds to the one-dimensional vertical screen scrolling command.

15. The computer-implemented method of claim **11**, wherein, in one heuristic of the one or more heuristics, a contact comprising a moving finger gesture that initially moves within a predefined range of angles corresponds to the two-dimensional screen translation command.

16. The computer-implemented method of claim **11**, wherein, in one heuristic of the one or more heuristics, a contact comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly horizontal with respect to the touch screen display corresponds to a one-dimensional horizontal screen scrolling command rather than the two-dimensional screen translation command.

17. A computer readable storage medium having stored therein instructions, which when executed by a device with a touch screen display, cause the device to:

detect one or more finger contacts with the touch screen display;

apply one or more heuristics to the one or more finger contacts to determine a command for the device; and

process the command;

wherein the one or more heuristics comprise:

a vertical screen scrolling heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command rather than a two-dimensional screen translation command based on an angle of initial movement of a finger contact with respect to the touch screen display;

a two-dimensional screen translation heuristic for determining that the one or more finger contacts correspond to the two-dimensional screen translation command rather than the one-dimensional vertical screen scrolling command based on the angle of initial movement of the finger contact with respect to the touch screen display; and

a next item heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.

18. The computer readable storage medium of claim **17**, wherein the computer readable medium has stored therein instructions, which when executed by a device with a touch screen display, cause the device to:

while displaying a web browser application,

detect one or more first finger contacts with the touch screen display;

apply a first set of heuristics for the web browser application to the one or more first finger contacts to determine a first command for the device; and

process the first command;

wherein the first set of heuristics comprises:

the vertical screen scrolling heuristic; and

the two-dimensional screen translation heuristic; and

while displaying a photo album application,

detect one or more second finger contacts with the touch screen display;

apply a second set of heuristics for the photo album application to the one or more second finger contacts to determine a second command for the device; and

process the second command;

wherein the second set of heuristics comprises:

the next item heuristic, wherein the respective item in the set of items is a respective image in a set of images; and

a heuristic for determining that the one or more second finger contacts correspond to a command to transition from displaying the respective image in the set of images to displaying a previous image in the set of images.

19. The computer readable storage medium of claim **17**, wherein, in one heuristic of the one or more heuristics, a contact comprising a finger swipe gesture that initially moves within a predetermined angle of being perfectly vertical with respect to the touch screen display corresponds to the one-dimensional vertical screen scrolling command.

20. The computer readable storage medium of claim **17**, wherein, in one heuristic of the one or more heuristics, a contact comprising a moving finger gesture that initially moves within a predefined range of angles corresponds to the two-dimensional screen translation command.

* * * * *

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(12) EX PARTE REEXAMINATION CERTIFICATE (7763rd)

United States Patent (10) **Number: US 7,479,949 C1**
Jobs et al. (45) **Certificate Issued: *Sep. 21, 2010**

(54) **TOUCH SCREEN DEVICE, METHOD, AND GRAPHICAL USER INTERFACE FOR DETERMINING COMMANDS BY APPLYING HEURISTICS**

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G09G 5/00 (2006.01)
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(58) **Field of Classification Search** 345/173
See application file for complete search history.

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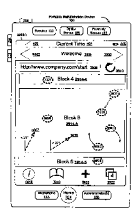
Primary Examiner—Eric B Kiss

(57) **ABSTRACT**

A computer-implemented method for use in conjunction with a computing device with a touch screen display comprises: detecting one or more finger contacts with the touch screen display, applying one or more heuristics to the one or more finger contacts to determine a command for the device, and processing the command. The one or more heuristics comprise: a heuristic for determining that the one or more finger contacts correspond to a one-dimensional vertical screen scrolling command, a heuristic for determining that the one or more finger contacts correspond to a two-dimensional screen translation command, and a heuristic for determining that the one or more finger contacts correspond to a command to transition from displaying a respective item in a set of items to displaying a next item in the set of items.

At the time of issuance and publication of this certificate, the patent remains subject to pending reexamination control number 95/000,541 filed Apr. 2, 2010. The claim content of the patent may be subsequently revised if a reeamination certificate issues from the reexamination proceeding.



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EX PARTE REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307

NO AMENDMENTS HAVE BEEN MADE TO THE PATENT

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

The patentability of claim **11** is confirmed.

Claims **1-10** and **12-20** were not reexamined.

* * * * *

CERTIFICATE OF SERVICE

I hereby certify that on November 27, 2012, I caused the nonconfidential version of the Opening Brief and Addendum of Plaintiffs-Appellants Apple Inc. and NeXT Software, Inc. to be electronically filed with the Clerk of the Court using CM/ECF, which will automatically send email notification of such filing to the following counsel of record:

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CERTIFICATE OF COMPLIANCE
UNDER FEDERAL RULES OF APPELLATE PROCEDURE
32(a)(7) AND FEDERAL CIRCUIT RULE 32

Counsel for Plaintiffs-Appellants Apple Inc. and NeXT Software, Inc. certifies that the brief contained herein has a proportionally spaced 14-point typeface, and contains 13,960 words, based on the "Word Count" feature of Word 2007, including footnotes and endnotes. Pursuant to Federal Rule of Appellate Procedure 32(a)(7)(B)(iii) and Federal Circuit Rule 32(b), this word count does not include the words contained in the Certificate of Interest, Table of Contents, Table of Authorities, Abbreviations, and Statement of Related Cases.

Dated: November 27, 2012

Respectfully submitted,

/s/ E. Joshua Rosenkranz
E. Joshua Rosenkranz