

Survey Findings towards Awareness of Mobile Phones' Security Issues

IOSIF I. ANDROULIDAKIS
Network Operations Center
University of Ioannina
451-10 Dourouti, Ioannina
GREECE

DIMITRIOS PAPAPETROS
Dipl. Electrical and Computer Engineer
71, Ksanthippou str.
155-61, Holargos
GREECE

Abstract: - In order to investigate some key issues related to mobile phones' security from a user's perspective, this paper explores and presents the results of a survey conducted in the University of Ioannina, Greece according to which 454 participants were asked about quite many key factors concerning various aspects about a possible interception of their mobile phone. The resultants are very interesting and can be considered as a potential guide by various mobile operators for their future technological investments.

Key-Words: - questionnaire survey, mobile phones, intruders , interception , security issues

1 Introduction

Mobile phones play vital roles in human societies; particularly, in developed and developing countries. While individuals are relying on mobile communication deeply, not only the commercial society but also the telecommunication industry is developing new functions and applications which are still modifying the term mobile communication. Voice transmission is no longer the only way individuals use mobile phones. Instead, mobile phone networks have become a new platform where data, information and transactions are exchanged. As a result, the more mobile phones can do, the more information is exposed to danger. Multi-functional mobile phones which contain camera lenses, Mp3 players/recorders, schedule organizers, gaming functions and the like, have increased the concerns of individual privacy and personal data/information security. The possibility of resembling privacy and security issues common with the Internet is the major concern when transactions are made via mobile phones.

Data and information security concern has been fiercely discussed along with the progress of wireless technology, as a result of wireless communications are

fundamentally a broadcast-based medium. In a mobile phone communication system, for example, since all transmitted data travel directly between a mobile host and the base station, it is possible to copy all the data of a particular message transmitted through the air [11]. For a mobile phone network, security is the issue critically important to end-users and service providers from various perspectives. In one hand, consumers need to be assured levels of trust to embrace m-commerce; in the other, Service providers benefit from wireless security in protection from fraudulent use of services, protection from unauthorized use of mobile devices (i.e., cloning), managing the distribution of digital rights (that is, distribution of audio and video files under license arrangements), and possibly as a competitive advantage relative to other service providers [5].

At present, security threats existing in mobile phone network could range from passively eavesdropping to actively sealing data from others; in other words, unauthorized access. Moreover, there are inherent security risks involved in transferring information over any network.

The importance of mobile phone privacy and security becomes increasingly

significant to publics for numerous reasons. First, the increased connectivity of people has, without question, begun to diminish the concept of being out of reach. No longer can one blame their unexplained absence on a lack of appropriate technology. Rather, one is now often subject to answering questions of where they are at any given time. This raises the matter of people being constantly accountable. It is one thing to be responsible for your office job but to be disturbed at the most inopportune of times is another. Personal information should be exactly that personal. When others choose to disrespect one's privacy and security the victim is often left feeling violated. Further, we are now aware that it is not only those we know who can interrupt us or cause us grief. Therefore the question will continue to be asked; namely, where should the line be drawn?

Mobile phone subscribers worldwide will hit the four billion mark by the end of 2008, according to the head of the United Nations International Telecommunications Union (ITU). Most of the increase in cell phone usage will be from the rapidly developing economies of Brazil, Russia, India, and China, which altogether account for over 1.3 billion mobile phone subscribers by year-end. In its daily news digest, the ITU said the number of subscribers has surged nearly 25 percent annually for the past eight years. In 2000, mobile penetration stood at only 12 percent, growing to reach over 60 percent by the end of 2008 [4].

Greece is a rather promising country for adopting new mobile services, as - according to latest statistics - mobile phone owners appear to overtake Greeks owning conventional fixed line telephones. A significant proportion of these mobile users corresponds to young people and thus we decided to survey their opinion and preferences about various issues related to security issues, ranging from concerns about various kinds of interceptions to their opinions of these security issues.

In the rest of this paper, section 2 presents related work on surveying users' opinions regarding various aspects towards mobile phone usage. In section 3

we analyze the methodology we used in our survey. Furthermore, we present - and briefly discuss - all the results coming out of the survey. Finally, in section 4 concluding remarks are drawn.

