Draft version

The iPhone and mobile access to the internet

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Introduction

The marketing of the iPhone has been a type of watershed event in the world of mobile communication. The sleek device has captured the attention of the public and the design and functionality of the iPhone has been seen as something new in the rather more established world of mobile phones. It is being marketed using unique forms of promotion; its design is notably different than that of other mobile phones and, of most interest to this analysis, it is being used to access the internet more regularly than other types of mobile phones. In addition, as we show here, it is encouraging the use of the mobile internet.

The iPhone, particularly in its first release, represented several new dimensions in mobile communication. The phone was only sold via one operator (AT&T) and there was the explicit notion that the device would be "locked" to that net. While there have been other mobile phones models that were released only by a particular operator, this is perhaps the only example of a whole brand that was reserved in this way.

The marketing of the iPhone and the ability of Apple to make a media event out of the commercialization was capitalized on in several ways. Apple was able to enter a contract with AT&T whereby Apple would receive a sum for each handset sold plus a certain amount per month for the duration of the customer contract. The idea was that the "buzz" surrounding the device would result in new customers – with their accompanying 2 year contracts – for AT&T. Indeed it was reported that more than half of the iPhone users were new subscribers to the AT&T net.[3] It was reported that about 270 000 phones were sold during the first days of its release meaning that AT&T had received as many 135 000 new subscribers (Benderoff, 2007).

Beyond the marketing aspects of the iPhone the device itself offers some new wrinkles in the use of a mobile phone. The functions of the phone included the simple design, the "multi-touch" and relatively high resolution screen that provides sharp images and an "accelerometer" that automatically reconfigures the screen from landscape to portrait format when the phone is rotated. On the negative side the first version of the iPhone was relatively slow when compared to other 3G phones and was not necessarily seen as an advanced business phone but rather as more as a multimedia device (Macedonia, 2007).

Mobile communication is often seen as a technology of the intimate sphere (Ling, 2008). When, for example looking at the number of calls, text messages and other "events"[4] generated by a mobile

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[3] http://news.cnet.com/8301-10784_3-9747031-7.html

[4] An event is when the user logs onto the net.

phone, it is the interpersonal activities that dominate. Indeed an analysis of the traffic on the network for this operator during the spring of 2008 shows that 90% of the events are either calls or text messages. Internet traffic accounts for only about 5% of the events. Further, analysis shows that half of the calls we make and text messages we send go to only a handful of other persons (Ling, 2008). Thus the mobile phone is, and has been a communications device that we largely, though not exclusively, use among to keep in contact with our nearest friends and family.

The iPhone may be changing this. It has widely been reported that Google recorded 50 times as many searches via the iPhone than with any other handset.[5] This is a remarkable statistic that, if true, may well indicate that some users are establishing a praxis of using the iPhone for activities beyond the more routine calls and text messages. Indeed, commentators such as Jonathan Zittrain to suggest that the iPhone and other such devices are fundamentally changing the way that the internet functions (Zittrain, 2008).

The Google statistic is interesting, but it is only one application. There are, of course many other types of internet functionality that are not captured in that type of an analysis. While we are not able to discuss the specific applications being used, we are interested in the broader question of absolute use of the iPhone using the telephone network (not the WiFi network) to access the internet. The fact that a relatively large number of iPhones were informally imported to onto the net to which we have access to the traffic information[6] meant that their use patterns could be traced in the traffic data.

This introduces the research question which we wish to examine, namely just how much do iPhone users access the internet? The material that is available will allow us to answer this question. The broader issue, however, is why this should be the case. There are three dimensions that can be drawn on when considering this latter issue. These are the usability of the iPhone, the degree to which there is "background" contact with the net and finally whether using the net via the iPhone is a type of self-fulfilling prophesy.

The iPhone does indeed have a unique interface that distinguishes itself from other mobile phones. As noted, it has a large touch screen and there is an emphasis on simple interaction. In addition, the iPhone facilitates web access through simple, intuitive web access. Another possible explanation is that the iPhone runs "background" applications that appear as web activity regardless of the intentions of the owner. In this respect, the owner may have configured the device to perform a function without realizing the consequences. In an odd way, this has assigned agency to the device (Bakardjieva, 2005). Another

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[5] http://www.macworld.co.uk/ipod-itunes/news/index.cfm?rss&newsid=20446

[6] Individuals could, for example, purchase an iPhone and log onto the alternative network where it could be "cracked" and used on any GSM network.

twist on this is that increased web browsing may be the result of a self-fulfilling prophesy (Merton, 1968). In this case, the buzz associated with the iPhone as an advanced device somehow permits the nascent owner to increase his/her surfing. The analysis here will only be able to determine whether or not the iPhone encourages web use. Based on that result it is possible to speculate as to the reason for use.

