

EXHIBIT A

1 UNITED STATES DISTRICT COURT
 2 NORTHERN DISTRICT OF CALIFORNIA
 3 SAN FRANCISCO DIVISION
 4

5 _____
 6 ORACLE AMERICA, INC.,)
 7 Plaintiff,)
 8 vs.) No. CV 10-03561 WHA
 9 GOOGLE, INC.,)
 10 Defendant.)
 11 _____)

12
13 ATTORNEYS' EYES ONLY

14
 15 Videotaped Deposition of ANDREW E. RUBIN,
 16 taken at 333 Twin Dolphin Drive, Redwood
 17 Shores, California, commencing at 9:31 a.m.,
 18 Tuesday, April 5, 2011, before Leslie
 19 Rockwood, RPR, CSR No. 3462.
 20

21
 22
 23
 24
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1 would license to a manufacturer.
 2 Q. Well, I thought that's what we were referring
 3 to in terms of the term "product." You had an open
 4 source product and a commercial product.
 5 A. No, commercial product I defined as a 11:42:49
 6 handset.
 7 Q. Okay. Fair enough. The -- but I want to go
 8 back so I want to make sure I understand.
 9 In referring to -- so that we don't create
 10 fragmentation, what was it that you were trying to not 11:43:02
 11 create fragmentation in?
 12 A. So -- so traditionally when you build a
 13 platform, the only reason these open platforms exist is
 14 so that developers, third-party developers build
 15 applications for the platform. 11:43:19
 16 Q. Uh-huh.
 17 A. Traditionally industries refer to
 18 fragmentation when a developer writes a program and it
 19 runs on one but not the other. Right?
 20 So the program basically -- the platform 11:43:31
 21 breaks compatibility between applications that are
 22 written from one platform to the other. That's typically
 23 how the industry defines fragmentation.
 24 So we think of it not as us making the
 25 platforms compatible, but us giving developers a good 11:43:45

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1 experience developing an application one time and having
 2 it run across a variety of products, those products being
 3 handsets.
 4 So, for example, if Motorola built a handset
 5 using one version of the platform and Samsung built a 11:43:56
 6 handset using another version of the platform, we would
 7 be doing the ecosystem of third-party developers a
 8 disservice if we didn't make those platforms all run his
 9 application. That's typically how the industry refers to
 10 fragmentation. 11:44:13
 11 Q. Okay. Did the subject of avoiding
 12 fragmentation come up in your discussions with Sun?
 13 A. Yeah, generally I think there was mutual
 14 agreement that -- that the two parties in partnership
 15 would create a platform that didn't exasperate 11:44:30
 16 fragmentation.
 17 Q. Why is that?
 18 A. Because it's good for the third-party
 19 developer ecosystem. There is no purpose of building an
 20 open platform other than to attract third-party 11:44:44
 21 developers to it. So anything that we would do to
 22 jeopardize the support of third-party developers would be
 23 bad for the success of the platform.
 24 Q. And in the platform you're describing, there
 25 is Android? 11:45:07

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1 A. Well, apparently I'm -- again, I'm
 2 speculating here. It's been many, many years. But
 3 apparently this email was talking about two versions of
 4 the platform, at least two versions of the platform. One
 5 was what I call Android, and that's what Google was 11:45:20
 6 working on. And another one is whatever an OEM licensee
 7 would get from Sun.
 8 And I don't know specifically what the
 9 difference was, and I think in 2005, at the drafting of
 10 this email, it was so early, none of this had actually 11:45:32
 11 been implemented. So even -- even then, it was
 12 speculation on what it would be once it got implemented.
 13 Things change all the time.
 14 Q. Did you discuss with anyone from Sun the
 15 concept of fragmentation in the Java platform? 11:45:48
 16 A. I don't have any specific recollection of
 17 those discussions. One recollection I do have is that
 18 Sun was hypersensitive to fragmentation to platform. I
 19 heard it. I heard the word all the time.
 20 Q. From Sun, you did? 11:46:05
 21 A. Yes. I think the Sun platform, as it was
 22 implemented before I approached our business discussions,
 23 had suffered some fragmentation, some forms of
 24 fragmentation.
 25 Q. But you understood from the people you talked 11:46:18

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1 with at Sun that they were concerned about further
 2 fragmentation?
 3 A. Further fragmentation, I think is a good
 4 term.
 5 Q. What was your understanding, if any, as to 11:46:29
 6 why Sun was concerned about that?
 7 A. I think we were aligned in that both of our
 8 belief was that it was bad for the third-party developer
 9 ecosystem to have a fragment of effort.
 10 Q. And that could be true in the context of 11:46:43
 11 fragmenting what became Android; correct?
 12 A. I'm not sure if I understand that question.
 13 Q. You expressed that fragmentation was bad for
 14 the third-party developer ecosystem; right?
 15 A. Assuming that we were both aligned and 11:46:59
 16 actually we had resolved and entered into a partnership,
 17 what we were contemplating is that there would be just a
 18 single third-party developer ecosystem focused on this
 19 new thing, which was this open source Linux thing we were
 20 creating.
 21 In the absence of a partnership between Sun
 22 and Android, by definition there had to be two
 23 third-party developer ecosystems, at which point
 24 fragmentation wasn't an issue. You only can have
 25 fragmentation when you're trying to build a holistic 11:47:27

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1 platform, had you reached out on behalf of Google to any
 2 other companies about working together on a mobile
 3 platform?
 4 A. Yes.
 5 Q. Which ones? 09:51:13
 6 A. I believe at that time frame we had already
 7 reached out to Texas Instruments, HTC, Samsung, and
 8 T-Mobile. There might be another one or two in there,
 9 but essentially the companies that were the founding
 10 members of the Open Handset Alliance were companies that 09:51:37
 11 we were interacting with in the early days.
 12 Q. And it's your testimony that you reached out
 13 to those companies before having reached out to Sun with
 14 regard to a partnership?
 15 A. The names I listed, yes. It's hard to say 09:51:53
 16 which happened first. It was -- you know, we were in
 17 kind of a development effort.
 18 Q. Okay. As of the time you joined Google, had
 19 you decided to use the Java programming language as the
 20 basis for Android? 09:52:17
 21 A. No.
 22 Q. What were your options?
 23 A. Well, I mean, they were pretty varied. We
 24 could use the C programming language. We could use the
 25 C++ programming language. We could use JavaScript at the 09:52:32

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1 time, we had some exploratory discussions around
 2 JavaScript. Also Microsoft C Sharp as the programming
 3 language.
 4 We also discussed briefly Lua as a
 5 programming language and Python. 09:52:54
 6 Q. As of the time you started discussions with
 7 Sun, had you decided to use Java Class Libraries as part
 8 of Android?
 9 A. I'm sorry, can you ask the question again?
 10 Q. As of the time you started discussions with 09:53:18
 11 Sun, you decided to use Java Class Libraries as part of
 12 Android?
 13 MR. BABER: Object to the form of the
 14 question.
 15 THE WITNESS: I'm not sure if I really 09:53:36
 16 understand the question. My discussions with Sun
 17 happened as, you know, part of Google, but also before
 18 that, as part of Android. Which time frame are you
 19 speaking of?
 20 Q. BY MR. HOLTZMAN: As of the time you started 09:53:47
 21 at Google.
 22 A. Started at Google. In the initial
 23 discussions with Sun, no, we didn't really have a -- the
 24 initial discussions with Sun were an exploratory phase, I
 25 believe, and we hadn't really made a decision on our 09:53:59

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1 architectural programming language at that time. Those
 2 discussions aided us in the decision-making process.
 3 Q. Let me ask you: Had you decided to use a
 4 virtual machine-based architecture at that time?
 5 A. No, we hadn't. 09:54:11
 6 Q. About how many months -- you said this
 7 before. I apologize for repeating. About how many
 8 months did you negotiate with Sun in that first try?
 9 A. Vague on the exact duration. I believe it
 10 would be out of character for me to let it drag on for 09:54:25
 11 longer than six to eight months.

12 Q. Why did those negotiations end?
 13 A. Well, we were seeking out a partnership with
 14 Sun to co-develop the next version of Java. The
 15 discussions doesn't proceed because the two companies 09:54:43
 16 couldn't agree on terms.
 17 Q. And which terms could they not agree on?
 18 A. Well, we had kind of a whole block of open
 19 items. One was control of the ecosystem, I would call
 20 it, which was the third-party developer ecosystem. 09:55:05
 21 Third-party developers contribute to the success of a
 22 platform by having their companies invest in the platform
 23 by basing their businesses on the platform.
 24 It was my intention to create an independent
 25 third-party developer ecosystem, and one of the terms we 09:55:25

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1 couldn't agree on was Sun's desire to own the third-party
 2 developer ecosystem.
 3 The second term that we couldn't agree on is
 4 the security -- who controlled the security model. It
 5 was my belief, similar to how I wanted the ecosystem to 09:55:44
 6 be an independent third-party developer ecosystem, or in
 7 other words, uncontrolled, the same with security is that
 8 I think in an open platform, giving up control is one of
 9 the key principles of an open platform. And in that
 10 term, Sun also wanted to control the security mechanism 09:56:03
 11 of the platform.
 12 Q. Were there any other terms that you couldn't
 13 agree on that co-contributed to the end of the
 14 discussions?
 15 A. I don't think so. I'm sure there were -- you 09:56:17
 16 know, if the discussions had proceeded, there would have
 17 been a handful of technical, you know, details that the
 18 teams would have had to work out, but they didn't even
 19 reach that phase.
 20 Q. So if I heard you correctly, you said there 09:56:33
 21 were two main points of disagreement, the first being
 22 Sun's desire to own a third-party ecosystem, as you put
 23 it; is that correct?
 24 A. Yes.
 25 Q. And the second was who would control the 09:56:43



1 security mechanism or the security model; is that
 2 correct?
 3 A. Yes. And those are the two, to my
 4 recollection.

5 Q. That's fine. Did you ever think that issues 09:56:51
 6 relating to patent infringement contributed to the end of
 7 those negotiations in -- this would have been in 2006.
 8 A. No, I did not.
 9 Q. Did you ever say that you negotiated with Sun
 10 and decided to walk away after Sun threatened Google with 09:57:22
 11 patent violations?
 12 A. Huh-uh, no. Sorry, can you ask the question
 13 again?
 14 Q. Did you ever say that you negotiated with
 15 Sun? I'm sorry. Yes. I'm sorry. Strike that and start 09:57:35
 16 again.
 17 Did you ever say that you negotiated with Sun
 18 and decided to walk away after Sun threatened Google with
 19 patent violations?
 20 A. Did I ever say it? Not to my knowledge, no. 09:57:47
 21 MR. HOLTZMAN: Okay. I'll ask the court
 22 reporter to mark as Oracle Deposition Exhibit Number 3 a
 23 two-page document Bates Numbered Google 0200020474.
 24 (Exhibit 3 marked.)
 25 Q. BY MR. HOLTZMAN: Do you recognize Oracle 09:58:55

1 Q. Where it says "tricky no"?
 2 A. It says: "Why would we want to do anything
 3 to support this behavior? We want to distance ourselves
 4 as much as possible from Sun."
 5 Q. All right. And then you have a P.S. after 10:00:27
 6 that. Could you read that.
 7 A. "We negotiated nine months with Sun and
 8 decided to walk away after they threatened to sue us over
 9 patent violations."
 10 Q. Okay. Now, the reference to negotiating nine 10:00:38
 11 months with Sun, what does that refer to?
 12 A. I imagine that refers to the time frame that
 13 we were discussing, between 2005 and 2006.
 14 Q. And then when you say you decided to walk
 15 away after they threatened to sue us over patent 10:00:57
 16 violations, what were you referring to there?
 17 A. Well, during our discussions -- I mean, first
 18 of all, this -- let me put this in context. This was a
 19 message that I had -- that I had sent in reaction to two
 20 strings that my engineers had sent me in this email 10:01:15
 21 thread, and what they're -- what they were bringing to my
 22 attention was some public statements Sun was making and
 23 what the -- what the community, the Java community's
 24 reaction was to Sun's TCK licensing announcement. And I
 25 don't recall exactly what the announcement was, but this 10:01:41

1 Exhibit 3?
 2 A. I'm refreshing my memory now. Okay.
 3 Q. So what is it?
 4 A. It looks like an email thread between two of
 5 my engineers or three of my engineers and myself. 09:59:29
 6 Q. And the three engineers are Bob Lee, Brian
 7 Swetland, and Dan Bornstein; is that correct?
 8 A. Correct.
 9 Q. And what's the date of that email?
 10 A. It was originally -- it appears originally 09:59:43
 11 August 11th, 2007.
 12 Q. And so there are two emails represented in
 13 this document; correct?
 14 A. It's an email string.
 15 Q. String. Fair enough. That's fine. That's 09:59:55
 16 fine. And I'm interested -- I just wanted to ask you
 17 about the top email here. That's an email from you;
 18 correct?
 19 A. Yes.
 20 Q. And if you go down to the last paragraph 10:00:04
 21 before your name, Andy?
 22 A. Uh-huh.
 23 Q. Just read that.
 24 A. I'm sorry, which paragraph does that start
 25 with? 10:00:18

1 thread started out with a public community rumor, I would
 2 say.
 3 Q. Okay. So I got that background, let me go
 4 back now to the question.
 5 A. And my response was, to my engineers, was 10:01:58
 6 basically to -- as a manager, to provide some guidance to
 7 them on basically getting them to move on and understand
 8 that we were no longer -- there was no longer really an
 9 opportunity to partner with Sun.
 10 In my discussions with Sun, I don't believe 10:02:15
 11 Sun ever threatened to sue us over patent violations. I
 12 think I was choosing those words to help my engineering
 13 team move along and, you know, continue their development
 14 effort on other technologies.
 15 During this -- the discussions, by the way, I 10:02:35
 16 mean, in normal business discussions, I think there's --
 17 I think there's a line where when you're in a partnership
 18 discussion you don't say, you know, "do this or we're
 19 going to sue you," but I do think you make statements and
 20 vague assertions on the consequences or the evolution 10:02:55
 21 of the partnership in cases the companies agree to
 22 disagree.
 23 I did feel during the Sun discussions that
 24 there was a threat that Sun would pursue legal action
 25 if -- if -- even if the legal action was frivolous, in 10:03:20

EXHIBIT C



Report: Android Sapphire CupCake Diary Study

February 2009

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2 minute summary

Research Goals

The goal of this research was to get an insight into the user experience for people who use the phone in their everyday lives, particularly any longer term usage effects of newly introduced features.

What we did

9 non-technical San Francisco Googlers exchanged their primary phone with a Sapphire Android phone and kept a diary of their interactions with the phone while using the device for 10 days (including two weekends). They explained their diary study entries in 1 hour debrief sessions. Some participants had the option to continue with the diary study.

The devices used were Sapphire Docomo with the non-final button layout. The built was CRA 56. Users only had access to 2G which resulted in slow speed for some applications.

Key Findings

Overall Summary

Diary study participants **loved** the Sapphire **form factor** and found the **battery life satisfactory** (the Sapphire has a much bigger battery than the G1). Users **appreciated** good **phone service and quality** and liked that the **all-in-one** device **concept**.

"I think it's really cool that this phone is my all in one music device, both as an ipod replacement (headphones) but also an ipod + dock replacement (speakers). I literally carry it around with me to listen to music (cooking, relaxing, whatever), and love that I can do whatever else I want on it while listening to music - surf the web, use different apps, send text messages."

Users appreciated **easy web access and** made **heavy use of downloaded apps and games**.

For some people the fact that the device **only** has a **touch screen keyboard** was a **showstopper**.

Speed remains one of the **most important factors** in adoption and retention. This includes **aspects inherent in the form factor** like the keyboard, **delays** that are introduced before an action executes and the **number of steps** to accomplish a **common action**. The importance of **speed** came up in a number of contexts such as the **keyboard, camera, browser, calendar, orientation**

switch, home screen, music player and market.

Users are still **most dissatisfied** with the **camera** and **music player** experience. In camera it is **speed** and **picture quality**. Though **sound quality** is **good**, users found it frustrating to **manage** their **music collection** both, **on the phone in order to listen to music** and **off the phone**.

Finding and **organizing content** has become **more challenging** since users now have **more content** (bookmarks, market place apps, downloaded apps) and because the **onscreen keyboard hides** some of the **filtering functions** that were previously available in **contacts**, the **IM buddy list**, etc.

Navigation continues to be **challenging** to learn for most users. Many of the **frustrations** stem from **not knowing about long press, the use of the menu key** and **general difficulty** with context **switching between the phone hardware** and **the screen**.

Another theme that becomes more relevant with Android's **focus on enterprise users** is the need for better support for **separating work** and **personal life** in email, contacts, notifications etc.

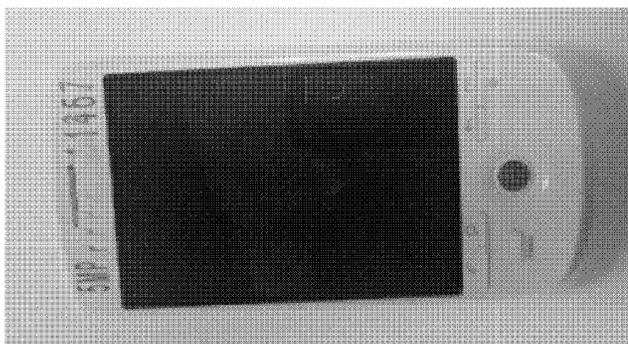
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Research Goals

Understand the usability of the Android Cupcake release in combination with the Sapphire form factor and uncover any issues that can be found after prolonged use in the real world. The main differences from previous diary studies were: new device form factor that is smaller and without a keyboard, an onscreen keyboard, a visual and feature refresh for many applications.

Hardware Usability Findings



Participants **loved** the phone's **shape, size** and the **way the phone feels in their hands**.

"Overall..LOVING the phone. It is so fast, the battery is so much better than the previous phone and it is the perfect size."

"not sure if i mentioned this yet, but I really like the size/weight/shape of the device. great shape in the hand. very balanced, nice curve on the bottom. nice bright, clear, hi-res screen. good screen refresh rate for the most part. also like the white color."

"The phone overall has a great look and feel and is a lot more feminine for a girl user. It is a phone that I am actually enjoy using because it looks so sleek."

"Although I have been very discreet with my phone, people will still notice it when I am taking it out to look at time or read an email. I can tell that folks are admiring the phone and often times I will have to put the phone away just because it is getting too much attention. This is much more attention than I ever got using the gphone. "

"I really like the form factor - light, good size, "feels" like a phone."