2 Related Work

Although there have been quite many theoretical studies concerning mobile services, a significant mean for investigating and understanding users' preferences is asking their opinion via specific questioning techniques (i.e. in-person delivery or e-mail questionnaires). There exist several survey studies in this direction [9]. Some of these surveys assessed customer's perspectives on the mobile phone services, while some others surveys by NTT DoCoMo - which are briefly mentioned in the next lines - examined the way mobile phone owners use their phone. A survey started at the end of year 2000 described the current trends in mobile phone usage among adolescents [7]. Another survey was conducted in April 2001, and it examined the mobile phone usage among elderly [8]. The respondents were 300 men and women in their sixties. The survey conducted in November 2000 involved 1000 subjects and investigated the use of mobile phones in every day urban life [9]. All of these surveys indicate the growing importance of mobile phones in everyday life and the increased popularity of new features such as email.

In a recent survey of mobile users versus shoppers in Finland, Germany and Greece [12], mobile shoppers were less focused on price and more on ease of use than mobile users but these differences were not consistent across countries. Thus the findings may indicate that the early adopters of mobile data services and adopters of traditional mobile services are not that different. The above remarks were also verified by some exclusive studies for the Greek mobile market [1] [2].

3 Research Analysis and Results

3.1 Methodology

Our survey was conducted using in-person delivery technique [3], with a total of 454 respondents participating in this survey. All the respondents were students in University of Ioannina and were asked for their participation in a questionnaire. Having such a supervised survey technique ensures that each respondent understands each of the questions and answers them correctly [10].

Targeting such a group is due to the fact that we wanted the participants to form a representative set in a certain age area (18-24), which corresponds to a major percentage of the overall users in the current mobile Greek market and thus have the potential to adopt new services as well. As far as concerning the gender statistics, 54,53% of the participants were men, while 42,73% were women. We selected 'gender' to be our main variable, as it appears to be a rather significant factor towards the adoption of mobile services [6].

3.2 Survey Results

Our survey was categorized in two main parts. In the first one, we are surveying some generic issues concerning the gender and the kind of studies, while in the second one we emphasize on the users' positions about their concern for the fact that a third person could intercept their mobile phone and extract valuable and personal information. (i.e. position, phonebook, messages, discussions etc.).

3.2.1 Generic Queries

3.2.1.1 Gender and Studies Profile

The participants were asked to define their gender and kind of studies. The results are shown in figure 1 and figure 2.

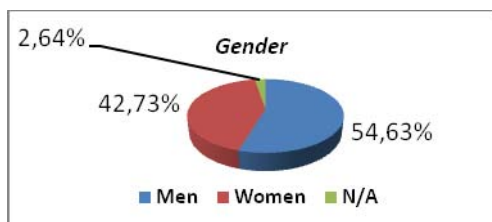


Figure 1: Percentage of participants by gender.

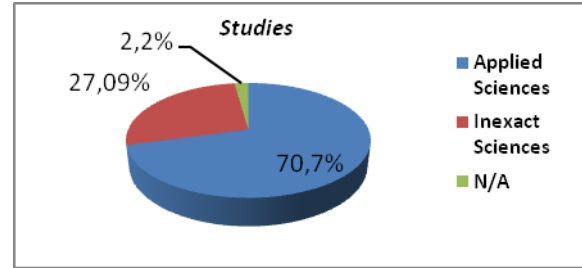


Figure 2: Percentage of participants by kind of studies.

3.2.2 Specific Queries

3.2.2.1 Location Awareness

In this subsection we examine the level of concern about location awareness. The queries No 3, No 4 and No 5 of our questionnaire try to determine this level. In specific they answer how concerned they are in case of a third person (not the provider) could know their position with a few meters accuracy, neighborhood accuracy and if and when they have passed by a certain point correspondingly. The results by gender are shown in the three following figures.

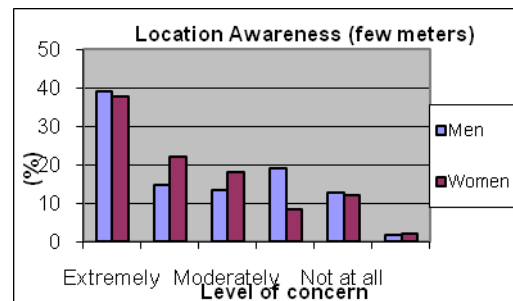


Figure 3: Level of concern about location awareness with a few meters accuracy by gender.

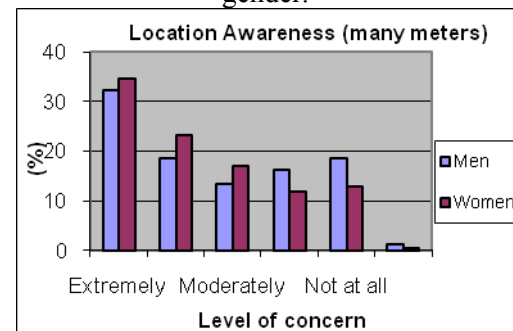


Figure 4: Level of concern about location awareness with neighborhood accuracy by gender.