Method

The material indicates that as of the second quarter of 2008 there had been about 8000 iPhones used on the net of the operator. About 1500 of these had been "cracked" and then, in all likelihood, sold to another owner. Further the analysis shows that there is an over-representation of young male users. The phone used previous to the iPhone is quite often a high-end Nokia phone (E65 or N95) but there are also a surprising number of basic phone users who move to the iPhone. The analysis also indicates that iPhone users do consume more "IP" traffic than others.

The data for this analysis came from anonymous records derived from actual traffic data. A total of 3917 users were included in the sample. They are divided into four categories based on their terminal (handset) type as of the second quarter of 2008.[7] In addition to the iPhone users we also compared their behavior to three other user groups. The sample included 957 Apple iPhone users, 989 Nokia E65 users, 985 Nokia N95 users and 986 general users. Data on the sample's use of voice, SMS, MMS, WAP and internet in the second quarter of 2007 – that is immediately previous to the release of the iPhone – and during the second quarter of 2008 was gathered.[8] In addition, this approach allowed us to examine the data on the "previous" handset type. Clearly the iPhone users had another type of handset in the second quarter of 2007 since the iPhone had not been released. We did a superficial examination of the Nokia N95 and E65 users and the broad majority of them had the same type of handset in T1 and T2.

The specific internet based information was the number of times that the individual logged onto the internet from their phone. This was compared to see the change in behavior between 2007 immediately before the introduction of the iPhone and a year later in 2008. The mean change in the number of "events" that is the number of times per month that an individual logged onto the net is 32.75 for the whole

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[7] The material was gathered using the operator's traffic database. The names and identities of the users are anonymous and there is no possibility of tracing the material back to a particular person. The analysis was conducted under the broader license to examine the use patterns in order to better develop the network. In this respect, knowledge of internet use represents a new use pattern that will likely have implications for the development of the network. The material on terminal type and traffic statistics are recorded in the general traffic database.

[8] The data reported here is the mean monthly traffic for the particular type of traffic. That is the quarterly data divided by three.

sample.[9] In addition, we were able to compare the number of bytes downloaded in September 2008. The data for the previous year was not available so only a cross-sectional analysis was possible in this case.

This data extraction allowed for both a longitudinal and a cross sectional analysis comparison of use. The Nokia phones were selected since at that point they were recognized as being advanced full function devices that would be in competition with the iPhone. In addition, the general sample of users provided insight into how the use of the iPhone (as well as the Nokia devices) was different from the use of a broad group of users who used a random sample of other terminal types.

As noted above, the iPhone was not sold outside the US during the time covered by this analysis. The persons who have an iPhone during this period purchased it in the US. This involved downloading new firmware into the phone and circumventing the security protocols of Apple.[10] Once imported, the device was "cracked" so as to allow its use on a local network. In order to unlock an iPhone a local SIM card was inserted and thus the device was registered on the network of the operator. This points to both the popularity of the phone and to the fact that the device was not commonly available at the time of the analysis. This also means that the individuals who adopted the iPhone cannot be seen as normal users. Rather they are in all likelihood those who can travel to the US to purchase a phone and who have the technical savvy to crack the phone, or at least know people who can assist them.

Findings

General analysis of iPhone users

The material gleaned from the traffic data indicates that while there are a limited number of iPhones on the network,[11] they were used in a significantly different way. In this section we will examine the influx of iPhones to the network and the socio-demographics of the users. We will examine the types of subscriptions that the users employed and the types of handsets that they used previous to owning an iPhone. Finally, we will examine the main question regarding their use of the iPhone for surfing the internet.

In spite of the fact that the iPhone was not available outside the US, it was obviously purchased by many people and informally imported into the country. Between the first phones arriving in the middle of August 2007 and the time of the data analysis, there were about 8600 phones that were registered at some

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[9] It needs to be noted that the sample examined here is very special and should not be generalized to the whole population.