"It is the perfect size"

Most objections were related to the button shape and assignments, including requests for a **more prominent home key**, and a request to **reverse the location** of the **menu** and the **home** key. The button shape and location was changed in subsequent revs of the hardware but the home and menu key locations haven't been addressed.

The **camera quality** was considered **good** with **ample lighting** but **unacceptable** when **lighting conditions were not ideal** (see more detailed camera feedback below).

Users **requested a physical camera shutter button** to make taking self portraits easier and a **flash** to make up for poor camera quality in low light conditions.

As with the G1, users lamented the **lack** of a **standard headphone jack** and **objected** to it being **shared with the battery charger**.

The full report is here: [Hardware Usability Feedback](#)

Battery Life Usability Feedback

Most users were very happy about the **phone's battery life**. The people who had used the G1 previously found it **vastly improved** over the **G1's** battery life.

"The Sapphire's battery life seems to be much better than that of the G1 - bravo."

"I used my phone all day one day, from making hour long phone calls to texting and listening to music. I then didn't charge it that night, and used it as normal the next day as well (including listening to music again). By the time I was home to charge it around 10PM it was only half gone, and I charged it for an hour which just about returned it to full power. !! that's awesome."

"I talked to my mom for an hour and a half using the headphones. I was really excited to see that the battery life had barely decreased!"

"I had it plugged into my computer most of the time, or in an outlet when at home. Overall, the battery life was great. I often would forget to turn off Wi-Fi, and it still held a charge all weekend. Very impressed. "

"The battery life for this phone is so great!"

"-Again, the battery life is a great thing"

But also: *"The battery doesn't last long. I feel as if I have to plug it in every couple hours to keep it going for as long as I'm out and about. Unlike the blackberry where, even if I use chat/apps/etc for awhile, it doesn't absolutely die after 6 hours. "*

Users would like **more notice when the battery is about to die**, and expect a **quick charge time**. They expect that **similar battery chargers** (e.g BB) will work.

"i would like a countdown timer like I have on my computer"

" although I think because of the long battery life takes a long time to charge the phone. "

" it takes a very long time to charge."

"i have been unable to use my blackberry charger in my car or at my desk to charge this phone. with the last G1 i had no trouble"

Speed

Speed remains one of the most important factors in adoption/retention. This includes **aspects inherent in the form factor**, **delays** that are introduced before an action executes and the **number of steps** to accomplish a **common action**. The importance of **speed** came up in a number of contexts such as the **keyboard, camera, browser, calendar, orientation switch, home screen, music player** and **market**.

Keyboard: *"the keys are too close. i've come to the conclusion that like the iphone, this not practical for someone as busy with emails as me. i need to hammer out at least 30-45 minutes of fireDrill emails a day and this is too much of a headache. it's fine for short fun things and while i've gotten better and the keyboard, it's not practical for speed/work"*

Orientation Switch: *"When switching the phone from horizontal to vertical, the screen takes too long to switch back and forth"*

Music Player: "music enjoyment is not possible with a large library on android. it is very step-driven, with lots of confirmations. seems to take me 6 clicks/events to get a song going, where on iPhone it's 2-3. there needs to be simpler/more rapid access to songs."

Navigation

Users had trouble **discovering long press** and the **home button app switcher**, often resulting in **frustrating hunts** for **functionality**. Sometimes these would be **triggered accidentally**.

"cant delete a bookmark?"

"I was initially looking for something in the settings menu from within the list of bookmarks, but couldn't find it - so for a few days I didn't think it was possible to add a shortcut to your homepage."

"I was scrolling from one desktop page to another and I wasn't quite sure what happened, but a box popped up that asked me what I wanted to do, and before I knew it I hit 'shortcut.' I then realized you could add a bunch of different things...like even a gmail label shortcut which is awesome!! I had to figure out how I'd gotten to that place, so I closed everything out and realized that you can just hold your finger in an empty space on the home page, and easily change your wallpaper, add a folder, etc."

"I found that you can hold down you finger on text and cut, paste, etc - and in text messages, you have even more options: forward, delete, etc. Love it!"

"I held down the home button longer than usual and realized that a list of recently used apps popped up for easy navigation. So I tried the menu button, and realized that the keyboard came up! Then I held down the call button just to see what would happen, and it activated voice dialing. I love shortcuts!"

Some users found the **current scrolling behavior disorienting** because they think about the scroll bar as something they can manipulate.

" the "scroll box" behavior is disorienting. while it's movement is technically correct, there's something weird about dragging my finger down and seeing the box go up, or dragging finger up and seeing the box scroll down. I keep playing with it and feel like I'm doing something wrong. (Sorta like when you don't have the right "invert" setting on a video game.)"

"the existence of the scroll box is misleading, because you can't scroll with it directly. i realized it's presence is to let the user know where they are within the drawer, but what about just removing it all together? It's not necessary and has too many irresolvable issues as is. I have always felt this way about the Android drawer scroll box."

Camera Usability Feedback

Users liked the **flow** for taking pictures and found the camera app **easy to navigate**.

*"Take a picture - The camera worked just fine"
"i was able to fine, the camera is easy to navigate."*

Some users complained about the **speed** at which the camera takes pictures (this was also one of the key pain points in the G1 release). However, the visual treatment of the camera delay has improved, we didn't get as many negative responses on the speed as we did for G1.

"huge delay from button push to picture snap. (maybe you know about this)"

This version of the phone has **no physical camera trigger** but an **on-screen button**, instead.

Some users **liked** the **on-screen button**. Others **wanted** a **physical button** so that they could take **pictures of themselves** more easily.

*"When using the camera, i really liked how the camera button is on the screen"
"what happened to the physical button? (G1 has it). Really hard to use the onscreen button in a real life scenario. This is also a weak point in the iPhone."*

The **picture quality** is **acceptable** in **good lighting conditions** but users found the **picture quality** in **non-ideal lighting conditions** unacceptable. Camera quality is particular important for **sharing** and **social aspects of the phone**.

"i'm a big app/photo/text person when it comes to my phone so uploading a bad photo is 1) not easy and 2) looks bad anyway."

Some users requested **camera settings** a **flash** to address this problem. The **additional megapixels** seem to have **raised the bar** for the camera because several users mentioned that they wouldn't be as picky with a camera that had fewer pixels.

"I took a picture (which has really good quality for a cell phone)"

"I took a picture just across the street from the SF office of the bridge. The bridge came out really nice."

Later...

"Without a flash, it's not a great replacement for a camera in anything other than ideal lighting. I was indoors and the picture didn't come out great even though I tried it a few times. When I used the camera before, I was outside, and the picture came out fine! I used it to take pictures of my new apartment to send to people :) I know I've left this feedback before but the camera is a great camera to take pictures on the go in spaces where you have plenty of light."

"The video quality was not very good, and unless I was holding it still and the subject was not moving (I wasn't tracking), it is not something I would want to share with others."

"Without a flash, it's not a great replacement for a camera in anything other than ideal lighting. I was indoors and the picture didn't come out great even though I tried it a few times. When I used the camera before, I was outside, and the picture came out fine!"

*"but... there aren't any settings (which is also a bummer)."
"there are not really any settings. i would like to adjust brightness, etc."*

Keyboard Usability Feedback

Users generally found the keyboard responsive and accurate - especially one person was a big fan. One person discontinued the study because she was dissatisfied with the typing experience.

"I like the vibration, the autocomple, the button appearance, pretty much everything about the keyboard."

"The keyboard looks too small, but it is actually quite responsive and accurate."

"The keyboard was actually more accurate than I thought it would be - although it's going to take some getting used to."

"the keys are too close. i've come to the conclusion that like the iphone, this not practical for someone as busy with emails as me. i need to hammer out at least 30-45 minutes of fireDrill emails a day and this is too much of a headache. it's fine for short fun things and while i've gotten better and the keyboard, it's not practical for speed/work"

Users **really appreciated** that they can **type one-handed** (this is one of the most requested features for G1 in the satisfaction survey)

"in a situation where i need to type with one hand, this device is far superior to the G1 because it is easy to type with one hand."

Landscape mode is more comfortable for typing than portrait

"When the phone is turned landscape the typing is great and feels as effortless as the G1. when the phone is portrait the typing is not as good and better done with one hand. Many more typing mistakes in portrait"

The most urgent **keyboard improvements** need to be made by making **opening** and **closing** the keyboard **more discoverable**, especially when there is **no text field present**.

The **extract mode in landscape** work seems to work fine for most apps but **impedes the proper operation of IM**.

Full report is at [Keyboard Usability Insights](#)

Orientation Switch Usability Feedback

Users **like** the **ability to flip** the phone **orientation** by rotating the phone. Some users **like the orientation animation** but one user wasn't a big fan because he **thought it impacted speed**. Orientation switch is **sometimes very slow** (4-5 pulses).

Sometimes the orientation **doesn't rotate when users mean to** even if the app supports it - this may have to do with the angle they are holding it at but some applications also do not support the switch (e.g home screen).

Switching the orientation when putting **the device on a table** is **frustrating** to users.

A left-handed user requested that the **screen orientation** switches the other way.

The full report is here: [Orientation Switch Insights](#)

Home Screen Usability Feedback

Users **liked** and **used** the **home screen customizations** like bookmarks shortcuts and wallpaper but found those features **difficult to discover and use**.

"I was scrolling from one desktop page to another and I wasn't quite sure what happened, but a box popped up that asked me what I wanted to do, and before I knew it I hit 'shortcut.' I then realized you could add a bunch of different things...like even a gmail label shortcut which is awesome!! I had to figure out how I'd gotten to that place, so I closed everything out and realized that you can just hold your finger in an empty space on the home page, and easily change your wallpaper, add a folder, etc."

"I was initially looking for something in the settings menu from within the list of bookmarks, but couldn't find it - so for a few days I didn't think it was possible to add a shortcut to your homepage.

"it is very difficult to set wallpaper on the phone. zooming/cropping, very over-complicated. "

User requested **more organization features** for the **application drawer** and the **objected** to the **speed** with which the icons load on the home screen.

"i'd like to reorder the App within the drawer. otherwise, i have to drag them out to the home screen and make it look like the iPhone."

"If we can't reorder within the drawer, at least offer a few user preferences.

- 1) alphabetical app sort order*
- 2) most frequently accessed app sort order*
- 3) something else I cant think of."*

"I ended up having to hit the home button and then stare at the blank desktop while the desktop applications were being added, it was blank until the app icons reloaded (this is similar to the G1, but to be fair it does take less time to load)"

Notifications, Status Bar and Settings Usability Feedback

Users generally **liked notifications** and make **heavy use** of features specific to certain apps (Gmail and Media player and texting).

"I saw in the notifications bar that I had a new email, so I pulled it down to see what it was. It actually said the subject line and the sender of the new email in my inbox so I could determine if it was beneficial for me to go read it, which it hadn't previously done. I thought that was cool."

"I love how you can pull the top menu down and pause a song quickly when it's playing "

Users were often **wrong** about their **guesses** about what the **status icons** for connectivity mean. This was problematic because users mistook cell tower connectivity for other types of signal strength (WiFi, Data).

"As soon as I got into the filter I tried to read the email and it said no service, even though I had service according to the 'bars' at the top."

"Reception: 1 wireless signal bars out of 5 when 3 feet away from my Airport Express. Signal reception is so weak that can't connect to this internet. not sure what to do, i rebooted WiFi and no change. Maybe it will get better on it's own. It has done this for 3 days sofar."

"I've been trying to figure out what the 'G' vs. the 'E' is in the top bar - but I think I figured out that it was GSM vs. Edge."

HR: filed bug 1668652 Status bar and Gmail connection status get out of sync.
It turns out that the service may have been data service vs cell phone coverage

One user noted that the **wifi notification were too persistent.**

"WiFi networks available" notification should automatically clear itself. This one is less-important than a text/email/voice mail, doesn't need to remain. causes more work for the use to always clear it out."

Users seemed be confused about how to **customize the notifications**, often getting confused about the **global settings vs app settings.**

"I eventually figured it out. I first tried to go into the normal settings of the phone, and wasn't successful...I then realized I had to go into the actual settings of the email app. When I did that I looked for an option to turn the sound off but still have the notifications pop up in the top status bar...I didn't see one so I just disabled notifications all together which grayed out the ringtone/vibrate options, which I assumed turned them off. Eventually, I figured out that under the different ringtones there is a 'silent' option that looks just like a ringtone name, which was confusing...I was looking for something like 'none' or 'off' under the settings/notifications menu."

Telephony Usability Feedback

Call quality and call **reliability** received **high praise** from the study participants.

"Still have had a total of 0 problems with the actual phone, which is very important for me. I would much rather have a phone with great service and call quality and not a ton of features than a phone with a ton of features and bad call quality. The fact that I get both with this phone is awesome!!"

"(In an hour long call) service never cut out even though it was in my pocket."

"I can eventually send the text just fine. Overall the service and reliability of this phone when it comes to sending and receiving calls and texts has been great, (minus yesterday not seeing the missed call icon)."

Users appreciated the **ease of answering a call** using the **headset.**

"Answering the call was easy. I pressed the button on the dongle, answered and spoke. Call clarity was very good."

Though once learned **switching between calls is easy** using the software interface, it is **initially confusing** to use the **menu key** instead of the **phone key.**

"It was the first time I'd had to use it and it was a bit confusing - it seemed like I couldn't just quickly switch using the phone key, but rather had to use the menu button and then select from a few options."

Resolution: Switching between calls should work with the green call button. Will investigate why this didn't work.

Users did **not complain about accidental call** unlike in previous versions. Some users were unhappy with the recently introduced change that was introduced to **avoid accidental calls**.

"there is an additional click in calling someone with this version of android. When I launch the "Dialer" application i want to call someone. when i click on their name i would like to place that call, rather than see info on them. I would understand if i were simply scrolling through contacts, but lets remember that this is a phone and if you are in the phone app then a user is expecting to make a call."

Note: After the diary study, an additional change was made to the call log UI that re-introduced the annoyance of accidental calls but brought one-click dialing closer. This is unfortunate because accidental calls were one of the top rated reasons for dissatisfaction with the phone in previous releases.

Resolution: Prasenjit will re-open the bug. The possible causes are multi-fold: 1. we always end on the call log when the user initiates a call. 2. The call log is a list of calls that can be initiated by one-touch dialing 3. Hitting the green call button twice will re-dial the last call (this is a convention on phones) 4. May it is too easy to press the call button when in the pocket 5. We have an open bug where when the users hits the end call button twice in succession the phone disregards the second key press. Will make this a priority for eclair - or maybe donuts?

There may be a problem with using the speaker phone over time.

"fine at first; then voice on other end became garbled; had to use headset instead"

Resolution: HR will raise this with HTC.

Contacts Usability and Dialer Feedback

Users liked the **easy access** to all relevant info in the **contacts card**.

"i really like the way all contact info is displayed. one touch, and then it's all on one screen (phone number/work/cell/email options). very nice. not hard to find. not too many "clicks" or "touches" to get there like the blackberry."

Users requested **more control** over **ordering and organizing** their **favorites**.

Automatically added results **weren't always useful** and users became **confused** about **how to remove items** in the list (this is done by starring).

"I can't manually order the favorites within the list. (I want my wife as #1, but she's #4 b/c her name starts with S. "

"I can't figure out how to remove an automatically added favorite from the list. It says "delete contact", but I dont know if this removes from the list or deletes them completely from my contacts."

"The list appears to auto-populate based off my calls. This is sorta weird because when the phone is new it is more like a "recent calls" list than favorite calls."

Resolution: The two big themes are: re-ordering lists and creating containers for lists. The framework needs to create paradigms for both. Mike/Helena will follow up with the framework team. The ability to re-order lists is something that Chris may already already planning for contacts 2.0, Helena and Prasenjit will follow up

that this is the case.

Scrolling through a long list gets **frustrating** and users devised **workarounds** for scrolling such as filtering by phone number and adding important numbers to the home screen.

"I was frustrated with scrolling through my entire list of contacts, so i found the "Ad to home screen" functionality by holding my finger on the home screen. Then I clicked "live folder" then i clicked "contacts with phone numbers"

"i found a way to create a shortcut for only my contacts that i have a phone number for. this way i can easily scroll through my contacts with numbers and place a call"

Some expected the ability to **initiate a sync** from the **contacts app**.

"I was trying to initiate the sync while in the Contacts app, and not through the settings. Once I was able to find the location in the settings, syncing was fast. "

Resolution: What we need is an easy and discoverable way to create containers for lists (this is mostly a UI problem). In donut, people will be able to add things to groups but they will only be able to create new groups on the PC. We will also file a bug to create a framework paradigm for creating container for long lists.

Browser Usability Feedback

The browser was very **well received**. Several people mentioned how much **faster and easier to use** the browser is **compared to their Blackberry browser**.

"Surfing the web on Android: much better than the Blackberry. The pages came up just fine, and I was able to easily read articles and look at pics."

"It was so quick and easy to navigate NextMuni.com"

"Craigslist: I was able to quickly do the search I was trying to do, and use the zoom feature to zoom out and view the whole page."

"Facebook:the application itself was much better than what I'm used to on Blackberry. The phone capabilities allow for a MUCH better experience."

"Google Reader: it works for the most part. opening headlines, scrolling down, click to open feed, all that works well"

Speed is important to users but they generally have difficulty separating **speed in web page navigation, browser speed** and **network speed**. Users commented that the browser was **fast/slow** in different instances and on different sites. Note: users only had access to 2G on these phones.

" I got to where I wanted to go (about 4 pages in past the homepage) super fast. On my Blackberry, I used Opera and it took FOREVER to do the same thing."

"When I got the search to go through, it was fast and easy to look at the results!"

"The browser was slow on the normal network."

"load time is slow with 3G"

Recommendation: We will start measuring and benchmarking latency to track our progress.

Users **liked** the **ability to add bookmarks to their home screen** and

bookmarks in general. One requested **making specific bookmarks easier to find** by sorting them alphabetically in the list and by reflecting the bookmark target in the home shortcut icon.

Recommendation: Including bookmarks in search or organizing bookmarks into folders becomes more important as people's bookmarks grow. Targeting this to Eclair release.

We didn't get a lot of feedback on the recent **combination of the URL entry and search functionality** under the **"go" menu item**. One person found the **"go" label** on the URL/search menu item **confusing**. They did not realize that it is used for both, URL entry and search.