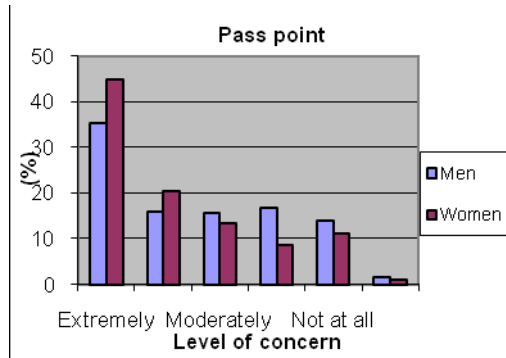


Figure 5: Level of concern about location awareness by gender.

As the previous figures depict, the women are more concerned in general. This is also confirmed by a statistic analysis has been made for the third query of our questionnaire. The results are shown in the following table.

Women seem to be more concerned than men (59.8% vs. 53.6%)				
Pearson Chi-Square= 14.120, df=5, p-value = 0,0149		Gender		
		Men	Women	Sum
Query No 3	Highly	97	73	170
		39,1%	37,6%	38,5%
	High	36	43	79
		14,5%	22,2%	17,9%
	Enough	33	35	68
		13,3%	18,0%	15,4%
Not too much	47	16	63	
	19,0%	8,2%	14,3%	
Not at all	31	23	54	
	12,5%	11,9%	12,2%	
N/A	4	4	8	
	1,6%	2,1%	1,8%	

Table 1: Statistic analysis for local awareness (Query No3) by gender.

We should also take note of the fact that women seem to be more worried in case of query No 5 too. According to our results the level of concern is 65,5% for women versus 51,6% for men.

In the sixth figure of this subsection we present the results that come from the participants' answers regarding the level of concern about location awareness (Query No3-few meters) by kind of studies.

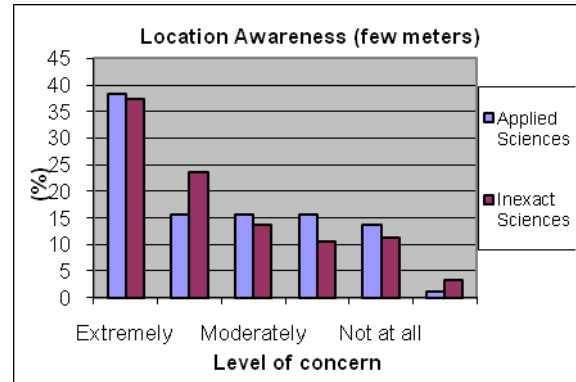


Figure 6: Level of concern about location awareness by kind of studies.

A remarkable note coming out of this figure is that the students of applied sciences seem to be more concerned about the possibility of location awareness, even if in general we notice that all the students have these security issues on their mind and seem to worry about them.

3.2.2.2 Interceptions

In order to have a deeper view of our participants' awareness level, we have asked them some common questions regarding various kinds of interception. The participants were asked to determine their level of concern answering the queries No 6 to No 13 and the results are shown below.

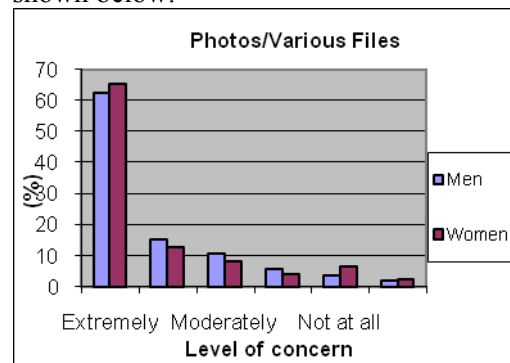


Figure 7: Level of concern about photos/various files interception by gender.

The figure 7 is a typical one and we could make out that it depicts very well the answers they are given to the queries No 6 to No 9 and No 9 to No 13. There is no considerable difference between the results of the two genders. For the same set of queries the results by kind of studies

are also similar. The results that represent men and women are similar to those that represent students of applied and inexact sciences correspondingly. The only results that made a difference are shown in the figure 8 and are related to the query No 10.