[10] With the next generation of the iPhone it has become available outside the US and can be "bought out" of a contract so as to avoid the need for the dodgier process of thwarting the security software of the phone.

[11] Far less than one percent of all handsets.

point on the net. There were about 1200 new phones registered on the net every month. Something approaching 20% were registered on the net only a single day indicating perhaps that they were "cracked" and then sold to another person who began using the phone on another network.

There is material on the age and gender of the person having the subscription in the traffic database. This material is generally correct, but in about 10% of the cases the wrong age is given and the same can be said of the gender. This comes from cases where, for example a 40-year-old father subscribes for his 14-year-old daughter. In that case, the "age" of the subscription owner is 40 but the behavior is that of a 14 year old. As noted this occurs in about 10% of the cases. Thus there is an inherent level of error in the data.

Looking at the material for the iPhone we can see that there are significantly more males who own one. When comparing the iPhone to general users, it is clear that the iPhone is a device that is fancied by male users.[12] While the general population of users is roughly 52% male vs. 48% female, the split was 84% vs. 16% for the iPhone. When compared to two other advanced phones, the Nokia E65 (a business phone)[13] and the N95 (a "high-end" phone) significantly more males had the E65 and significantly fewer had the N95[14] when compared to the iPhone.

Looking at the age distribution of the different phones, it is clear that the iPhone appeals to younger users. Looking across these handsets, the mean age of the Nokia E65 users was 47.8, the Nokia N95 users was 46.5 and the mean age of the general users was 48.6 years. The mean age for the iPhone users was 35.6. This difference is significant.[15]

An analysis of the type of subscription indicates that a large number of the iPhone users – almost 60% – had a subscription associated with their job. The data shows that 50% of the E65 and 64% of the N95 users had a business subscription. By contrast, only 29% of the general users had a business subscription. This is an important finding since the users of these subscriptions often do not pay for their own use. This would free them from directly feeling the economic consequences of surfing the internet, a practice that can often add significantly to the cost of using the device.

Two thirds of the persons who made the transition to the iPhone in this period were using a Nokia phone previous to adopting the Apple product. The material indicates that the owners of Nokia handsets were less loyal than the owners of other types. Nokia owners were somewhat more likely than others to

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[12] Chi^2 (3) = 364.40, sig < 0.001

[13] Chi^2 (1) = 12.14, sig. < 0.001

[14] Chi^2 (1) = 10.491, sig. < 0.001

[15] f (3,2880) = 149.48, sig. < 0.001

make the transition to the iPhone. Owners of Sony Ericsson and Samsung handsets are a smaller portion of the total mobile phone population. They were, however somewhat less fickle in their loyalty.

When looking at specific handset types, the largest number of persons transferring to the iPhone came specifically from the Nokia E65 and Nokia N95. Previous to having an iPhone 16% of the iPhone users had an E65 and 15% had an N95. These are both advanced handsets that offer a variety of functions. In this way the multi-functionality of the iPhone would match well with many of the functions found on these two devices. As we have already seen there are a significant number of males who own these Nokia models, though the age comparison is different for the Nokias and the Apple phone.