Recommendation: This is expected but the current solution seems to be a reasonable compromise. Most likely a completely different, more accessible solution for entering urls is preferable. Many people in usability studies intuitively tap on the title bar in expectation to bring up an URL entry field so that is a good opportunity to introduce an intuitive design solution.

Itemized list of items of Browser improvement opportunities:

Description	Explanation	Possible Solutions/Actions	Severity
Need a bookmarking organization system or at least search	<i>" I think bookmarks should be sorted alphabetically or at least the user should have the option to sort them alphabetically in addition to in the order in which they are added"</i>	HR: Including bookmarks in search or organizing bookmarks into folders becomes more important as people's bookmarks grow. Would be good to have data on how many bookmarks people have on average. Need to make it easier to find <u>1803392</u> Bugspecific bookmarks targetedTo_Eclair	Medium
Sharing URLs is cool but hard to discover	<i>"I was initially bummed because I couldn't figure out how to copy and paste a URL - I couldn't figure out how to even access or view the URL. But then I found that if you press the Menu button, you can choose to share a page via email or messaging. So cool!"</i>	HR: Many people in usability studies have intuitively tried to access the URL by touching the title bar. This would be a great opportunity to take advantage of an already established convention. Resolution: This is not a high priority issue. We keep this in mind when re-designing the URL bar	Medium
Users find it difficult to delete bookmarks because long press in lists is hard to discover	<i>"It's hard to figure out how to delete a bookmark" Adding a bookmark to home screen: "I was initially looking for something in the settings menu from within the list of bookmarks, but couldn't find it - so for a few days I</i>	HR: We need a frame work solution that makes it easy to see which items are "long-pressable". We also need to teach users through other means that long press is an action that is available as one of the core interactions onthe phone.	Medium

	<i>didn't think it was possible to add a shortcut to your homepage."</i>	Mike brought up an interesting point that we could also make it easier to organize bookmarks (re-ordering, deleting, etc) Bug: 1803405 Need to make it easier to organize bookmarks	
Users find it difficult to discover how to add a bookmark from within the browser	<i>"I was initially looking for something in the settings menu from within the list of bookmarks, but couldn't find it - so for a few days I didn't think it was possible to add a shortcut to your homepage."</i>	This is a known issue with the discoverability of long press.	Medium
Hard to discover how to switch between windows	<i>"switching between open windows: i can't figure out how to do it. i know i can search online for an answer, but i'll see if i can figure it out."</i>	HR: I think this is a limitation of the overall system of using the menu key. Maybe there is also a problem with the icon switching very subtly when the functionality changes No action	Low
"go" label doesn't imply URL bar to people and combined url/search functionality is not obvious from the "go" label.	<i>the "GO" within Browser is not clear that is acutally "Enter URL". on a desktop pc, "Go" is clicked after you type in the URL. Please change it to URL</i>	HR: This is expected but the current solution seems to be a reasonable compromise. Most likely a completely different, more accessible solution for entering urls is preferable. Many people intuitively tap on the title bar in expectation to bring up an URL entry field. No action, tracking	Low
Bookmarked shortcuts are hard to distinguish from each other	<i>"It would rock if the icons of bookmarked websites are updated to their Favicon rather than the same icon as the Browser. (At least, it should be a generic "webpage" icon rather than the same one as the Browser application.)"</i>	Change bookmark icons to favicons was done in a later release but the team feels that it's still not that easy to distinguish bookmarks from each other. Need to explore better ways to distinguish home browser shortcuts from each other <u>1803322</u> Bug	Low
Need to remove confirmation dialog when closing windows	<i>"i cant stand the 'confirm to close' browser window that shows after i've already tapped 'X' to close a window. this needs to be user configurable."</i>	Done. Based on this feedback we removed the dialog because users can access the last URL in history already.	Done: Low

Browser loads and redirects last open window instead of opening a new window every time.	<i>"When I first got the phone, I realized that every time I opened a shortcut on the phone, it opened a new browser window. Before I knew it I had 4+ windows open just from checking different Muni times. Now, I see that it just loads and redirects the last browser window I'd opened to avoid having so many different windows open. "</i>	Just wanted to mention that this was fixed and people noticed it positively	Bug
Hard to navigate between form fields	<i>"Forms: I got into the 'what task are you trying to do' box and started typing. I then tried to get into the second 'what worked well' box, but I couldn't get out of the first box! No matter what I did it didn't let me get back to the initial spreadsheet form - I hit back, revert (which deleted my text) and also just tried clicking outside of the box, but nothing seemed to work."</i>	bug filed, fixed	Bug
Text box on facebook is incorrectly interpreted as password field	If you're familiar w/FB you know that the status box says "What are you doing right now?" When I clicked on the track ball to deploy the keyboard and change my status there were circles representing each letter and space in the sentence "What are you doing right now?" that I had to backspace through to delete in order to input new text.	bug filed, fixed	Bug

Calendar Usability Feedback

Calendar was **very well received**, both the **way it looked** and the **consistency** with the **desktop calendar** and **ease of use**.

"Calendar looks great; calendar looks as it does on my PC"

"Adding things to my calendar was easy! I could never access my calendar as easy on my bberry."

However, participants found the corp calendar **too slow too load**.

Recommendation: Tracking and benchmarking the calendar latency will help us track improvements over time.

GTalk Usability Feedback

GTalk was **well received** and praised for its ease of use.

"I like this app a lot - worked well, and everything loaded - AND it didn't freeze my device which is what happens when I attempt to use it on my Blackberry."

"I liked the interface, and it was easy to use"

Finding specific **chat buddies** is **difficult** when a contact isn't in the default chat list or when chat lists get long (especially corp users have hundred's of buddies). Users requested that they can either search for specific contacts or order the chat list alphabetically and scroll through it similar to the address book.

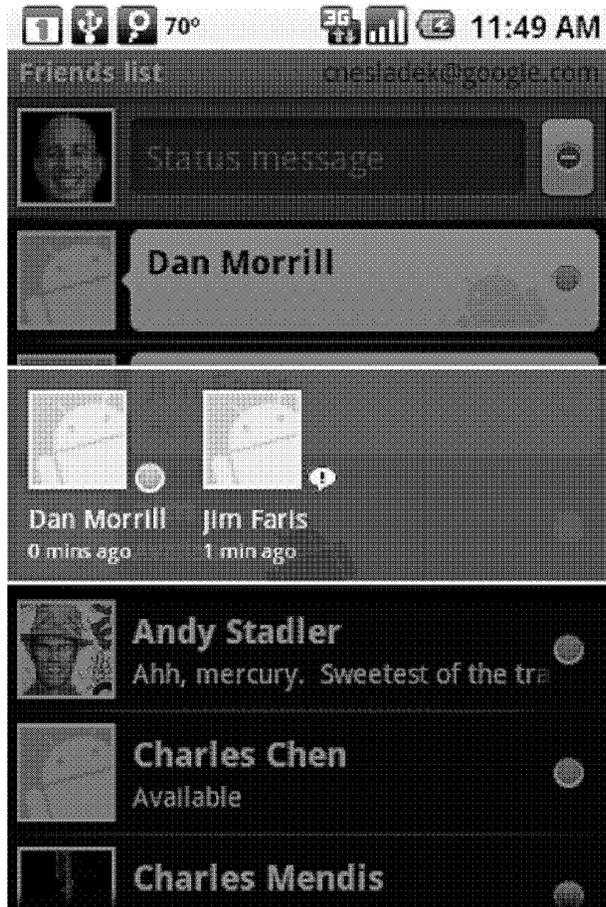
"if the contact i'm trying to reach is listed, i can chat with them easily. if they're not listed in my chat list, i didnt' see a feature on how to search for them. on my pc however, the names do exist on my chat list"

"hard to get the keyboard to come up to look up a contact , not sure how to do that"

Recommendation: Introduce a search function to search over the chat buddy list or some other way to sort and filter to help people find their contacts when the chat list gets long. This could also be done using the keyboard and filtering the way it's done in contacts.

There was also some confusion over **the UI for multiple incoming chats.**

"I dont really get the screen that shows when there are several texts waiting from multiple contacts. It shows buddy icons in a horizontal 3d bar, but this UI isnt used anywhere else, and I'm not clear if I can drag/scroll sideways. Maybe some arrows would help."



GMail Usability Feedback

Users **liked Gmail's looks** and thought that **general navigation was easy**. Users liked that **organization** they set up **on the desktop was preserved**. Users also liked when the **keyboard opened automatically when they needed it**.

"Gmail looks great"

"I got into the gmail app just fine and navigated to one of my filters where it said I had a new message"

"it was easy to navigate most of the application/settings... "

"My filters and mail all comes in"

The biggest **pains points** with **Gmail** were **load time, the need for separate applications for private and corporate email and improved pdf support** (this person was unable to open that particular pdf).

"I understand that it's a standalone app, and it may be in the pipeline already, but it would be really great to have a corp mail application much like the existing Gmail one. "

Recommendation: It's a good idea to start measuring latency. Both, pdf support and separate Gmail apps for personal and work have been top feature requests and will become even more important in future releases targeted toward enterprise customers.

EMail Usability Feedback

The biggest pain points with the **Email app** were the **need to refresh every time it is opened**, a perceived **unreliable sync**, the inability see if **filters** had **new email** and difficulty **distinguishing read** from **unread messages** in the inbox.

Description	Explanation	Possible Solutions/ Actions	Severity
Manual refresh is too cumbersome and seems unreliable	<p><i>"Literally the first thing I do in the morning is roll over and check my email on my phone to see if everything is as it should be with my clients and the TV product. Today I had to refresh three times and my new mail still didn't populate, even though I knew I had unread messages and messages that came in after Friday. It seems as though email in my inbox comes in okay, and it's synced pretty well, but none of the labels are the same."</i></p> <p><i>"My mail doesn't seem to update very often - I usually have to open the mail and refresh my inbox to see new messages. "</i></p> <p><i>"I tried to check it a few times this morning - one time it quit on me, another time I refreshed each label to check for new mail (it said I had none), and then 20 minutes later I refreshed again and it said I had new mail, that came in around 6:15AM. I didn't wake up until closer to 8 this morning, so after I refreshed and checked for new mail the first time, I should have seen my new mail. "</i></p>		
Need a way to alert people about new messages in something other than inbox	<p><i>"It also doesn't tell me if a label has a new message in my work email[the Email app]...and it does in my regular gmail but doesn't seem to sync very often."</i></p> <p><i>"It's getting to the point where I don't even bother to use that application because I have to refresh it anytime I open it (new messages don't just show up), and it doesn't tell me if any of my corporate filters have new messages."</i></p>	Need to verify that in the outside world (outside of Google), we need support for new messages in folders	
The contrast of bold vs. not bold is not enough to distinguish read from	<p><i>"I am having a hard time getting used to the mail applications. Within my labels, it's hard to distinguish new mail from read mail (the bolding isn't super obvious)."</i></p>	It seems that the contrast combined with the green line isn't obvious	

unread messages	enough for easy scanning.
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Maps Usability Feedback

Maps was well received, particularly the **integration of My Location and directions, zoom** (the circular zoom widget), **traffic** and the **easy switch between the list view and maps view** in directions.

"to map it and get directions to my location is awesome, I like you can go from map to directions"

"I was in my car, and I have a Garmin that I usually use, but since I was in the city I just pulled up the address on my phone (not while driving, of course), zoomed in and looked at the cross streets, and found my way really fast. It was great."

"I easily pulled up my location, and then selected map view and further selected traffic. Not only was it super fast, I realized that I've figured out the zoom capabilities!"

"The initial load was just fine, to where the app is open and I have a view of the United States/Canada/Mexico"

The **trackball pans** the map **too slowly**.

"it scrolls do slow, i need to move the ball a lot to get to the app. should allow user to set scroll speed."

Recommendation: This was one of the biggest pain points in the previous Maps satisfaction survey. can we please fix the trackball/scroll speed?

Some people found the **zoom** functionality **frustrating**, particular with **slow data connection speeds** and **while walking**.

"basically, I was very frustrated using maps in a real life situation. maybe it's because it was over Edge network speed, but I was trying to map between two addresses while walking. the looseness of the scroll ball combined with the delay of zoom prevented me from using maps while walking."

Market Usability Feedback

Users commented **positively** on the **speed** of the **Market app**, and **improved ease of installing applications** compared to the previous software release.

"Access was fast (I was on WiFi)."

"downloading the apps with this phone was significantly faster and easier to do than with the G1."

"worked great!. easy to install apps."

Biggest improvements can be made by **giving users tools** to make **finding apps easier**. Users asked for more ways to **sort and distinguish between apps**, were **confused by our ranking method**, and asked for **additional categories** (gadgets).

"Overall, it already feels like I'm downing in apps with few ways to slice and dice."

"Also, the popularity rankings seem off - it doesn't list all the 5 stars, then th 4 stars, etc., but mixes them."

"For some reason i expect there to be more gadgets, maybe from the web. it would rock if there is a link in the "choose gadget" window to jump into the

Market to browse more gadgets. having only 5 gadgets doesn't seem like enough to warrant a need for them."

One user found it **hard to find applications** on the **Market web site** and expected to have **access to all applications**, not just a select subset.

"It is very had to find anything [on www.android.com/market], and the marketplace app on the phone shows far more apps. "

Recommendation: In the upcoming market refresh, give users more ways to sort, filter and search for apps. Consider making the entire corpus of apps available on the PC with options to search and filter by specific criteria.

Messaging (SMS/MMS) Usability Feedback

The messaging app was **well received**.

"Messaging works well"

"I was able to easily navigate to the text box where I wanted to type to send the message"

Switching between **two text messages using notifications** was perceived as **easy**.

"I was texting, and another text came in, so I went to switch between the two.

"I really like how when I'm in a text message, if another text comes in I can select it from the top drop down bar and everything will remain the same (i.e. the keyboard will remain open) but the new text will populate in place of the old one."

The biggest pain point was **finding contacts from within the app** because the only way to **bring up the keyboard** in this mode (by long-pressing) is **not discoverable**.

"Let's say I went into my texts, and went to create a new text message. I would go to type in the name on the 'to:' field, and sometimes it would recognize that I had a contact named 'Jennica Smith,' and find the contact, and I could add it to the to: field. Othertimes, I'd type Jennica Smith (or any other contact, just using her as an example), and it wouldn't populate in the suggested entries field, even though I knew for a fact the contact was in my address book. I first thought for some reason I'd lost contacts in the sync, but then I went into my contacts and sure enough, they were all there, as normal."

" I tried to send it to a certain contact, but when I started typing her name in the text message, it didn't find her in my contacts list (as per my earlier feedback) even though I have verified she's definitely a listed contact - and since I don't have her number memorized I was kind of out of luck.

"Sometimes, I can start typing the name and it will come up just fine, at which point I can select and text or call the person."

" had to go through contacts and then text from there. couldn't go to compose and detect a contact in the field."

Music Player Usability Feedback

Users responded well to having a device for all their needs - **high sound quality, ease of multitasking** and **features** such as the ability **control music from the headphones, looking up music and artists online from their phone** or **setting** sound files as **ring tones**.

"I think it's really cool that this phone is my all in one music device, both as an ipod replacement (headphones) but also an ipod + dock replacement (speakers). I literally carry it around with me to listen to music (cooking, relaxing, whatever), and love that I can do whatever else I want on it while listening to music - surf the web, use different apps, send text messages."

"I also loved the sound quality. It's been working flawlessly, both with and without headphones. The alarm this morning was set to a song, and even though it was loud the quality was great, it actually incorporated itself into my dream before it woke me up."

"I have the option to 'set as ringtone.' Very cool! And then if you do that, it seems to add itself to your library and allow you to use it as an alarm, too."

"I figured out that if you hold down the name, artist or album, you can choose to search for it in the browser, on YouTube or in the Amazon store. So if I wanted, I could look up and buy the entire Fleetwood Mac album if I had at least one song from it on my device. Really cool. "

"Easy to search for music by same name, artist or album online."

Main complaints were about the **many steps to accomplish common tasks**, the **lack of satisfying (PC or phone based) music organization system** and some interaction problems when **controlling the music player from the dongle**. Users also requested the ability to **change the volume without unlocking** the phone.

Multi-tasking

The music player **supports multi-tasking** pretty **well**. Users' expectation is that **playing music** will be **seamless** and only be **interrupted for urgent communication**.

"Music stayed constant and clear as I navigated between apps."

The listening pleasure only seems to be diminished by this bug:

"The music seems to skip if I'm listening through headphones and I get a text message - it's also skipped a few times when nothing else is happening (unless I'm receiving an email or something at that time, I wouldn't know though because I turned those notifications off). It's not a skip like, the music turns off long enough to hear the notification, the sound actually completely goes away for a few seconds."

Bug "every once in a while, there is a static interruption of the sound. The phone is in my pocket and had been playing for a while. There is not action of effect that correlated to why this happened. It was only for a moment and then continues to work fine. "HR: filed bug 1682658

Navigation

Users appreciated the ability to **control common music player functions from the headset dongle**

"I like that you can change the song with the button on the headphones"

"I love how you can pull the top menu down and pause a song quickly when it's playing "

"I used it as my MP3 player while I was skiing the other day, and it was great! I could pause and unpaue easily. "

Issue	Description	Possible Solution	Severity
<p>The step-driven navigation on the music player makes common tasks with large libraries cumbersome. Shortcuts to playing songs are not easily discoverable.</p>	<p><i>"music enjoyment is not possible with a large library on android. it is very step-driven, with lots of confirmations. seems to take me 6 clicks/events to get a song going, where on iPhone it's 2-3. there needs to be simpler/more rapid access to songs."</i></p>		High
<p>The logic behind the control of the music player through the dongle can sometimes be unclear to the user.</p>	<p><i>"The caller hung up, and then I tried to hang up. I pressed the button on the dongle, and there was silence for a few seconds, then the music started, stopped, switched songs twice, then started again. As an experiment, I pressed the dongle later to see what the effect on the music would be (thought it might allow you to forward songs), but it stopped the music player altogether. It was difficult to determine exactly what the functionality was."</i></p>		
<p>The feedback and interaction speed when interacting with the dongle aren't always quite right.</p>	<p><i>" It seems as though there is very little room for error here - you have to press the button twice at the perfect speed for it to change songs, otherwise it just pauses, and I get confused because I don't know if it's paused or just between songs. Not a huge deal but it was something I noticed. "</i></p>		
<p>Users want quick access to changing the music volume without having to unlock the phone</p>	<p><i>The only thing is that with the security lock, I can't change the song or turn down/up the volume without unlocking the screen first. With my iPod I'm used to just being able to put it in my pocket and then quickly take it out and change the song or volume.</i></p>		

Un-pausing a song through the touch screen UI needs to be easier	<i>Not a big deal, but it's not as easy to restart a song after you've paused it, because it goes away in the top bar as soon as you hit pause. So to un-pause you have to go back to home, to the music app, click the song that's paused on the bottom of the screen and then hit play.</i>	The music player widget should help with that.	
Songs skip when phone isn't locked	<i>When I put it in my pocket, if the phone isn't locked, sometimes something (my leg or wallet) makes the touch screen respond and the song skips. I've taken to holding it in my hand until it locks, and then putting it in my pocket. Perhaps there could be a button to lock?</i>		

Music Management

Several participants were unhappy about our support for **managing playlists**, on the **phone** and on the **PC**.