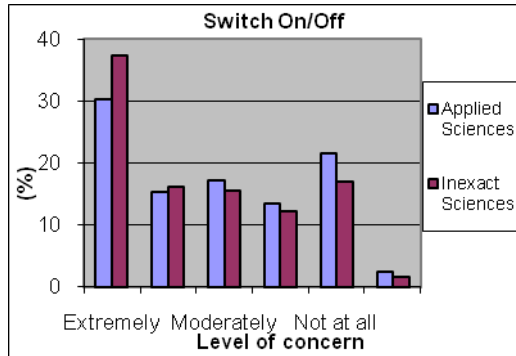


Figure 8: Level of concern about the chance that a third person knows when you turn on/off your phone.

According to the results, the students of inexact sciences seem to be more concerned than these of applied about the fact that a third person could know exactly when they turn on/off their mobile phone. The analogy between applied/inexact sciences and men/women applies to this case too. Our statistic analysis showed us that women seem to be more worried about this chance than men (55.7% vs. 41.9%) and about the fact that an intruder could deprive them of the ability to use their phone temporarily (73.7% vs. 62.5%).

3.2.2.3 Considerations about safety and security

The objective of this particular subsection of our research is to determine if our participants consider that the previously mentioned kinds of interception are possible to happen, as well as if they assume communication through mobile phones safe and if they are informed about that mobile phone's options and characteristics affect its security.

The answers of the query No 14 are shown in the figure 9 below, by kind of sciences.

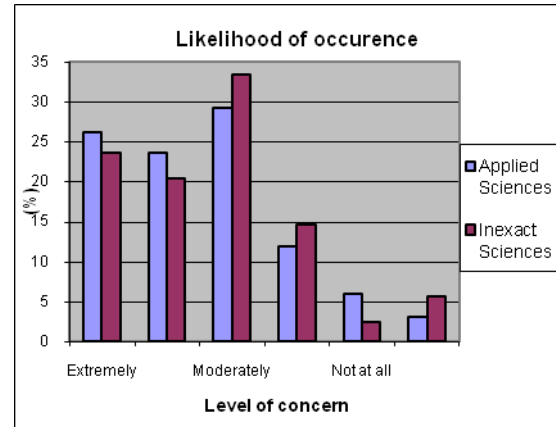


Figure 14: Level of concern about the likelihood that interceptions occur by kind of sciences.

It is obvious the fact that all the students, regardless of their kind of studies, believe that the various interceptions possibly occur and according to their answers they do not consider communication through mobile phones safe.

According to our statistic analysis' results, men consider communication safer than women (13.7% vs. 3.1%) and they are better informed about their phones (27% vs. 13.4%).

4 Conclusions

Our research has shown some challenging findings. A major part of the mobile users are extremely concerned about the most kinds of interception and the fact that an intruder could gain unauthorized access to their devices. Furthermore, we argue that there is no feeling of safety and no advanced technical knowledge of their mobile phones among young adult population.

The use of wireless devices is here to stay. The number of devices, and more importantly, the types of devices, will only increase over time. There are undeniable cost benefits and increases in efficiency that can be derived from their use. But these benefits will only be actualized if a culture of privacy is developed. As wireless communication technology becomes fully integrated into information systems and business processes, it is inevitable that substantial amounts of personally identifiable information will flow over the airwaves. Since radio waves

are a broadcast medium, capable of being received by anyone who is in range, reception of the signal by unauthorized receivers cannot be prevented. Therefore, those responsible for personal information must ensure that “data-in-motion” must be strongly encrypted at all times. Finally we should have in mind that users are critically affected by security and privacy issues, and play a key role in protecting themselves and others.

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APPENDIX

The main questions forming the questionnaire that was used for our survey are quoted here:

- 1) Gender: A)Male B) Female C) Other
- 2) You study: A)Applied Sciences B) Inexact Sciences C) Other

How much concerned are you of the fact that a third person (NOT the provider) could:

3.Know your position with a few meters accuracy?, 4.Know your position with a neighborhood accuracy?, 5.Know if and when you passed by a certain point?, 6.Intercept your phonebook?, 7. Intercept your messages?, 8.Intercept your photos/other files?, 9.Intercept your list of incoming/outgoing calls?, 10.Know exactly when you turn on/off your phone?, 11.Intercept your phone talk?, 12.Intercept your discussion with people around you?, 13.Deprive you of the ability to use your phone temporarily?, 14.How possible do you think it is that all the above already happen? (In general , not personally), 15.Do you consider communication through mobile phones safe?, 16.Are you informed about how the options and technical characteristics of your mobile phone affect its security?

- A) Highly B) High C) Enough D) Not too much E) Not at all F) N/A