By contrast, it is surprising to look at the second tier of devices that were traded in for an iPhone. These were three older Nokia phones that were actually no longer in production. These phones, the Nokia 3510 (5% of all phones replaced by the iPhone) 3410 (2%) and 6310 (2%) are phones with a black and white screen no camera and only limited ability to access the internet. That this group would make the transition to the use of the iPhone is startling. While it is difficult to understand the issue it is possible to speculate that the users were well entrenched in the menu structure of the older phone and perhaps reluctant to change to another device that would be difficult to learn. In this way the simplicity of the
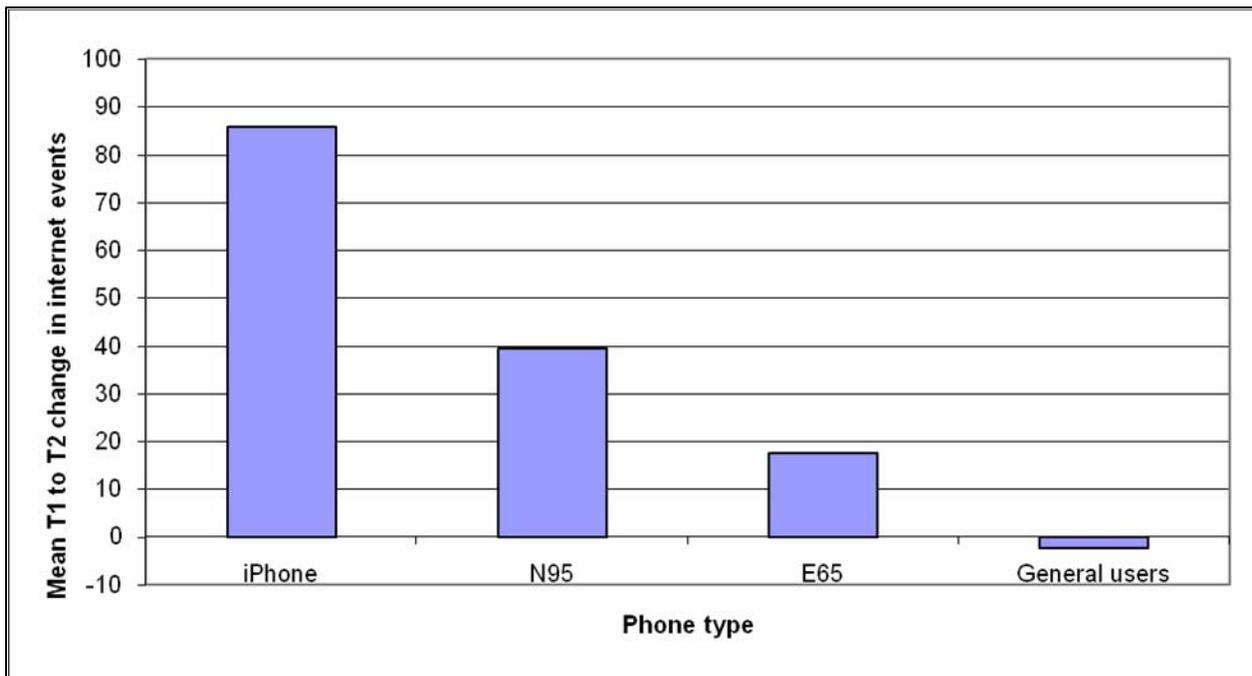

iPhone allowed them to switch phones with the least trouble.

Figure 1 Mean change in internet monthly number of internet "events" between T1 and T2

Traffic analysis

When looking at the actual change in surfing behavior the analysis shows that there was an increase in the mean number of internet "events" recorded for the iPhone users. The iPhone users increased the number of times that they logged onto the net by a mean of just under 90 times a month. That is, they showed an increase of about three times a day compared to the period before they had the iPhone. For the users of the Nokia N95 the increase was about 40 times a month, the E65 users increased the number of times they logged on by just under 20 and the general users actually reduced the number of times that they logged on in the period between T1 and T2.[16] As the material in figure 1 suggests, the users of the N95 also increased the number of events.[17] Users of the N95 recorded an increase in the number of internet events significantly more than either the users of the E65 or the general users. Finally the analysis shows that the users of the E65 logged more events than the general users.[18]