"I can't figure out how to make playlists without consulting the web for help. The lack of powerful music management and organization is a major hurdle for me, and probably would prevent me from buying an Android device."

"Is there a way to make playlists from a desktop computer, rather than only from within Android itself?"

Shuffle doesn't work as expected

"I have about 30 songs on the device, but if I shuffle songs, it only shuffles maybe 5 of them over and over again. "

Video Player/Recorder Usability Feedback

Users liked the **ability to record** and **upload videos to YouTube**.

"Recording a video! It was awesome and I love that you can upload right to YouTube!"

"Capturing the video was very easy and intuitive (once I received the clue that this was possible)"

"Capturing the video, and navigating the menu to the point of upload was easy"

Main painpoints were with **video quality** which made videos too bad to share, and **easier switching to video mode**.

"The video quality was not very good, and unless I was holding it still and the subject was not moving (I wasn't tracking), it is not something I would want to share with others."

Switch from camera to video mode:

"not intuitive, needs to be more prominent"

YouTube Usability Feedback

Users commented that they had trouble accessing video links that were sent to them. Because we have different corpora for PC and mobile YouTube, sometimes videos that are forwarded aren't transcoded yet.

"Clicked on the link that had been emailed to me. Selected complete action using YT. Was told "Sorry, this video is not available." I tried several times and received this response. I was able to watch the video on my laptop so it's not an issue w/the video."

Recommendation: For technical reasons, the mobile and desktop corpora get out of sync. Short of a technical solution to this problem, we need to at least improve the messaging around this issue. Hr filed bug.

Is it possible to initiate the encoding when they visit from an Android phone from a technical perspective?

Search Usability Feedback

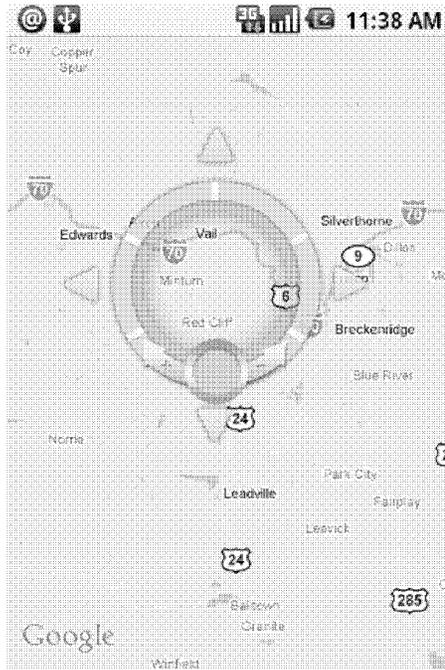
Participants liked the **easy access to search**.

"I like that the Google search bar is easily accessible on the desktop. Easy to get to and easy to navigate to."

We need better feedback on the **progress of the search** that originates from the **search widget**.

"There is a bit of a delay between actually searching and getting your results. I typed something into the Google search bar on the homepage, and then after I pressed the magnifier key, the text box said 'Google Search' as if it didn't read my entry. After a few seconds it had remained that way - so I tried to perform a search again, but in reality it was already searching. I found that it was already searching after I tried to type in the text box again, and then when that didn't work, I hit the back button right as the browser window was popping up."

Zoom Usability Feedback



Note: This particular zoom solution was removed from the release after the diary study. It is not part of the cupcake release. However, the findings on invoking a zoom solution through double tap and the requirement to work while walking can be applied to future design solutions.

The response to the zoom widget **started out positive** for all but one participant. For 3 participants it was **mixed after a few days of use**. At the end of the study, out of 9 participants, 5 participants were satisfied with the zoom solution, 3 participants were dissatisfied and 1 person didn't express an opinion (she dropped out of the study). The satisfied participants noted how **cool** the widget it is, how **easy to use**, how **easy** it is **to zoom into specific points** and also **get an overview of an entire web page**.

" I think the new wheel interface is very cool"

" The zoom is working great. I have been able to easily zoom in to see an image or zoom out to see a full page."

"Was in maps, and was trying to zoom out to see a larger map area when I was checking traffic conditions. I zoomed out and it was quick and easy!"

Of the 3 participants who were dissatisfied, 2 people objected that the **widget was too small** and **requiring too much fine control to manipulate**, and the **zoom widget covered up what they were trying to see**. One person had trouble getting the handle to rotate consistently when she tried to move it with her finger. People particularly encountered **problems when trying to zoom** into maps **while walking** and while trying to use maps in cold NYC weather with clammy hands. Of the 3 dissatisfied people, 2 people had used the Petit Four widget before. One said that this solution was better, the other person said that the Petit Four solution was better.

Triggering and **dismissing** the zoom widget was difficult for users, some people **triggered it accidentally**, some people triggered **single clicks instead** and some developed **theories of double or triple click to dismiss the widget** (as opposed to the single click).

In the browser, several people had **difficulty triggering** the **overview widget** attached to the zoom widget. Because of the dragging motion that the zoom widget requires, participants assumed that the arrows on the widget also required a dragging motion rather than a button press.

The biggest improvements to this version of the zoom widget can be made in **giving users a preview** of which **level they are about to zoom to** (because their fingers covered up the tick marks), making users more **confident about grabbing and dragging the widget handle** and **making the overview** trigger look more **more button-like**. In the long term, an **immediate visual on-screen zoom response** is of **high importance**.

The full report is [here](#).

Related Research

[High level presentation of research findings](#)

[Keyboard Insights Report](#)

[Hardware Insights Report](#)

[Orientation Switch Insights Report](#)

[Zoom Insights Report](#)

More research is a at [go/AndroidUserResearch](#)

Methodology

9 non-technical San Francisco Googlers exchanged their primary phone with a Sapphire Android phone and kept a diary of their interactions with the phone while using the device for 10 days (including two weekends). They explained their diary study entries in 1 hour debrief sessions. Some participants had the option to continue with the diary study.

The diary study [plan is here](#).

- [Welcome letter](#)
- [Recruitment Survey](#)
- [Participant list and schedule](#)
- [Participant list w. phone assignment](#)
- [Diary form](#)
- [Zoom survey](#)
- [Script - ED - IN - SD- NW- JM](#)
- [Issues tracking sheet](#)
- [Dogfood site with contacts sync instructions](#)

Acknowledgements

Many thanks to Brian Jones, Matty Pellegrino, Mike Cleron, Hiroshi Lockheimer, Chris Nesladek and all who made this diary study possible.

EXHIBIT D

From: Mario Queiroz Sent: 7/11/2008 3:43 AM
 To: [-] eumg@; eng-leads-emea; Berthier Ribeiro-Neto; lamg.
 Cc: [-]
 Bcc: [-]
 Subject: [Eng-leads-emea] Fwd: PM All Hands Notes and Docs (video comingsoon!)

FYI, video of this week's PM all-hands. The main topics were (1) How to be a more effective PM; APM trip report for recent trip to Tokyo, Beijing, St. Petersburg, and Trondheim; (3) Demo's of big upcoming search experience changes [Search Wiki, Bento, Toolbelt, for those of you who know the product lingo] by Johanna Wright.

#3 is very interesting for the non-PM folks.

And enclosed are important reference documents which Jonathan R. always insists that PM's (and every other Googler also) read: Founders letters, Googler Handbook, Eric's product strategy memo's from 2006, 07, 08.

mario

----- Forwarded message -----

From: Diana Ly <dianal@google.com>
 Date: Fri, Jul 11, 2008 at 10:28 AM
 Subject: Re: PM All Hands Notes and Docs (video coming soon!)
 To: Amy Wu <amywu@google.com>, productmanagers@google.com, Marissa Mayer <marissa@google.com>, Jonathan Rosenberg <jonathan@google.com>, John Woodell <woodie@google.com>

Hi everyone,

Thanks so much for your patience. The video is below and I've also attached reformatted versions of the founders' letters and strategy memos to provide for easier reading and browsing.

Video: <http://pm/meetings/ptah/2008-07-09>

Thanks to John Woodell, our tireless webmaster, for his help in putting up the video and slides.

Thanks,
 Diana and Amy

On Thu, Jul 10, 2008 at 6:43 PM, Diana Ly <dianal@google.com> wrote:

Hi everyone,

Sorry for the delay, but video production has taken longer than expected, so we wanted to send out the notes and documents first. We are hoping to send out the video with associated slides later tonight.

Notes: http://docs.google.com/a/google.com/Doc?id=dfn63cgz_4cjbfgct

Many of the documents that Jonathan referenced are attached and are also available on JR's corner. Other references:

- JR's Corner: https://pm.corp.google.com/training/getting_started
- Product Fix-it: go/productfixit
- New PM orientation: <http://go/pmorientation>

Again, please feel free to submit feedback here: <http://go/pmfeedback>

Thanks to Brandon Bilinski for taking notes.

Please let me and Amy know if you have more questions,
 Diana

Productmanagers mailing list
Productmanagers@google.com
<https://mailman.corp.google.com/mailman/listinfo/productmanagers>

Google Strategy and Guidelines

Google's 2008 Strategy and Eric Schmidt's Guidelines and Product Memos from 2006 to 2008

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Back to Basics - 2008

Eric Schmidt
May 2008

Dear Googlers,

Our mission to organize the world's information and make it universally accessible and useful is far from complete. Our reputation is based on innovation and creativity and our operations are almost flawless in their execution. Our number one priority is delighting the end user with our products and we set a very high bar, from providing fast, compelling experiences to always respecting a user's data and privacy. Although our strategy is more detailed in 2008 it is still based on our bedrock principles: focus on the user, don't be too serious, and follow where the technology leads.

For 2008, our core message is "Back to Basics". We launch great products, collaborative partnerships, and are not afraid to make bold moves—both as a company and with our products—to build a new online network experience and business, worldwide.

1. Rethinking search

Search is in no way a "solved" problem. Many queries remain very difficult to answer properly and the interplay between high quality content, search algorithms and personal information is just beginning. Search corpora are always incomplete, and our work in data extraction and content partnerships continues to expand the reach and relevancy of search.

Search is and always will be our first priority. We know that freshness, recency, hard queries, and comprehensiveness are important to users worldwide. Better quality inevitably leads to more usage. We want to have Universal search worldwide and for all corpora. New search products (e.g. Knol, Search Wiki, Annotations using Toolbar) are harnessing the world's expert knowledge. Our international efforts include home page redesigns, OneGoogle, and new CJK designs, with continued focus on search quality worldwide.

It's clear that search will become more social: share what you are searching, use what your friends are finding. Google Social projects like iGoogle v2, Gmail Updates, Search Profiles and Reader Friends will make social search effective, by building communities with richer, immersive and social experiences.

2. Speed is still important

Every test and every survey indicates that speed is one of the most important "features" of a product; even milliseconds in response time seem to matter. We recently completed a Code Yellow, and we have 10-30% improvements in observed end user latency, but it's by no means

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over. Imagine all the time saved by over one billion users worldwide. Every service should have user-perceived latency targets (and means to monitor them).

We are asking every global R&D center to devote a percentage of their development bandwidth to their local latency issues. For critical products that are not on fast broadband networks, we have a requirement that you offer a 1 second user access page, with reduced functionality if necessary. Speed is still important and critical in many of our developing markets. Just travel to India and see why.

3. Internationalization at scale

Google is today very global, with most of our users outside the US and a majority of our revenue as well. We take language and internationalization issues very seriously; our goal is still to support at least 40 languages within 2 months of first shipment. Our localization quality is still not comparable to US versions, and we are still doing brute force retrofitting. We ask that core teams should dedicate at least 15% of their development bandwidth to integrate internationalization into their products. We also require that distributed engineering offices spend 30 - 50% of their development bandwidth on local products, including localization and providing local services. We want Google to feel as though it is native to the language, culture, and usage patterns of its users. Mobile usage, for example, shows great potential internationally, and our products should reflect that.

4. Create and use powerful common infrastructure

Scale matters and we can use the power of networks and computers to achieve enormous information advantage, as long we use a common infrastructure for our systems and services. When a common system gets faster, all users and applications benefit. Common systems also mean great ease of use benefits for our users: one way to log in, one way to manage personal information, and so on.

Our continued focus on scalability, availability, and latency at network, storage, indexing, and compute layers leverages all of our systems. We have developed network enhancements to deliver video, photos, Gmail, and more at low latencies to users around the globe (e.g. Bantaid, Kosmos). Utilization rates of our computing cloud need to be improved and we are deploying an integrated set of cluster management and monitoring tools to measure and improve our fleet utilization. Google is building one of the world's biggest supercomputers in the form of its distributed server clusters. We must continue to invest in breakthroughs in networking, server design, and core operating system/cluster management technologies.

5. We focus on the user first, and we also care enough to monetize pages without degrading the user experience

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EXHIBIT E

Hi all,

Following up on Andy's email, I've posted GPS meeting notes at: http://docs.google.com/a/google.com/Doc?id=cndsqjb_33d3q756

For your convenience and reading pleasure, I've also included a copy of the notes below.

Thanks,
erick

Android GPS - Meeting notes

July 17, 2007

Attendees

Eric Schmidt, Sergey Brin, Larry Page, Jonathan Rosenberg, Shona Brown, Andy Rubin, Steve Horowitz, Rich Miner, Ethan Beard, Erick Tseng, Yael Shacham, Elliot Schrage, Nelson Mattos, Urs Hoelzle, Chris DiBona, Mike Morrissey, Salar Kamangar, Joan Braddi, Douglass Merrill, Michelle Vidano, Ryan Gibson, Bill Coughran, Mike Cleron, Marco Nelissen. (Apologies to anyone I may have left off this list!)

Action Items

- (andy/steve/erick) Host a Tech Talk to drum up interest amongst Google developers - (Deadline: Before August 1st)
- (andy/steve) Develop plan to dramatically ramp up Google developers for Android - (Deadline: Within the next week)
- (steve) Test Contacts ability to store 10K+ contacts
- (andy) Set up UI review with Larry, Sergey, and Android UI team. Goal is to review all Android app screenshots
- (andy) Develop specific staffing asks that will help alleviate the roadmap crunch - (Deadline: Within the next week)

Takeaways/Key Decisions

- We need to get 100 active developers building on Android ASAP
- We should be as deeply integrated with 3rd party apps as possible to avoid being perceived as just a Google Phone
- We need to make the Android UI as fast as it can possibly can be. The UI should focus on speed before beauty
- We need to set "minimum rules" for OEMs (e.g., If OEMs want to build a device on Android platform without a keyboard, they will have to integrate triple-tap/T9 themselves)

Discussion Summary

General Notes

- Android is a phone *and* a platform
- Eric wants to do a big internal announcement of the product in ~August to generate momentum
- LP: Should try to fit more messages in Gmail client. Perhaps two lines per message isn't right
- SB: Should test the Contacts app's ability to store 10K+ contacts

Google Internal Development

- Currently have 10-20 active developers building on Android SDK. Eric wants 100 active developers
- To drum up interest in developing on Android, will run a Techtalk and give out Sooner devices to internal developers
- Other ideas: contest, free phones
- ES: Within a week, should develop a plan for getting large number of internal Google developers building for Android

UI

- ES: We should focus on speed first, then beauty. Speed without beauty is still a win
- LP: Would like to test UI by putting the device in the hands of an expert user, and timing how long it takes him/her to use every app, and whether he/she can do everything on the phone while driving
- LP: Wants all screens to load in <200ms

Potential criticism at launch time

- Punted on POP and IMAP email
 - When Android gets announced, we should reach out to a Yahoo! or Hotmail to get a 3rd-party mail client on Android
- Don't directly support a music store like iTunes. Android will be no better, no worse than non-iPhones
- Dream will be perceived as a Google Phone. We want to be deeply integrated with everything (e.g., 3rd party email), and not heavily favor Google apps

Dream Discussion

- Dream will ship with a "Sergey Light" - a camera flash
- Touchscreen will be primarily used for scrolling
- Dream will be a keyboard+touchscreen device. Other OEMs can build a device without a touchscreen, but they should have a keyboard
- Dream will have transfective screen, and will thus be visible in bright sunlight
- We would need to have 3K devices in actual hands before shipping
- First 1K Dream devices arrive in August
- Key differentiators of Dream
 - True multi-tasking
 - Tight background integration with Google services

On 7/17/07, **Andy Rubin** <arubin@google.com> wrote:

Team,

Here's a quick update from the GPS.

First, I'd like to thank everyone who was involved. The demos worked flawlessly, which I think left a favorable impression of our product. Special thanks to Marco, who interrupted his normal duties as media engineer extraordinaire so we could steal his machine for the touch screen demo. We ended up not having time to show it, but

invited everyone to swing by and see it in it's native habitat (Marco's cube).

It was very obvious to me that EMG knows what it takes to build and ship a platform. Bill and Eric have done so in their past careers with Unix and Java, for example. They basically had 3 areas of feedback for us:

1) Get the platform out to Googlers.

We plan on preparing a Tech Talk for Android. The goal is to get as many Googlers as humanly possible developing for the platform (500?). This will happen in about 3 weeks. Before then we will need to work diligently to make sure the platform is ready.

2) User Interface

The feedback was that speed matters. EMG would like to see a UI review, but I was not able to commit to make it happen anytime soon. We have been making arrangements to get additional resources to complete the UI work, at which time a review will be possible.

3) EMG asked a very simple question that I didn't have a direct answer for. The question was "How can EMG help?"

From a management perspective, I think we have done all the tricks in the book to build and ship a quality product.

- We partnered and acquired technology to accelerate the schedule.
- We acquired Skia, who along with 4 others form the basis of our browser team
- We cut a killer deal with T-Mobile, our launch partner, which greatly reduced the amount of "industry functionality" needed for 1.0
- We have made sound technical decisions in building our product
- We have assembled a team of the world's best engineers

My question for you (and this is a serious question): How can EMG help?