Thus, while it is true that the iPhone was clearly that device that most encouraged surfing the internet, it is not the only one. Users of both the Nokia N95 and the E65 also showed an increase in the number of times that they logged onto the internet using their phones when compared to general users.
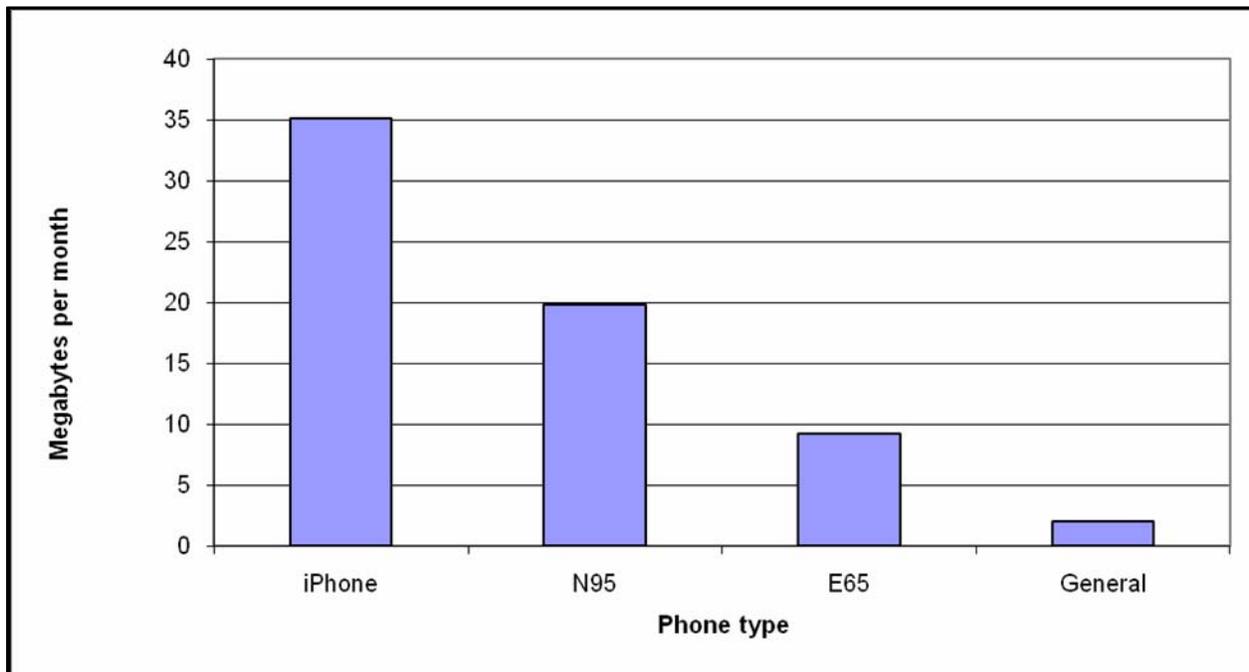
comparisons, increase in the number of events for the iPhone was significantly more than for the N95, the E65 and the general population at less than the 0.001 level of significance.

[17] As with the iPhone, the users of the N95 increased the number of events by a significant level when compared to the users of the E65 and the general users. In both cases this was at less than the 0.01 level of significance or better.

[18] This is at less than the 0.001 level of significance.

Figure 2 Mega Bytes down loaded per month by different types of phones, September 2008

The different handsets were also compared in a cross-sectional analysis of the number of bytes that were downloaded over a month's time.[19] This analysis is shown in Figure 2. Again, users of the iPhone clearly downloaded more data than did users of the other phones.[20] The users of the iPhone downloaded approximately 35 megabytes or about one megabyte per day during the month. Users of the N95 downloaded approximately 20 megabytes per month, the Nokia E65 users downloaded just under 10 per month and the general users downloaded a mean of about 2 megabytes per month or about 0.06 megabytes per day. This last statistic is perhaps a surprisingly high number when considering all the general users of mobile telephony. However, the data shows that of all the general users, over half never used any internet traffic.

Looking at the data a slightly different way, 13% of the iPhone users never used their phones for data traffic while just under half of the general users never did. The data shows that 18 – 20% of the of the two Nokia phone users never used their phones for downloading data traffic. These numbers were almost reversed when looking at those who downloaded more than 100 megabytes per month. Just about half of the iPhone users downloaded more than 100 megabytes where only 5% of the general phone users did the same. The material also shows that 28.6% of the N95 users and 18.3% of the E65 users downloaded this much data.

When compared to the E65 and to the general users there was a clear difference between the use of iPhone and these other types of users. When compared to the users of the N95, that is in many respects also a multi-media device, the results were still statistically significant, but the margin was not as pronounced.[21] With all the other two-way comparisons the results showed a high degree of statistical significance.[22]

Discussion and conclusion

In summary, the users of the iPhone use the internet more than other users. This is not simply a cross-sectional finding, but the analysis shows that the same users altered their behavior as a result of the adoption of the iPhone. Why would this be so? What is it about the iPhone that would encourage users to

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[19] There is a rather low correlation between the number of bytes downloaded and the number of events. For the whole sample in T2 it is 0.19. The correlation for the iPhone is 0.23, for the Nokia N95 it is 0.20, for the E65 it is 0.14 and for the general population of users it is 0.25.