Your feedback appreciated,

- andy

android-team mailing list
android-team@google.com
<https://mailman.corp.google.com/mailman/listinfo/android-team>

EXHIBIT F

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COLLABORATION DEVELOPMENT AND LICENSE AGREEMENT

THIS COLLABORATION DEVELOPMENT AND LICENSE AGREEMENT, including the Exhibits, either executed by the parties the same date hereof or later executed pursuant to the terms hereto (this "Agreement") is made by and between Sun Microsystems, Inc., a Delaware Corporation, having its principal place of business at 4140 Network Circle, Santa Clara, California, 95054 ("Sun"), and Google, a ----- corporation, having its principal place of business at -----("Google") (individually a "Party" or collectively the "Parties"), and is effective as of the ---day of -----, 2006 (the "Effective Date").

RECITALS

WHEREAS, Sun is engaged, inter alia, in the development, sale and distribution of certain Java Platform technologies and products;

WHEREAS, Google is engaged, inter alia, in the development and distribution of a Linux-based operating system and applications related to its online services;

WHEREAS, the Parties wish to work together to facilitate the joint development of a Java/LinuxOS software stack targeted at mobile devices, which will be jointly architected and which will be delivered under an agreed Open Source Model and under a commercial model by Sun; and

WHEREAS, the Parties desire to license to one another certain rights with respect to said technologies and software programs to facilitate such development, all on the terms and conditions set forth herein and in the Project Plan to be adopted by the Parties.

NOW, THEREFORE, in consideration of the foregoing and the mutual covenants, promises, and undertakings set forth herein, and for other good and valuable consideration, the Parties agree as follows:

1. DEFINITIONS

1.1 "Architecture" means the general organization and structure of the software programs, and their manner of interaction, including the general design of the Open Source Stack.

1.2 "Google Developed Software" means the software, to be developed by Google under this Agreement in conformance with the Specifications, and Error Corrections and Updates thereto developed during the Term.

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1.3 “Google Technology” means the Technology (exclusive of Google Tools) owned or licensed (with the right to sublicense) by Google, and provided to Sun as identified in the Project Plan, which includes the Google Developed Software and Google Pre-Existing Software as identified in the Project Plan, and Error Corrections and Updates thereto developed during the Term.

1.4 “Google Tools” means those tools owned or licensed by Google (with the right to sublicense by Google) and provided under the Project Plan.

1.5 “Binary Code” means machine-readable, executable code of a computer program.

1.6 “Confidential Information” means information as described in Exhibit A hereof.

1.7 “Derivative Work” means a work (including without limitation designs, ideas, inventions, works of authorship, technical information, processes, schematics, know-how, and other technology) created, conceived, developed, or derived by or for a Party which makes use of or incorporates all or any elements of the other Party’s Technology, such as a revision, modification, improvement, translation, abridgement, condensation, expansion, collection, compilation, or any other form including a new work, in which such Technology or elements thereof may be recast, transformed, or adapted. Each such work or component thereof shall be considered a “Derivative Work” only to the extent that the preparation, use, copying, display, and/or distribution of such work, or components thereof, in the absence of this Agreement or other authorization from the owner of the pre-existing work, would constitute an infringement of such owner’s Intellectual Property Rights.

1.8 “Developed Software” means the Google Developed Software and the Sun Developed Software developed under the Project Plan by Sun and/or Google during the Development Period, including any Error Corrections and Updates developed during the Term (as defined in Section 12.1), and all related Documentation.

1.9 “Development Period” means the period beginning on the Effective Date, and ending on the earlier of the (a) completion of the initial development of the Open Source Stack or (b) termination in accordance with the provisions of Section 12.

1.10 “Documentation” means the documentation defined in the Project Plan, and any other documentation which the Parties agree, currently and hereafter from time to time, in writing, to treat as Documentation under this Agreement, including documentation necessary to use the Developed Software, together, in each case, with any updates, derivatives, modifications, or enhancements thereto.

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1.11 “Error” means any reproducible failure of the Developed Software to conform in any material respect to the Specifications therefor, as the same may be amended and/or supplemented from time to time.

1.12 “Error Correction” means either a modification to the Developed Software that, when made or added to the Developed Software, establishes material conformity to the current Specifications and Documentation therefor, or a procedure or routine that eliminates the practical adverse effect of an Error in the regular operation of the Developed Software.

1.13 “Governance Model” means such terms as provided on a post-execution exhibit (“Exhibit B”) to be agreed upon by the Parties, relating to the policies and procedures for partner engagement, as well as management and hosting of the Open Source Stack for a community of open source developers.

1.14 “Intellectual Property Rights” means all worldwide (a) patents, patent applications, and patent rights; (b) rights associated with works of authorship including copyrights, copyright applications, copyright restrictions, mask work rights, mask work applications, mask work registrations and “moral” rights; (c) rights relating to the protection of trade secrets and confidential information; (d) rights analogous to those set forth herein and any other proprietary rights relating to intangible property; and (e) divisions, continuations, renewals, reissues, and extensions of the foregoing (as applicable) now existing or hereafter filed, issued, or acquired, but specifically excluding trademarks, service marks, trade dress, and trade names.

1.15 “Invention” means any idea, design, concept, technique, invention, discovery or improvement, whether or not patentable, made during the term of the Agreement and in the performance of Project Plan.

1.16 “Joint Invention” means an Invention made, jointly by one or more Sun employee(s) with one or more Google employee(s) during the term of the Agreement and in the development of Jointly Developed Software as provided in the Project Plan.

1.17 “Jointly Developed Software” means Developed Software developed jointly by one or more Sun employee(s) with one or more Google employee(s) during the term of the Agreement and identified in the Project Plan as “Jointly Developed Software”.

1.18 “Go To Market Plan” means such terms as provided on a post-execution exhibit (“Exhibit C”) to be agreed upon by the Parties, relating to the joint marketing efforts to be undertaken by the Parties to promote the Open Source Stack.

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1.19 “Open Source Model” means (i) the Apache 2.0 License for the Google Technology portion of the Open Source Stack and (ii) the Common Development and Distribution License for the Sun Technology portion of the Open Source Stack.

1.20 “Open Source Stack” means the complete and integrated implementation of the Architecture as detailed in the Project Plan, to be released under the Open Source Model, as governed by the Governance Model to be adopted as Exhibit B, with such code base to be supplemented over time by additional code releases the Parties under the Open Source Model, and accepted contributions from other members of the open source community.

1.21 “Pre-Existing Technology” means Technology owned or licensed (with the right to sublicense) by Sun or Google prior to the Development Period and which is provided to the other under the Project Plan.

1.22 “Project Plan” means the development program and schedules as provided on a post-execution exhibit (“Exhibit D”), which sets forth the stages of development and deliverables for the Open Source Stack (including all the technologies and features for the initial release), as agreed upon by the Parties and as it may be amended from time to time in accordance with Section 4.7.

1.23 “Source Code” means program code in high-level computer language readable by humans skilled in the language that is not executable by a computer system directly but must be converted into machine language by compilers, assemblers, and/or interpreters, as well as documentation, release notes, or other specifications which describe the content, organization, and structure of the program code and the complete build environment thereto including make files, comments thereto, listings, flow charts, logic diagrams, and support documentation suitable and sufficient to permit a reasonably skilled software technician to manufacture, maintain, and support the program code based thereon.

1.24 “Specifications” means the document or documents, agreed upon by the Parties, which characterize and define the logical, functional, performance, and operational aspects of the Developed Software, as defined by the Parties in accordance with the Project Plan.

1.25 “Sun Developed Software” means the software to be developed by Sun under this Agreement in conformance with the Specifications, and Errors and Updates thereto developed during the Term.

1.26 “Commercial Stack” means versions of the Open Source Stack, as may be modified, optimized, subsetted and/or superseded, and/or ported to various hardware and/or software platforms and delivered in the form of commercial products and or services..

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1.27 “Sun Technology” means the Technology (exclusive of Sun Tools) owned or licensed (with the right to sublicense) by Sun, and provided to Google as identified in the Project Plan, and shall include the Sun Developed Software and Sun-Pre-Existing Software as identified in the Project Plan, and Error Corrections and Updates thereto developed during the Term.

1.28 “Sun Tools” means those tools owned or licensed by Sun (with the right to sublicense by Sun) and provided under the Project Plan.

1.29 “Technology” means software and other works of authorship developed for or contributed by the Parties for the Open Source Stack as provided in the Project Plan and any technical information, knowledge, ideas, concepts, processes, procedure, designs, schematics and Inventions directly related to the Open Source Stack, and any and all Intellectual Property Rights pertaining thereto.

1.30 “Test Plan” means the written plan to be developed by the Parties, and as contained in the Project Plan, for testing the designs and pre-release specimens of the Developed Software for the substantial and material conformance with the Specifications.

1.31 “Updates” means later releases, modifications, enhancements, additions, improvements, or extensions to any Developed Software or Derivative Work thereof, excluding Error Corrections, made after the end of the Development Period and during the Term.

2. OWNERSHIP

2.1 Pre-Existing Technology. Each Party acknowledges and agrees that, as between the Parties, each Party is and shall remain the sole and exclusive owner of all right, title and interest in and to its Pre-Existing Technology and all associated Intellectual Property Rights, and that this Agreement does not affect such ownership. Each Party acknowledges that it acquires no rights under this Agreement to the other Party’s Pre-Existing Technology other than the limited rights specifically granted in this Agreement.

2.2 Separately Developed Software and Inventions. The Google Developed Software, Derivative Works thereof, and related Inventions and Google Tools shall be exclusively owned by Google. The Sun Developed Software, Derivative Works thereof and related Inventions and Sun Tools shall be exclusively owned by Sun. The Parties acknowledge and agree that, during the Term, Error Corrections and Updates which are developed by either Party shall be owned by the Party whose Technology is corrected or updated. Except as set forth below, the Parties further acknowledge and agree that the Architecture and Project Plan developed during the Term shall be owned jointly and equally by the Parties with no duty to account. After

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expiration or termination of the Agreement for any reason, each Party shall own any Error Corrections or Updates it may create, subject to each Party's ownership of its respective Developed Software and the restrictions imposed by the licenses granted hereunder.

2.3 Jointly Developed Software and Joint Inventions. Jointly Developed Software identified in the Project Plan and related Inventions reduced to practice in the pursuit of the development of the Jointly Developed Software shall be jointly-owned, all patents issued thereon shall be joint, all expenses incurred in obtaining and maintaining such patents shall be jointly shared (except as provided hereunder), and each Party shall have the right to license to third Parties without an obligation to account to the other. With respect to any Joint Inventions, if one Party elects not to seek or maintain such protection thereon in any particular country or not to share equally in the expenses thereof, the other Party shall have the right to seek or maintain such protection at its own expense and shall have full control over the prosecution and maintenance thereof even though title to any patent shall be joint. Each Party agrees to give the other Party all reasonable assistance in connection with the preparation and prosecution of any patent application filed by the other Party in order to carry out the intent of this Agreement.

2.4 No Limitations On Use. Except as provided in Section 2.5, this Agreement shall not be construed to limit or restrict, in any way or manner, any right of either Party to encumber, transfer, license, access, reference, use, or practice its Pre-Existing Technology and/or the Developed Software to be owned by it in any way for any purpose or use.

2.5 Covenants. The Parties agree to the following covenants: (1) Sun and Google shall release the Open Source Stack under the agreed Open Source Model upon its successful completion according to the Project Plan and the terms herein; (2) Google agrees that it shall not develop or distribute a Commercial Stack, shall use Sun's Commercial Implementation for any Google branded handsets, and further agrees to refer prospective commercial customers to Sun to license Sun's Commercial Implementation; and (3) for additional technologies (not specified in the Project Plan) that are relevant to the Open Source Stack and which Google intends to release under the Open Source Model, Google agrees to provide Sun with a twelve (12) month roadmap, to be updated quarterly, for additional technologies Google intends to release under an open source model that are related to the Open Source Stack and further agrees, upon Google's development or acquisition of such new technologies, Google shall provide Sun with prompt delivery of such technologies under Section 3.1(a) license rights, but in no case less than six (6) months prior to any such open source release.

2.6 Further Assurances. Each Party agrees to cooperate with the other and take all reasonable actions required to vest and secure in each Party the ownership rights and appurtenant Intellectual Property Rights as provided in this Agreement. Should any such rights vest in a Party in a manner inconsistent with the Parties' intentions as expressed herein, then that Party shall upon request by the other Party promptly assign such rights to the other, and/or otherwise take all steps reasonably requested to conform the Parties' respective ownership rights with this Agreement, including but not limited to the execution of documents necessary to perfect or evidence such assignments. The Parties agree that the costs attendant to such actions shall be borne by the requesting Party.

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3. LICENCES; LIMITATIONS AND OBLIGATIONS

3.1 Licenses. Subject to the limitations and obligations set forth in this Agreement, the following licenses are granted:

(a) License to Sun of Google Technology and Tools for Internal Use and Development Purposes. Google hereby grants to Sun a worldwide, nonexclusive, royalty-free and (except as provided in Section 15.2) nontransferable license, without the right to sublicense except as expressly provided in Section 6, under Google's Intellectual Property Rights in the Google Technology, to (i) use and reproduce Google Technology for Sun's internal purposes, solely to the extent necessary to develop, test and support the Sun Developed Software, the Open Source Stack and Sun's Commercial Stack, and to assist Google in its development efforts hereunder, in each case during the Development Period; (ii) create and have created Derivative Works of the Source Code of the Google Technology provided to Sun under the Project Plan, solely to the extent necessary to exercise the license granted in Section 3.1(a)(i); (iii) compile the Source Code of the Google Technology; and (iv) use the Google Tools for development and testing of the Google Developed Software, the Open Source Stack and the Sun Commercial Stack. To the extent Google Technology is incorporated into the Sun Developed Software as agreed in the Project Plan, Google hereby grants Sun a perpetual, irrevocable right to use, reproduce, modify, prepare Derivative Works from, and support and maintain the Sun Developed Software, and to sublicense the use of the Sun Developed Software in Binary Code or Source Code form, subject to the limitations herein.

(b) License to Sun of Google Technology for Commercial Use and Distribution Purposes. Google hereby grants to Sun (notwithstanding any limitations provided in Section 3(a) above) a royalty-free, nonexclusive, perpetual, irrevocable, transferable and worldwide license to (i) reproduce, prepare Derivative Matter of, compile, demonstrate, market, and distribute the Google Technology and Derivative Matter thereof in any form on any media or via any electronic or other method now known or later discovered and (ii) make, have made, use, sell, offer to sell, import and otherwise exploit the Google Technology and Derivative Matter thereof in any manner and on any media or via any electronic or other method now known or later discovered; (iii) sublicense the foregoing rights to third Parties through multiple tiers of sublicensees or other licensing mechanisms; and (iv) use the Google Tools internally. The rights under this Section 3(b) shall only become effective, if at all, upon the release by Sun and/or Google of the Open Source Stack as provided in the Project Plan or upon termination by Sun for material breach by Google (or Google's inability to complete its obligations due to an Insolvency Event) as provided in this Section 12.2 and 12.3 hereunder.

(c) License to Sun of Google Technology for release under agreed Open Source Model. Google hereby grants, upon the successful completion of the Project Plan, that Sun and Google may release (in accordance with the Project Plan and only as part of the Open Source Stack) the Google Technology specified in the Project Plan under the Apache 2.0 License.

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(d) License to Google of Sun Technology and Tools for Internal Use and Development Purposes. Sun hereby grants to Google a worldwide, nonexclusive, royalty-free and (except as provided in Section 15.2) nontransferable license, without the right to sublicense except as expressly provided in Section 6, under Sun's Intellectual Property Rights in the Sun Technology and Tools, to (i) use and reproduce Sun Technology for Google's internal purposes, solely to the extent necessary to develop, test and support the Google Developed Software and the Open Source Stack and to assist Sun in its development efforts hereunder, in each case during the Development Period; (ii) create and have created Derivative Works of the Source Code of the Sun Technology, provided to Google under the Project Plan, solely to the extent necessary to exercise the license granted in Section 3.1(d)(i); (iii) compile the Source Code of the Sun Technology and (iv) use the Sun Tools for development and testing of the Google Developed Software and the Open Source Stack. To the extent Sun Technology is incorporated into the Google Developed Software as agreed in the Project Plan, Sun hereby grants Google a perpetual, irrevocable right to use, reproduce, modify, prepare Derivative Works from, and support and maintain the Google Developed Software, and to sublicense the use of the Google Developed Software in Binary Code or Source Code form, subject to the limitations herein.

(e) License to Google of Sun Technology for release under agreed Open Source Model. Sun hereby grants, upon the successful completion of the Project Plan, that Google and Sun may release (in accordance with the Project Plan and only as part of the Open Source Stack) the Sun Technology specified in the Project Plan under the Common Development and Distribution License.

3.2 No Other Rights. Other than the limited rights granted herein, neither Party acquires any right, title, or interest in or to the other Party's Technology, nor in the Intellectual Property Rights therein and appurtenant thereto.

4. DELIVERY AND DEVELOPMENT

4.1 Delivery of Deliverables on Target Dates. Each Party shall develop the Developed Software according to the Project Plan, using diligent and good faith efforts to design, develop, complete, test, and deliver to the other Party all deliverables by or before their associated target dates. Under the Project Plan, the Parties will work jointly to develop the Architecture of the Developed Software, and (a) Google will code the Google Developed Software, and (b) Sun will code the Sun Developed Software. In accordance with the Project Plan, Sun and Google shall release the Open Source Stack under the agreed open source licensing model upon completion of the Development Period.

4.2 Detected Errors. During the Term, each Party shall promptly inform the other Party regarding any Errors it may detect in its relevant Pre-Existing Technology or Developed Software, and shall undertake diligent and good faith efforts to implement Error Corrections.

4.3 Delivery of Error Corrections, Updates, and Derivative Works. During the Term, each Party shall, promptly after their development, deliver to the other Party the Binary Code and Source Code versions of any Error Corrections, Updates and Derivative Works made

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by it, or on its behalf, with respect to the Developed Software. Such Error Corrections, Updates and Derivative Works shall be owned by one Party as provided in Section 2.2 and licensed to the other Party as provided in Section 3.

4.4 Development Meetings. During the Development Period, the Parties shall meet periodically, on at least a monthly basis, to review the status of the Project Plan and exchange information. Additional meetings may be held as reasonably requested by a Party. Meetings will be held in California unless otherwise agreed by the Parties.

4.5 Testing. The Parties will mutually develop the Test Plan for assuring the ultimate performance and interoperability of the Developed Software, and the validity of the results which are generated through operation of the Open Source Stack. The Parties shall jointly test and evaluate the Open Source Stack in accordance with the Test Plan.

4.6 Schedule Changes. In the event a Party determines that a particular target date under the Project Plan likely will be missed, it shall promptly give notice to the other Party setting forth in reasonable detail the reason for the anticipated delay, any corrective measures it intends to undertake, and the estimated revised target date.

4.7 Project Plan. The Parties shall agree on an initial Project Plan within sixty (60) days of the Effective Date. The Project Plan shall set forth the key deliverables and associated target dates. The Parties may, from time to time, modify the Project Plan on mutual agreement in accordance with a change control procedure to be detailed in the Project Plan. In the event of inconsistencies between the Project Plan and this Agreement, the terms of the Project Plan shall prevail. Upon completion and acceptance of the final deliverable of the Project Plan, the Parties will mutually confirm such completion in writing, at which time the Development Period will terminate. The Parties presently anticipate completion of all tasks under the Project Plan on or before -----, 200_. In the event the Project Plan is not agreed and signed by both Parties within sixty (60) days of the Effective Date, and unless otherwise agreed by the Parties in writing, this Agreement shall terminate with immediate effect.

4.8 Updates. From time to time during the Term, either Party may request that an Update to one or more of the Developed Software be created. Each request for an Update shall include the general reason for, or commercial validation of, the Update. The Parties shall negotiate in good faith with respect to the development of the Update.

5. PAYMENTS & COSTS

In consideration for Sun's agreement to provide Google access to the Sun Technology and Sun's agreement to release the Sun Technology as part of the Open Source Stack under the agreed Open Source Model (or in the case of Section 12.2, Google's ability to effect the release), Google agrees to pay Sun following fees:

[Under Discussion]

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Such fees shall be fully earned when due and non-refundable.

Unless otherwise provided above, each Party shall be responsible for its own costs incurred in the performance of its obligations hereunder. In the event a Party anticipates that it will incur extraordinary expenses in connection with its performance hereunder, it will so notify the other Party and the Parties will discuss an appropriate allocation of those costs prior to such Party's incurring the expense.

6. USE OF CONTRACTORS

Either Party (the "Contracting Party") may retain third parties (the "Contractors") to furnish services to it in connection with the performance of its obligations or the exercise of its licensed rights hereunder, and may permit the Contractors to have access to the other Party's Confidential Information, but only to the extent and insofar as reasonably required in connection with the performance of the Contracting Party's obligations under this Agreement and the exercise of the Contracting Party's licensed rights hereunder; provided that each of the Contractors shall be required by the Contracting Party to execute a written agreement (a) sufficient to secure compliance by the Contractor with the Contracting Party's obligations of confidentiality concerning the Confidential Information set forth in the CDA (as defined in Section 7.1); (b) acknowledging the Contractor's obligation to assign all work product in connection with performance hereunder; and (c) effecting assignments of all Intellectual Property Rights concerning any Developed Software to Sun and/or Google, as applicable, consistent with the terms of this Agreement. Either Party, upon request, may review such agreements at any time before or after signing to ensure compliance with this Agreement.

7. CONFIDENTIAL INFORMATION

7.1 **Generally.** Confidential Information disclosed by either Party hereunder will be governed by the terms and conditions of the Confidential Disclosure Addendum, which is attached hereto as Exhibit A and incorporated herein by reference (the "CDA").

8. PROPRIETARY RIGHTS NOTICES

8.1 **Reference to Other Party's Trademarks.** Except as expressly provided in this Agreement, or later provided by written modification to this Agreement and/or execution of any necessary trademark licenses, neither Party is granted any right, title, interest, or license to use the other Party's trademarks, tradenames, logos, product designs, corporate identities, or other marketing designations or brands used in connection with the Parties' products, technologies, or businesses.

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9. REPRESENTATIONS AND WARRANTIES

9.1 Authorization. Each Party represents and warrants that it has the right to enter into this Agreement.

9.2 Disclaimer. Except as expressly warranted above, each of the Parties' Pre-Existing and Developed Software is provided "AS IS" and without any warranty of any kind. Unless specified in this Agreement, all express or implied conditions, representations and warranties, including any implied warranty of merchantability, fitness for a particular purpose, or non-infringement, are disclaimed, except to the extent that such disclaimers are held to be legally invalid.

10. INTELLECTUAL PROPERTY INDEMNITY

10.1 Indemnity Obligation. The contributing Party of the Technology ("Contributor") will defend, at its expense, any legal proceeding brought against the other Party, to the extent it is based on a claim that the use of its Technology is an infringement of a third party trade secret or a copyright, and will pay all damages, costs and fees awarded by a court of competent jurisdiction, or such settlement amount negotiated by the Contributing Party, attributable to such claim.

10.2 Right of Intervention. The Contributor will have the right, but not the obligation, to defend the other Party, at the Contributor's expense, in connection with a claim that the use of its Technology is an infringement of a third party patent and will, if Contributor chooses to defend, pay all net damages, costs and fees awarded by a court of competent jurisdiction, or such settlement amount negotiated by Contributor, attributable to such claim.

10.3 Prerequisites. Under Sections 10.1 and 10.2 above, the Indemnified Party must: (i) provide notice of the claim promptly to the Contributor; (ii) give the Contributor sole control of the defense and settlement of the claim; (iii) provide the Contributor, at Contributor's expense, all available information, assistance and authority to defend; and (iv) not have compromised or settled such claim or proceeding without the Contributor's prior written consent.

10.4 Additional Remedies. Should any of the Contributor's Technology become, or in the Contributor's opinion be likely to become, the subject of a claim of infringement for which indemnity is provided above, the Contributor may, at its sole option, attempt to procure on reasonable terms the rights necessary for the Indemnified Party to exercise its license rights under this Agreement with respect to the infringing items, or to modify the infringing items so that they are no longer infringing without substantially impairing their function or performance. If the Contributor is unable to do the foregoing after reasonable efforts, then the Contributor may send a notice of such inability to the Indemnified Party, in which case the Contributor will not be liable for any damages resulting from infringing activity with respect to the infringing items occurring after such notice.

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11. LIMITATION OF LIABILITY

Except for breaches of Section 3 and each Party's obligations under Section 10, and to the extent not prohibited by applicable law:

A. Neither Party will be liable for any indirect, punitive, special, incidental or consequential damages in connection with or arising out of this Agreement (including loss of business, revenue, profits, use, data or other economic advantage), however arising, including under contract or tort, even if that Party has been previously advised of the possibility of such damages.

B. Liability for all other damages shall not exceed the amounts payable by Google to Sun under this Agreement, even if an exclusive remedy provided for in this Agreement fails of its essential purpose.

12. TERM AND TERMINATION

12.1 Term of Agreement. This Agreement shall have an initial term of three (3) years, and shall automatically renew for two (2) additional annual renewals, unless either Party provides notice of its intent not to renew the Agreement at least thirty (30) days prior to an annual renewal date (the "Term").

12.2 Termination for Cause. If either Party commits a material breach of the terms and conditions of this Agreement, the other Party may terminate this Agreement upon ninety (90) days prior written notice to the defaulting Party describing in reasonable detail such breach, unless within the ninety (90) day period after receipt of such notice all breaches specified therein shall have been remedied, or if the breach is one which by its nature cannot be fully remedied within ninety (90) days the Party has taken substantial measures toward remedying the breach and continues to use best efforts to remedy the breach promptly, provided that such period cannot exceed a total of one hundred and twenty (120) days. In the event that this Agreement is terminated by Google for material breach by Sun (or Sun's inability to complete its obligations due to an Insolvency Event) as provided in this Section 12.2 and 12.3 hereunder, Google shall have the right to complete the Open Source Stack pursuant to the Project Plan and under Section 3.1(d), and upon payment to Sun of the fees specified in Section 5, Google shall have the right to release the Open Source Stack under the agreed Open Source Model pursuant to Section 3.1(e), without further consent from Sun, and notwithstanding anything to the contrary therein. In the event that this Agreement is terminated by Sun for material breach by Google (or Google's inability to complete its obligations due to an Insolvency Event) as provided in this Section 12.2 and 12.3 hereunder, Sun shall have the right to complete and distribute the Sun Commercial Stack pursuant to Section 3.1(b) hereof.

12.3 Termination for Insolvency Event. This Agreement may be terminated at the option of the terminating Party with written notice thereof upon the occurrence of any of the following events with respect to the other Party: (i) such Party is unable to pay its debts as they

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mature; (ii) a receiver is appointed for such Party or its property; (iii) such Party makes a general assignment for the benefit of its creditors; (iv) such Party commences, or has commenced against it, proceedings under any bankruptcy, insolvency or debtor's relief law, which proceedings are not dismissed within sixty (60) days; or (v) such Party is liquidated or dissolved ("Insolvency Event").

12.4 Termination for the Parties' Failure to Execute Exhibits. If the Parties fail to agree and execute Exhibits B, C or D (or any combination thereof) in accordance with Sections 4.7, 13.1 or 13.2, as the case may be, this Agreement shall terminate with immediate effect.

12.5 Survival of Rights and Obligations Upon Termination. The provisions of Sections 1, 2, 5, 7-12, 13 (including Exhibit B), and 15, shall survive any expiration or termination of this Agreement and any provisions (or parts thereof) which by their express terms survive. Notwithstanding the foregoing, Sections 2.5, 5, 10 and 13.2 shall not survive if the Agreement is terminated pursuant to Section 12.4.

13. Marketing & Governance

13.1 Go To Market Plan. Within sixty (60) days of the Effective Date of this Agreement, the Parties will develop a Go To Market Plan for the Open Source Stack. This Go To Market Plan shall include, inter alia, the following obligations: (1) Sun and Google shall promote the Java brand for the mobility market; (2) Google shall certify its mobile applications on the Sun Commercial Stack; (3) Google shall use commercially reasonable efforts to ensure that its mobile client applications interoperate with Sun's backend products; (4) Sun shall be responsible for the development and implementation of programs and infrastructure related to ISVs and developers and the Open Source Model hosting.

In the event the Go To Market Plan is not agreed and signed by both Parties within sixty (60) days of the Effective Date, and unless otherwise agreed by the Parties in writing, this Agreement shall terminate with immediate effect.

13.2 Governance Model. Within sixty (60) days of the Effective Date of this Agreement, the Parties will develop a Governance Model for the Open Source Stack.

In the event the Governance Plan is not agreed and signed by both Parties within sixty (60) days of the Effective Date, and unless otherwise agreed by the Parties in writing, this Agreement shall terminate with immediate effect.

14. Support. Each Party shall provide backline and development support to the other Party for its respective Technologies as shall be further detailed in the Project Plan.

15. MISCELLANEOUS

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15.1 Force Majeure. A Party is not liable under this Agreement for non-performance caused by events or conditions beyond that Party's control if the Party makes reasonable efforts to perform.

15.2 Assignment. Neither Party may assign or otherwise transfer any of its rights or obligations under this Agreement without the prior written consent of the other Party, such consent not to be unreasonably withheld, except that either Party may assign this Agreement to a division or subsidiary.

15.3 Relationship of Parties. This Agreement is not intended to create a relationship such as a partnership, franchise, joint venture, agency, or employment relationship. Neither Party may act in a manner which expresses or implies a relationship other than that of independent contractor, nor bind the other Party.

15.4 Waiver or Delay. Failure to exercise promptly any right under this Agreement will not create a continuing waiver or any expectation of non-enforcement.

15.5 Severability. If any term or provision of this Agreement is found to be invalid under any applicable statute or rule of law then, that provision notwithstanding, this Agreement shall remain in full force and effect and such provision shall be deemed omitted, unless such an omission would frustrate the intent of the Parties with respect to any material aspect of this Agreement, in which case this Agreement and the licenses and rights granted hereunder shall terminate.

15.6 Export Control. All Technology and technical data delivered under this Agreement is subject to U.S. export control laws and may be subject to export or import regulations in other countries. The Parties agree to comply strictly with all such laws and regulations.

15.7 Beneficiaries. This Agreement is made for the benefit of the Parties, and not for the benefit of any third Parties unless otherwise stated herein.

15.8 Governing Law. Any action related to this Agreement will be governed by California law and controlling U.S. federal law. No choice of law rules of any jurisdiction will apply.

15.9 Attorneys' Fees. In addition to any other relief, the prevailing Party in any action arising out of this Agreement shall be entitled to attorneys' fees and costs.

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15.10 Notices. All written notices required by this Agreement must be delivered in person or by means evidenced by a delivery receipt and will be effective upon receipt.

15.11 Headings. Headings used in this Agreement are for ease of reference only and shall not be used to interpret any aspect of this Agreement.

15.12 Entire Agreement. This Agreement is the Parties' entire agreement relating to its subject matter. It supersedes all prior or contemporaneous oral or written communications, proposals, conditions, representations and warranties, and prevails over any conflicting or additional terms of any quote, order, acknowledgment, or other communication between the Parties relating to its subject matter during the Term. No modification to this Agreement will be binding, unless in writing and signed by an authorized representative of each Party.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives.

SUN MICROSYSTEMS, INC.

GOOGLE

By _____

By _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

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EXHIBIT A

CONFIDENTIAL DISCLOSURE ADDENDUM

Sun Microsystems, Inc., a Delaware corporation with a principal place of business at -----
-----("Sun"), and Google, a ----- corporation, having its principal place of
business at ----- ("Google"), agree that:

1. 1. "Confidential Information" means (a) the Google Technology, which shall be the Confidential Information of Google, (b) the Sun Technology, which shall be the Confidential Information of Sun, and (c) the Project Plan, Architecture and the terms and conditions of this Agreement, which shall be the Confidential Information of the Parties, and any trade secrets related to any of the foregoing, including but not limited to the Parties' product and marketing plans, software programs, designs, research or know-how. "Confidential Information" further shall include any and all other information which is disclosed by either Party to the other Party, in whatever form, which is identified as confidential and/or proprietary at the time of disclosure, and if disclosed in non-tangible form, is followed up within 30 days of the disclosure with a writing identifying the confidential and/or proprietary material, and any notes, extracts, analyses, or materials prepared by either Party which are copies of the Confidential Information or from which the substance of the Confidential Information can be inferred or otherwise understood. "Confidential Information" does not include information which the receiving Party can clearly establish by written evidence (i) is or becomes known by the receiving Party without an obligation to maintain its confidentiality; (ii) is or becomes generally known to the public through no act or omission of the receiving Party; or (iii) is independently developed by the receiving Party.
2. 2. The Confidential Information disclosed under this Confidential Disclosure Addendum ("Addendum") shall be as defined in Section 1.6 of the Collaboration Development and License Agreement entered into by Sun and Google (collectively, the "Parties"), effective as of -----, 2006 and in which this Addendum is incorporated by reference (the "Development Agreement"). Unless otherwise stated herein, all capitalized defined terms in this Addendum shall have the meaning assigned to them in the Development Agreement. 2The permitted use of Confidential Information is: for the Parties to develop, update, support and use the Developed Software and other licensed Sun Technology and Google Technology, as permitted under the Development Agreement.
3. 3. This Addendum covers only Confidential Information which is disclosed between the Effective Date and thirty six (36) months thereafter. Each Party's obligations regarding Confidential Information shall expire three (3) years after the date of disclosure (except for Google and Sun Source Code, which shall be protected in perpetuity). Confidential Information shall be used solely as permitted above, and shall not be disclosed to a third Party other than a subsidiary, agent, or subcontractor of the receiving Party who has agreed to be bound by terms substantially similar to those of this Addendum and as provided in Section 6 of the Development Agreement. Each Party shall protect Confidential Information of the other Party using the same

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degree of care, but no less than a reasonable degree of care, as such Party uses to protect its own confidential information. Upon termination of the Development Agreement or the disclosing Party's written request, the receiving Party shall cease use of the disclosing Party's Confidential Information and return or destroy such Confidential Information.

4. 4. Disclosure of the other Party's Confidential Information is not prohibited if prior notice is given to the other Party and such disclosure is: (a) compelled pursuant to a legal proceeding or (b) otherwise required by law. Confidential Information is delivered "AS IS," and all representations and warranties, express or implied, including fitness for a particular purpose, merchantability, and noninfringement, are hereby disclaimed. Neither Party has an obligation to sell or purchase any item from the other Party. Nothing in this Addendum shall be construed as a representation that the receiving Party will not develop or acquire information that is the same as or similar to Confidential Information, provided that the receiving Party does not do so in breach of this Addendum. The receiving Party agrees that any breach of this Addendum will result in irreparable harm to the disclosing Party for which damages would be an inadequate remedy and, therefore, in addition to its rights and remedies otherwise available at law, the disclosing Party shall be entitled to equitable relief, including injunction, in the event of such breach. The receiving Party does not acquire any rights in Confidential Information, except the limited right to use Confidential Information in the Development Agreement and this Addendum.

5. 5. This Addendum is not intended to prevent the receiving Party from using Residual Knowledge, subject to any valid patents, copyrights and mask work rights of the disclosing Party. "Residual Knowledge" means ideas, concepts, know-how, or techniques related to the disclosing Party's technology that is retained in the unaided memories of the receiving Party's employees who have had access to Confidential Information. An employee's memory is considered unaided if the employee has not intentionally memorized the Confidential Information for the purpose of retaining and subsequently using or disclosing it.

EXHIBIT H

HIGHLY CONFIDENTIAL - ATTORNEYS' EYES ONLY

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UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

ORACLE AMERICA, INC.,)
Plaintiff,)
vs.) No. CV 10-03561 WHA
GOOGLE, INC.,)
Defendant.)
_____)

-- HIGHLY CONFIDENTIAL, ATTORNEYS' EYES ONLY--

Videotaped deposition of IAIN M. COCKBURN, PH.D.,
taken at the law offices of Boies, Schiller &
Flexner LLP, 1999 Harrison Street, Suite 900,
Oakland, California, commencing at 9:41 a.m.,
on Monday, October 17, 2011, before
Leslie Rockwood, RPR, CSR No. 3462.