[20] Looking across all four handsets, the ANOVA showed that the results were $f(3,3996) = 22.166$, sig. < 0.001.

[21] $F(1, 1998) = 6.586$, sig $= 0.01$

[22] In all the other comparisons the level was near to or below the 0.001 level.

change their pattern of use? There are several explanations that are available. These include the socio-demographics of the iPhone users, the nature of the iPhone when compared to other devices and finally the nature of the subscriptions that the users had.

The analysis shows that there is a somewhat different socio-demographic group that has adopted the iPhone, namely younger males. It is interesting to look at this by comparing it to material describing the use of the PC based web. There is not a particularly high percentage of young males who report surfing the net on a daily basis when compared to other age groups (39.4% for 18 to 30 year olds vs. 40.5% for 31 to 49 year olds) By contrast, young adult females do not report surfing as often as middle-aged adult females (37.2% for 18 to 30 year olds vs. 51.8% for 31 to 49 year olds). However, the picture is somewhat different when looking at the time used by those people who do surf the web (PC based). In that case, as with the demographic profile of iPhone users in this study, young adult males who report surfing the PC based web also report using the web for longer time periods than other groups. Looking at males 18 to 30 year olds, they reported using the web a mean of 118 minutes per day vs. 77 minutes for 31 to 49 year old males. The 18 to 30 year old females reported using the web a mean of 88 minutes per day vs. 50 minutes for 31 to 49 year old females. Thus, it is possible to suggest the correspondence between iPhone users, who were more over-represented among young adult males, and the PC based surfing behavior of the same group.

At the same time the data suggests that the same users surfed more after they had started using the iPhone when compared with their own previous use. This points to the idea that there was something about the actual surfing experience on the iPhone that encouraged the surfing. Here is it important to look at the differences between the iPhone and other mobile phone handsets on the market.

The screen of the iPhone is quite large, there is an enhanced touch screen that allows for multiple touch points (used to enlarge or reduce sections of the screen image) and the software allows the user to "flick" through images. Thus, there is a different experience associated with using the iPhone when compared to the more static experience of other phones. These qualities may provide the user with a better experience of the internet than other devices that have smaller screens and less advanced displays.

It is also possible to suggest that the accessibility of the internet entices users to link up to the internet more often than with other phones. That is, there may be fewer steps in the process of accessing the internet. With the elimination of each step, the likelihood of accessing the net is greater.

Another possible explanation is that access to net based e-mail and other background services might mean that whether the or not the user actively uses the device to link to the internet, there is the generation of internet traffic. That is, the phone is configured to check into different web based applications as a type of background task. This functionality is not unique to the iPhone. Other devices can

be configured in this way. However, the fact that the iPhone strives to give users access to a variety of web based services, this type of configuration is likely a common one.[23]

Putting this into a social perspective, by configuring the device to use these background services, the users is assigning a type of agency to the device (Bakardjieva, 2006). In an interesting way, this making the machine into a social actor, or at least an economic actor. The device has been configured in order to make decisions for the individual. In spite of the fact that the individual does not have a specific overview over the individual actions of the device, they nonetheless have economic consequences. To the degree that this takes place, there will be the generation of web traffic.

The increase use of the iPhone on the net can also be the result of a self-fulfilling policy (Merton, 1968). Apple and the various telecom operators who have sold the iPhone have focused on the iPhone as a mobile web terminal (Becker, 2007). To the degree that owners accept this characterization they will be encouraged to surf from the iPhone in order to justify their purchase.

Finally, the data indicates that as many as 40% of all iPhone user had a job that paid for their use. This means that there was not the same economic constraint as experienced as "private" users. Again, this would perhaps encourage the use of web-based services.

All told, there are several factors that contribute to the increased use of the iPhone for surfing the web. However, the T1/T2 setup of this analysis indicates that there was a particularly strong effect of the device itself. Users of the N95 were active users of the mobile internet and this indicates that there is a general drift in this direction, particularly among that *avant-garde* mobile users. Nonetheless, the iPhone has shown itself to be a device that encourages use of the internet in a way that was not common until now.

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[23] The iPhone considered in this analysis was the first version. The "apps" store had not become available and so there was a more limited number of web-based services available.

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