HIGHLY CONFIDENTIAL - ATTORNEYS' EYES ONLY

1 A. Because he can't make the claim he's making,
 2 which is that the Linpack co-efficient is -- is biased.
 3 **Q. Doesn't bias in one co-efficient generally**
 4 **tend to spread to others?**
 5 A. Maybe. Generally, I don't think it's 14:14:05
 6 sufficient here. You'd need to -- in my view, if you're
 7 going to do this kind of specification test, do one which
 8 speaks to, you know, the co-efficient of interest, not
 9 these other three.
 10 **Q. Have you done any testing to see whether the** 14:14:23
 11 **conditions exist that would allow bias in the**
 12 **coefficients Dr. Leonard tested to spread to the**
 13 **co-efficient -- the Linpack co-efficient?**
 14 A. That's not an easy statement to make in a
 15 multivariant context. 14:14:40
 16 **Q. Do you have any information on which to offer**
 17 **an opinion as to whether or not the bias in the three**
 18 **coefficients Dr. Leonard identified might have spread to**
 19 **the Linpack co-efficient?**
 20 MS. RUTHERFORD: Objection. 14:14:55
 21 THE WITNESS: I don't think you could rule it
 22 out necessarily on purely theoretical grounds, but it's
 23 my assessment, based upon my long experience of -- of
 24 doing applied econometrics, that I don't think this is a
 25 problem. 14:15:21

1 A. I would characterize it as a method of
 2 capturing the value to Sun of compatibility and control.
 3 **Q. All right. We'll get to that in a second.**
 4 **Other than those three bases, the litigation**
 5 **premium, fragmentation and then as you put it, the value** 14:17:01
 6 **to Sun as capturing compatibility and control, is there**
 7 **any other basis for the upward adjustment that you make**
 8 **in the patent royalty from just below \$30 million to just**
 9 **above 200 million in your initial report?**
 10 A. Maybe I misheard your question. But those 14:17:19
 11 would be the -- those would be the three factors which
 12 would lead me to an upward adjustment.
 13 **Q. Now, looking at the litigation premium first,**
 14 **you state that you're not able to quantify that**
 15 **precisely; correct?** 14:17:54
 16 A. Correct.
 17 **Q. And why is that?**
 18 A. Well, I think to make the correct adjustment
 19 here, one would have to have a good sense of the ex-ante
 20 probability of success in litigation. 14:18:12
 21 The literature on this has -- has focused, if
 22 you like, on -- on average -- on average values and the
 23 types of the sizable litigation premium, which would be
 24 suggested by, for example, the -- the -- what the data
 25 would allow you to infer about -- infer for a randomly 14:18:37

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1 **Q. BY MR. PURCELL: Other than your experience**
 2 **in doing econometrics, is there any basis for your**
 3 **statement that co-efficient bias spread isn't a problem**
 4 **here?**
 5 A. Dr. Leonard can't rule it in. And I can't 14:15:32
 6 necessarily rule it out. It's my opinion, based upon my
 7 judgment and experience, that I don't think this is a
 8 problem.
 9 **Q. We've been talking about the 30 percent**
 10 **patent apportionment. You apply that to the starting** 14:15:48
 11 **point royalty, and you end up with an initial starting**
 12 **point royalty of just below \$30 million; correct?**
 13 A. Correct.
 14 **Q. And then you make upward adjustments to that**
 15 **starting point royalty; correct?** 14:16:01
 16 A. Correct.
 17 **Q. And in your report, you identify three**
 18 **primary causes of that upward adjustment; there's**
 19 **fragmentation, there's the litigation premium, and then**
 20 **there's Sun's lost profits; correct?** 14:16:14
 21 A. No.
 22 **Q. Okay. What did I get wrong?**
 23 A. I don't accept your characterization of one
 24 of my upward adjustments as being lost profits.
 25 **Q. Okay. How would you characterize it?** 14:16:35

1 chosen patent or a randomly chosen litigation, what the
 2 probability of -- of the patentee establishing liability
 3 would be.
 4 Those studies point us to the general
 5 magnitude of such adjustments. I am personally hesitant 14:18:56
 6 to apply them in a situation such as this, where I think
 7 it's really unclear what the ex-ante probability of a
 8 finding of liability would be.
 9 **Q. Is it fair to say that you used the**
 10 **litigation premium only as a reasonableness check to** 14:19:19
 11 **support your conclusion that an upward adjustment of the**
 12 **patent royalty is justified?**
 13 A. Litigation -- the potential for a litigation
 14 premium, which -- you know, which could be significant
 15 but which I believe is difficult to reliably -- was 14:19:37
 16 difficult for me to reliably assess, is one of the
 17 factors that I would take into account within the Georgia
 18 Pacific framework as suggesting -- as suggesting upward
 19 pressure on a reasonable royalty. Yeah.
 20 **Q. And is that the only way in which you use the** 14:20:04
 21 **litigation premium in your analysis, to suggest upward**
 22 **pressure on the royalty?**
 23 A. I believe so.
 24 **Q. The next basis for your upward adjustment is**
 25 **fragmentation. And I believe you say you're not able to** 14:20:26

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<p>1 Q. Yes.</p> <p>2 A. Okay.</p> <p>3 Q. So you write: "With Project Armstrong, Sun</p> <p>4 would have been the only source for commercial</p> <p>5 implementations of Android." 15:38:10</p> <p>6 What's your understanding of what Project</p> <p>7 Armstrong was, first off?</p> <p>8 A. Project Armstrong is the terminology used by</p> <p>9 Sun to describe the putative agreement with Google to</p> <p>10 jointly develop a Linux and mobile Java-based mobile 15:38:31</p> <p>11 platform.</p> <p>12 Q. What's the basis of your statement that under</p> <p>13 that partnership Sun would have been the only source for</p> <p>14 commercial implementations of Android?</p> <p>15 A. Well, it's my understanding that was the 15:38:46</p> <p>16 spirit, if not the letter of the draft agreements</p> <p>17 exchanged between them.</p> <p>18 Q. And so under the draft agreements, Google</p> <p>19 would not have been a potential source for commercial</p> <p>20 implementations of Android? 15:39:03</p> <p>21 A. Well, this is one of the provisions we were</p> <p>22 discussing this morning, which I think is important to --</p> <p>23 to recognize as a source of value to Sun outside the</p> <p>24 payment of specific royalty amounts.</p> <p>25 Q. Did Sun and Google ever agree that Sun would 15:39:23</p> <p style="text-align: right;">174</p>	<p>1 where the issue here is the difference between Java ME as</p> <p>2 I think you were describing as a piece of middleware,</p> <p>3 Java ME can be implemented on many different platforms,</p> <p>4 and certainly it's the case, I think, that OEMs or</p> <p>5 carriers may be understood to be distributed -- you know, 15:41:16</p> <p>6 distributing a commercial implementation and doing so on</p> <p>7 top of that platform.</p> <p>8 So I think, for example, Java ME runs on</p> <p>9 Blackberry. There's a big distinction between that and</p> <p>10 Android, which is a -- what we were describing earlier as 15:41:33</p> <p>11 a full stack.</p> <p>12 Q. I think you said earlier that your only basis</p> <p>13 for quantifying the upward adjustment of patent royalties</p> <p>14 is the third upward adjustment, the value to Sun of</p> <p>15 compatibility and control; is that correct? 15:42:09</p> <p>16 A. Yes.</p> <p>17 MR. PURCELL: I'd like to mark these two</p> <p>18 documents as Exhibits 509 and 510.</p> <p>19 (Exhibits Google 509 and 510 were marked</p> <p>20 for identification.) 15:42:42</p> <p>21 MR. PURCELL: So Exhibit 509 is a March 20,</p> <p>22 2006 email from Kathleen Knopoff to the Armstrong core</p> <p>23 email group, Bates-Stamped OAGoogle 0100166873.</p> <p>24 And then Exhibit 510 is a presentation with</p> <p>25 the Bates-Stamp OAGoogle 0100166874 through 66899. 15:43:06</p> <p style="text-align: right;">176</p>
<p>1 be the only company that could offer a commercial</p> <p>2 implementation of Android?</p> <p>3 MS. RUTHERFORD: Objection to form.</p> <p>4 THE WITNESS: There was no agreement.</p> <p>5 Q. BY MR. PURCELL: Was there ever an agreement 15:39:38</p> <p>6 on that term between Sun and Google during negotiations?</p> <p>7 MS. RUTHERFORD: Objection to form.</p> <p>8 THE WITNESS: I don't think so.</p> <p>9 Q. BY MR. PURCELL: When you say "commercial</p> <p>10 implementation," are you distinguishing between that and 15:39:49</p> <p>11 zero price implementations?</p> <p>12 MS. RUTHERFORD: Objection to form.</p> <p>13 THE WITNESS: I'm referring to -- to an</p> <p>14 implementation which is licensed under the kind of</p> <p>15 commercialize which Sun had used and continues to use 15:40:08</p> <p>16 with its licensing of Java ME.</p> <p>17 Q. BY MR. PURCELL: But there are other</p> <p>18 companies that are able to offer commercial</p> <p>19 implementations of Java ME; correct?</p> <p>20 A. What do you mean specifically? 15:40:27</p> <p>21 Q. Well, OEMs, wireless carriers, there are</p> <p>22 other companies that offer commercial implementations of</p> <p>23 Java ME; correct?</p> <p>24 A. They do so under license from Sun, is my</p> <p>25 understanding. So it's a distinction. I think maybe 15:40:51</p> <p style="text-align: right;">175</p>	<p>1 MS. RUTHERFORD: I think it's important to</p> <p>2 mention that 509 and 510 were attached to each other.</p> <p>3 MR. PURCELL: Right. I assume that that's</p> <p>4 the case.</p> <p>5 Q. Dr. Cockburn, looking at -- and feel free to 15:43:30</p> <p>6 look at Exhibit 509 if you want, the email -- but looking</p> <p>7 at 510, the presentation, is this document the basis for</p> <p>8 your quantification of the upward adjustment for the</p> <p>9 value of control and compatibility to Sun?</p> <p>10 A. It's the basis for that part of my 15:43:48</p> <p>11 adjustment, which, if you like, is a lump sum. I also --</p> <p>12 I also account for compatibility control as regards of</p> <p>13 lifting a cap on -- on the revenue sharing part of the</p> <p>14 agreement. This is the principal part, yes.</p> <p>15 Q. BY MR. PURCELL: Is there any other basis for 15:44:18</p> <p>16 that principal part of your upward adjustment, other than</p> <p>17 this document?</p> <p>18 A. No. Other than -- other than my locating it</p> <p>19 in the general context of the record and the other</p> <p>20 evidence I considered, this is the specific document. 15:44:37</p> <p>21 Q. Leaving aside your discussions with counsel,</p> <p>22 which I can't get into, did you discuss this document</p> <p>23 with anybody at Oracle prior to relying on it in your</p> <p>24 expert report?</p> <p>25 A. No. 15:44:49</p> <p style="text-align: right;">177</p>

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<p>1 MS. RUTHERFORD: Objection to form. 2 Q. BY MR. PURCELL: Did you do any independent 3 investigation whether the projections in this document 4 were reasonable given the market conditions that existed 5 at the time it was created? 15:45:00 6 A. Yes, I assessed it in light of my general 7 review and appreciation of -- of the mobile marketplace 8 at the time and the economics of -- of this technology.</p>	<p>1 A. Services included by whom? 2 Q. Well, the services that Sun was planning to 3 offer and derive revenue from according to this 4 projection? 5 A. Well, there may be some distribution or 15:48:34 6 hosting of code, but there's no -- there's no -- you 7 know, typically Open Source software is one in which, you 8 know, it's offered as is. There's no additional 9 engineering or technical support or, you know, value 10 added, you know, beyond -- beyond access to the code 15:49:00 11 under whatever terms it's being offered.</p>
<p>9 Q. What other documents or facts did you rely on 10 as a check on the reasonableness of the projections in 15:45:26 11 Exhibit 510? 12 A. Well, I looked at the information as to the 13 scale of -- of Sun's Java licensing business. I looked 14 at the size of the -- the mobile space, if you like, in 15 terms of numbers of handsets, amount of economic 15:45:55 16 activity, just the overall economics of the mobile space. 17 Q. Can you point me to any specific fact that 18 you believe supports your conclusion projections in 19 Exhibit 510 are reasonable? 20 MS. RUTHERFORD: Objection to form. 15:46:22 21 THE WITNESS: Well, if you look at the scale 22 of the existing mobile or, you know, Java licensing in 23 general and mobile licensing in particular, you know, and 24 what Sun was already realizing, I think that the 25 projections captured in this document as to the amount of 15:46:46 178</p>	<p>12 Q. What about the customized source line item; 13 what Sun services or products were included within that 14 category? 15 A. Well, if you look to the page of this 15:49:28 16 document ending 6890, this document is specifying the 17 types of services they're providing by selling a custom 18 source subscription. 19 So complete productized source tested and 20 certified on the device, updates, working with -- with 15:50:06 21 problems relating to bugs in the code or security updates 22 that might be necessary, helping their -- the OEM with -- 23 with licensing to third parties and providing technical 24 support in association with -- with distribution of the 25 implementation to third parties. These are all 15:50:38 180</p>
<p>1 revenue which Sun anticipated receiving from -- from 2 monetizing the full stack with Linux and -- and Java seem 3 entirely consistent with what's at stake in this 4 business. 5 I looked at the volume anticipated, which is 15:47:18 6 on the page with the Bates Number ending 883. I 7 generally assessed as to whether I believed these numbers 8 were reasonable in the -- as I said, in the context of 9 the marketplace at the time.</p>	<p>1 recognizable to me as valuable services in the 2 perspective of a hardware manufacturer. 3 Q. Going back to page 883. The second column in 4 the chart is customer price per unit? 5 A. Yes. 15:51:04 6 Q. Do you know how Sun determined the prices in 7 that column? 8 A. Well, that's not clear from the document 9 other than it's, you know, back to page 6890, I assume 10 that this number made sense to Sun in the course of 15:51:27 11 preparing this document, in light of their experience 12 selling similar types of services to these very same 13 customers.</p>
<p>10 Q. BY MR. PURCELL: Let's actually stick on the 15:47:44 11 page that ends with 883. 12 A. 883. 13 Q. For a moment. 14 A. Yes. 15 Q. The title is "Per Unit Pricing and Sun's 15:47:51 16 Share"? 17 A. Yes. 18 Q. The left-hand column is headed "Offering." 19 Do you see that? 20 A. I see that. 15:47:58 21 Q. And then there's a number of line items under 22 there. There's Open Source, customized source, binary, 23 and commercial source. 24 What sort of services are included within the 25 Open Source category, do you know? 15:48:15 179</p>	<p>14 Q. What about the next column, Sun share dollars 15 per unit; do you know how Sun determined what it 15:51:45 16 projected its share would be? 17 A. Well, you know, that's the customer price net 18 of third-party royalties. Again, I haven't independently 19 verified what those numbers would be, but given that this 20 document was created by Sun for the specific purpose of 15:52:06 21 evaluating this opportunity, I have to believe that it 22 reflects their internal data and experience in offering 23 these services and paying third-party royalties when 24 necessary. 25 Q. The volume column, do you know how Sun got 15:52:25 181</p>

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1 **the figures that are listed in the volume column?**
 2 A. I believe the -- they went to a variety of
 3 third-party sources to project likely volume and
 4 integrated that into this document. I'm not aware of the
 5 specific process or the degree to which they relied upon 15:52:50
 6 one data vendor versus another.
 7 **Q. What's your basis for your statement that Sun**
 8 **assembled the volume numbers by serving third-party**
 9 **sources?**
 10 A. I believe I've cited those sources in my 15:53:36
 11 report. I'm just checking through here to see if they're
 12 also listed in this -- in this document. I don't see
 13 them listed in the document.
 14 **Q. If you could turn the page to the page that**
 15 **ends in 884. 15:54:17**
 16 A. Yes.
 17 **Q. Now, under this chart, it's assumed that Sun**
 18 **would start seeing revenue from Project Armstrong in**
 19 **fiscal year 2007. 15:54:29**
 20 A. Yes.
 21 **Q. Do you know when Sun's fiscal year ends? In**
 22 **other words, when did fiscal year 2007 end?**
 23 A. July, I believe.
 24 **Q. So it would end in the end of June 2007?**
 25 A. If my recollection as to whether it's July or 15:54:48

1 specific assumption about the -- the -- how quickly it
 2 would take to assemble this product and how fast it would
 3 go to market. You know, that -- it doesn't seem
 4 unreasonable to me, you know, in February 2006, given the 15:56:23
 5 cooperative relationship envisioned with Google and the
 6 amount of this technology which Sun already had to hand,
 7 it doesn't seem to me unreasonable to believe that the --
 8 a product like this, you know, couldn't have -- could
 9 have gotten to market in the fiscal '07/'08 time frame
 10 and could not have achieved the volume of sales which 15:56:47
 11 would support the revenue figure that they're
 12 forecasting.
 13 I'm sorry, you had another question you
 14 wanted to ask me?
 15 **Q. Well, my question, which you may have 15:57:02**
 16 **answered, was just that given the projection of**
 17 **\$153 million in revenue for the fiscal year ending in**
 18 **June of 2008, and the fact that Android only got to**
 19 **market later in 2008, you don't consider that projection**
 20 **to be overly optimistic? 15:57:16**
 21 MS. RUTHERFORD: Objection.
 22 THE WITNESS: Well, again, it depends on what
 23 you assume the point at which work starts on the project,
 24 how quickly it's completed. You know, the actual number
 25 of units underlying this, I think, are not unreasonable. 15:57:31

1 June is correct, it would end in June.
 2 **Q. Okay. Now, the Android platform itself was**
 3 **released only in late 2008; correct?**
 4 A. Correct.

1 You can infer -- you can infer that from the previous
 2 page which talks about, you know, 235 million units in
 3 fiscal '09. You could scale that down to, you know, help
 4 you understand how many units were projected and how
 5 quickly this product might have ramped up and received 15:57:59
 6 acceptance.

5 **Q. Given that fact, don't you think it's a 15:55:01**
 6 **little optimistic for Sun to be forecasting receiving**
 7 **substantial revenue from this platform in fiscal years**
 8 **'07 and '08, which would only cover the period up to**
 9 **July -- or June 30, 2008?**
 10 A. Well, I'll first note that the total revenue 15:55:22
 11 there forecasting receiving in fiscal year '07 is
 12 \$1.4 million, which I would not characterize as
 13 substantial in this context.
 14 **Q. Yes. But fiscal year '08, it jumps to**
 15 **\$153.1 million; correct? 15:55:39**
 16 A. I see that.
 17 **Q. So --**
 18 A. I hadn't --
 19 **Q. -- focusing on that number more**
 20 **specifically -- 15:55:44**
 21 A. I'm sorry, I hadn't finished my previous
 22 answer.
 23 **Q. All right. Well, go ahead.**
 24 A. Secondly, the timing of these forecasts of
 25 revenues, you know, would depend very much upon some 15:55:56

7 **Q. BY MR. PURCELL: Have you seen any other**
 8 **document that would support a conclusion that if Project**
 9 **Armstrong had gone forward, Sun could have got it to**
 10 **market by the end of 2007? 15:58:09**
 11 MS. RUTHERFORD: Objection to form.
 12 THE WITNESS: I'm not recalling a specific
 13 document.
 14 **Q. BY MR. PURCELL: In looking at the numbers**
 15 **for fiscal year 2009, the revenue number is 15:58:29**
 16 **\$462.6 million; correct?**
 17 A. Yes.
 18 **Q. And the gross margin is \$428.0 million?**
 19 A. Yes.
 20 **Q. That's a profit margin of over 90 percent, 15:58:42**
 21 **isn't it?**
 22 A. I'll accept your arithmetic.
 23 **Q. Are you aware of any other Sun or Oracle**
 24 **business segment that generates a margin of that nature,**
 25 **90 percent? 15:59:00**

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<p>1 MS. RUTHERFORD: Objection.</p> <p>2 THE WITNESS: These types of gross margins</p> <p>3 are not uncommon for software products. I don't think</p> <p>4 that's -- that's unrealistic. These types of businesses,</p> <p>5 in particular, the -- you know, supplying binary 15:59:19</p> <p>6 distributions or creating customized source have -- very</p> <p>7 much have a fixed component. That is to say once volume</p> <p>8 ramps up, they can -- gross margin can be expected to</p> <p>9 widen very substantially. That's why successful</p> <p>10 products, software products are very profitable 15:59:44</p> <p>11 businesses to be in.</p> <p>12 Q. BY MR. PURCELL: Did you do anything to</p> <p>13 verify whether that projected profit margin would have</p> <p>14 been realistic, given the product that's at issue here?</p> <p>15 A. It seems reasonable to me, particularly if 16:00:02</p> <p>16 you were to start adding in an allocation of overhead</p> <p>17 rather than just the line here which is labelled COGS,</p> <p>18 which is cost of goods sold. This looks to me like the</p> <p>19 typical economics of software development, particularly</p> <p>20 if it's a B-to-B type of product sold to a limited number 16:00:32</p> <p>21 of vendors as opposed to requiring a massive amount of</p> <p>22 consumer marketing support or distribution by stamping</p> <p>23 out, you know, hundreds of millions of CDs in the company</p> <p>24 documentation.</p> <p>25 Q. Wouldn't marketing of a full-stack mobile 16:00:54</p> <p style="text-align: right;">186</p>	<p>1 A. No.</p> <p>2 Q. Have you seen any documents that revised or</p> <p>3 confirmed these projections after they were vetted</p> <p>4 bottoms up by the customer?</p> <p>5 A. No. It's my understanding the document was 16:02:30</p> <p>6 prepared in February 2008 as part of the background for</p> <p>7 the negotiations that were being conducted in late March</p> <p>8 and early April, and that as those negotiations fell</p> <p>9 apart, it doesn't surprise me that there's no subsequent</p> <p>10 revision of this document. 16:02:54</p> <p>11 Q. I think you said February of 2008. I think</p> <p>12 you might have meant February of 2006?</p> <p>13 A. I certainly meant to say 2006. I apologize</p> <p>14 for misspeaking.</p> <p>15 Q. No problem. 16:03:04</p> <p>16 So just to be clear, you've never seen any</p> <p>17 other iteration of this document that made projections</p> <p>18 about potential revenue for Project Armstrong; correct?</p> <p>19 A. That's correct.</p> <p>20 Q. Let's turn to Exhibit 6 to your reply to the 16:03:29</p> <p>21 Leonard report, which should be the very last page of the</p> <p>22 document.</p> <p>23 A. Okay.</p> <p>24 Q. Now, Exhibit 6 to your reply to the Leonard</p> <p>25 report, this calculates your current estimates of 16:04:12</p> <p style="text-align: right;">188</p>
<p>1 operating platform have required consumer marketing?</p> <p>2 MS. RUTHERFORD: Object to the form.</p> <p>3 THE WITNESS: Well, the customer here are</p> <p>4 OEMs and carriers. In the global marketplace, you know,</p> <p>5 the serious customers here would be measured in tens or 16:01:16</p> <p>6 hundreds rather than millions or hundreds of millions.</p> <p>7 The carriers and the OEMs are going to market to</p> <p>8 consumers.</p> <p>9 Q. BY MR. PURCELL: Now, looking for a second at</p> <p>10 Exhibit 509, Kathleen Knopoff's March 20th, 2006 email? 16:01:36</p> <p>11 A. Yes.</p> <p>12 Q. It's your understanding that this email was</p> <p>13 attached to and referring to the presentation we've been</p> <p>14 discussing that's Exhibit 510?</p> <p>15 A. Yes, that's my understanding. 16:01:51</p> <p>16 Q. So Ms. Knopoff writes a number of things, but</p> <p>17 number 3 in her email is the provisos that we gave them</p> <p>18 are that the numbers will move as the business model is</p> <p>19 more fully developed and that these numbers have not been</p> <p>20 vetted bottoms up by customer. 16:02:11</p> <p>21 Do you see that?</p> <p>22 A. I see that.</p> <p>23 Q. Have you ever seen another document that</p> <p>24 revised or confirmed these projections in any way after</p> <p>25 the business model was more fully developed? 16:02:20</p> <p style="text-align: right;">187</p>	<p>1 Oracle's patent damages under various sets of</p> <p>2 assumptions; correct?</p> <p>3 A. You know, if I could ask for your</p> <p>4 forbearance.</p> <p>5 Q. Sure. 16:04:22</p> <p>6 A. The -- the way this is reproduced, the type</p> <p>7 is really small and my vision is blurring a bit. I don't</p> <p>8 know whether it's jet lag or the fact that it's late in</p> <p>9 the evening in Boston, but if there's any way to give me</p> <p>10 a copy of this which I can read, I would much appreciate 16:04:37</p> <p>11 it.</p> <p>12 Q. Well, I don't have another copy of it. This</p> <p>13 is sort of how it was presented to us.</p> <p>14 MS. RUTHERFORD: Let me see if there's a</p> <p>15 larger copy in here (indicating). 16:04:50</p> <p>16 THE WITNESS: Thank you. That's better.</p> <p>17 Q. BY MR. PURCELL: Good. So taking the</p> <p>18 left-most column, patent apportionment percentage, do you</p> <p>19 see that?</p> <p>20 A. I see that. 16:05:05</p> <p>21 Q. I understand that the bottom row there, the</p> <p>22 collective apportionment of the six patents you view as</p> <p>23 30 percent of the value of the starting point license fee</p> <p>24 number; correct?</p> <p>25 A. That's the apportionment percentage I applied 16:05:25</p> <p style="text-align: right;">189</p>

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<p>1 both to the starting point license and to the upwards 2 adjustment that we've just been discussing.</p> <p>3 Q. The numbers above that, under the patent 4 apportionment percentage column for each of the six 5 patents-in-suit, what do those percentages measure? 16:05:40</p> <p>6 A. That would be the same apportionment one 7 would apply to these -- what I call the starting point 8 license and to the upward adjustment, which is specific 9 to the patents which are the row titles to this table.</p> <p>10 Q. So does that mean that patent '104 by itself 16:06:00 11 accounts for 25 percent of the starting point?</p> <p>12 A. That's what the -- my analysis indicates that 13 is my opinion.</p> <p>14 Q. And similarly, patent '205 accounts by itself 15 for 25 percent of the starting point? 16:06:16</p> <p>16 A. Correct.</p> <p>17 Q. And yet the two of them added together and 18 with four other patents, that accounts for only 19 30 percent of the value of the starting point?</p> <p>20 A. That's not legitimate to -- to add these 16:06:28 21 numbers. The analysis -- you know, these are the -- 22 these are the numbers. These apportionment percentages 23 are those which are supported by the evidence that I 24 reviewed, which are specific to a particular patent. 25 They won't add because these -- these are 16:06:55</p> <p style="text-align: right;">190</p>	<p>1 A. That's right.</p> <p>2 Q. And what accounts for the decrease from 3 \$201 million to 176?</p> <p>4 A. Well, the difference is accounted for by 16:08:44 5 treatment of overhead numbers. If we go back to 6 Exhibit 510 and the page number ending 884, it's an open 7 question in my mind as to whether or not one should 8 subtract overhead or whether one should be using, if you 9 like, gross -- gross profit or net profit from the -- 10 this Project Armstrong financial projection. 16:09:19</p> <p>11 I'm using this not to -- not to assess lost 12 profits, but rather to understand the magnitude of the 13 value that some placed upon the kind of compatibility and 14 control which would allow them to realize these revenues. 15 There's an argument for doing it both ways. 16:09:45 16 To be conservative, I have -- in Exhibit 6 to my reply 17 report to Dr. Leonard, I've applied the overhead numbers, 18 and that slightly reduces the damages assessment.</p> <p>19 Q. Is that calculation explained anywhere in the 20 body of your reply report? 16:10:05</p> <p>21 A. Well, it's certainly laid out here. In 22 Exhibit 6, you can see Note 8. It explains the 23 methodology I used, and it says it includes an additional 24 adjustment of 28 -- sorry, \$25.85 million cost of 25 Armstrong operating expenditure. Refers back to the 16:10:34</p> <p style="text-align: right;">192</p>
<p>1 complementary components of a larger portfolio. So it's 2 not economically meaningful, you know, as I laid out in 3 my report, to suggest that, well, if they're worth -- six 4 are worth 30 percent all together, that doesn't mean to 5 say that each of them constitutes 5 percent. 16:07:16</p> <p>6 They're complementary -- there are good 7 reasons to believe, you know, based upon my work on 8 thinking about software patents and my understanding of 9 how these inventions contribute to the performance of the 10 overall product, there's good reason to believe that 16:07:40 11 they're complements in the extent to which they interact, 12 and their value is complementary to the other parts of 13 the portfolio.</p> <p>14 So you can apply the same methodology that 15 one would to a group of patents and apply that to single 16:07:55 16 patent and would not come up with numbers which mean that 17 the -- the value of the group is the sum of the value of 18 its components.</p> <p>19 Q. Through December 2011, you calculated a total 20 damages figure before adjustments of \$176 million; is 16:08:21 21 that correct?</p> <p>22 A. For patent infringement, yes.</p> <p>23 Q. Yes. And in your initial report, you had a 24 larger figure of slightly over \$200 million; is that 25 right?</p> <p style="text-align: right;">191</p>	<p>1 original damages number.</p> <p>2 I don't know what other explanation I could 3 offer.</p> <p>4 Q. Where does the \$25.85 million number come 5 from? 16:10:50</p> <p>6 A. Well, if you go to -- what you'll need to -- 7 to get to that number is --</p> <p>8 MS. RUTHERFORD: Exhibit 510. 9 THE WITNESS: I can't do the -- sorry.</p> <p>10 MS. RUTHERFORD: Just make sure you're 16:11:23 11 looking --</p> <p>12 THE WITNESS: I'm looking at Exhibit 510, and 13 I'm looking at the page with Bates Number ending 6884. I 14 can't do the calculation in my mind sitting here, but to 15 get to that number, what you would need to do would be to 16:11:37 16 do the calculation of Armstrong -- Project Armstrong 17 profits, which is laid out -- bear with me.</p> <p>18 I think it was pretty clear in the backup 19 materials to my report precisely how this calculation is 20 done with the \$25.8 million referred to in Note 8 to 16:12:40 21 Exhibit 6 to my reply to Dr. Leonard's report would be 22 the apportioned amount of the additional expenses which 23 are described in Exhibit 510. The treatment of them is 24 exactly symmetrical to the way I've treated the other 25 costs. 16:13:16</p> <p style="text-align: right;">193</p>



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1 **Q. BY MR. PURCELL: When you're calculating the**
 2 **value of compatibility and control to Sun, why do you use**
 3 **as a proxy for that the projected Project Armstrong**
 4 **profits?**
 5 A. Well, these place a lower bound, if you will, 16:13:32
 6 on how Sun would, in my view, you know, place a monetary
 7 value on compatibility and control provisions, you know,
 8 as contemplated in the Project Armstrong negotiations.
 9 There's certainly more value, you know, to
 10 the extent that the compatibility and control revisions 16:13:54
 11 protect other revenue streams or sustain other revenue
 12 streams, that was certainly contemplated -- you know, we
 13 spoke about the email from Mr. Nachi earlier today. It
 14 was certainly contemplated there were going to be
 15 opportunities to -- to -- substantial opportunities to 16:14:18
 16 grow and expand these revenues.
 17 But these provide, in my view, some concrete
 18 evidence as to a minimum amount of money that Sun would
 19 have required from the hypothetical license in order to
 20 compensate them for loss of compatibility and control. 16: 4:36

21 **Q. Now, you calculate a separate damages figure**
 22 **through September of 2011 in Exhibit 6; correct?**
 23 A. Correct.
 24 **Q. And that total damages figure before**
 25 **adjustments is \$120.9 million? 16:14:56**

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1 A. Yes.
 2 **Q. That's all I wanted to know.**
 3 A. You can be -- I was worried -- I was trying
 4 to understand what you meant by adjustments.
 5 **Q. I'm referring to the adjustments for marking 16:15:17**
 6 **and for accused devices.**
 7 A. Okay.
 8 MS. RUTHERFORD: When you get to a reasonable
 9 stopping point --
 10 MR. PURCELL: Sure. I'm almost done with 16:15:25
 11 this document, and then we can -- we can take a break.
 12 **Q. The -- both your December 2011 and**
 13 **September 2011 patent infringement damages calculations**
 14 **contain these two adjustments for marking and for accused**
 15 **devices; correct? 16:15:43**
 16 A. Yes.
 17 **Q. Do you dispute that -- strike that.**
 18 **What's your understanding of the marking**
 19 **adjustment?**
 20 A. I understand this is a legal issue relating 16:15:51
 21 to whether damages can be claimed with respect to some
 22 standard governing -- governing marking. I'm not quite
 23 sure about the -- the -- what the standard constitutes or
 24 how it's applied here. I understand that there may be a
 25 limitation of the -- if you like, the reach of these 16:16:21

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1 patents based upon whether they've been -- they're deemed
 2 to have been marked or not.
 3 **Q. And I assume you don't have any opinion as to**
 4 **whether or not that adjustment is appropriate? That's an**
 5 **issue for the Court to decide? 16:16:40**
 6 A. That seems entirely to be -- to me to be a
 7 legal decision within the purview of the Court.
 8 **Q. Similarly, the accused devices adjustment,**
 9 **what's your understanding of that?**
 10 A. My understanding. Again, as a legal matter, 16:16:51
 11 there's a question as to which devices are legally deemed
 12 to be the instantiation of infringing or the source of
 13 infringing activity and that there be a -- may need to be
 14 a limitation of damages to be apportioned according to
 15 the sales attributable to those accused devices versus 16:17:25
 16 non-accused devices.
 17 **Q. And similarly, that's an issue for the Court**
 18 **to decide?**
 19 A. Yes.
 20 **Q. Does this analysis take into account the fact 16:17:34**
 21 **that the various patents were issued at different times?**
 22 A. I understand that all of the sales which
 23 constitute the basis of infringement are -- take place
 24 after these patents issued and that there are -- the
 25 damages are calculated through a period which ends before 16:18:16

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1 any of the patents expire.
 2 **Q. And Did this analysis take account of the**
 3 **fact that various of the allegedly infringing**
 4 **functionalities were added to Android at different times?**
 5 A. Yes, it does. I think we'd have to go way 16:18:33
 6 back to the discussion about my econometric analysis
 7 where I apply a -- a counterfactual performance with
 8 respect to the '205 patent and the JIT, the Just-In-Time
 9 compiler. I apply the performance attributable to the --
 10 to the JIT only to those devices in the -- in the data 16:19:24
 11 that I looked at, which I understand to incorporate the
 12 JIT.
 13 **Q. The JIT was added fairly late in the process;**
 14 **is that your understanding?**
 15 A. It was not in the initial releases of 16:19:38
 16 Android.
 17 **Q. Does the fact that Android was launched**
 18 **without the JIT suggest that the JIT functionality is not**
 19 **essential to Android?**
 20 MS. RUTHERFORD: Objection. 16:19:49
 21 THE WITNESS: There's a meaning that you
 22 place on the word "essential." It's certainly my
 23 understanding that it was a significant contributor to
 24 the performance of Android.
 25 **Q. BY MR. PURCELL: Did you attempt to measure 16:20:12**

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EXHIBIT L

From: Tim Lindholm.

Sent: 10/13/2005 10:55 AM.

To: [-] Andy Rubin; Rich Miner.

Cc: [-] .

Bcc: [-] .

Subject: One last thought on Sun.

One thing to keep in mind is that, if we ignore some of the more immediate pain points, Google's vision for the device ecosystem is not very different from Alan's: one-stop shop for device stack, a powerful embedded platform, one implementation to reduce fragmentation, carrier control of the device L&F and branding, highly integrated apps, and a highly usable phonetop.

Alan presumably wants this both for tactical reasons (preserve TCK and implementation revenue, defend franchise against fragmentation which is his main threat for long-term erosion) and strategic ones (keep Sun's ownership and value add in Java to buy time to find new monetization opportunities). I'm not sure which is most important, and given what is probably a lot of quarter-by-quarter pressure for revenue we can't underestimate the tactical concerns. But Alan is probably also at least willing to consider whether Google could be trusted to solve some of his problems for him, so he could go straight to next steps. He just needs to be compensated for collateral short-term revenue loss and get comfortable that this won't allow Google or anyone else to run away with the platform, and that Google won't want to go where he wants to go next or block him from doing so. We do not want to turn this into a negotiation for buying the Java franchise itself from Sun, even compensating for the risk of its loss. While Sun probably would contemplate that, the price would be high.

I guess that's the optimistic view. The pessimistic one is that we are both after the same position, he isn't willing to share, and he thinks if we both go for it it's MAD (this latter is certainly true). We might still be able to win in that scenario, but it might take a nuclear staredown, and we'd need buy-in from Google to go there. I also think that simply outspending Sun or outexecuting them is an option, if a safe even if disadvantaged base could be established.

-- Tim