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RELEVANT AFFECT FACTORS OF SMARTPHONE MOBILE DATA TRAFFIC

ABSTRACT

Smartphones are used to access a wide range of different information and communication services and perform functions based on data transfer. A number of subscription contracts for smartphones is rapidly increasing, and the development of mobile communications network provides higher speed of data transfer. The continuous increase in the average amount of data traffic per one subscriber contract leads to an increase in the total Mobile Data Traffic (MDT), globally. This research represents a summary of factors that affect the amount of smartphone MDT. Previous literature shows only a few of the factors individually that affect the realization of smartphone MDT. The results of the research clarify the ways which influence the amount of MDT generated by a smartphone. This paper increases the awareness of the users of the methods of generating smartphone MDT. The research also allows users to specify parameters that affect the prediction of generated MDT of a smartphone.

KEY WORDS

data traffic; Internet; smart mobile phones; mobile communication;

1. INTRODUCTION

According to [1] data traffic is the transfer of data between the source and destination data mobile device using a portion of the capacity of the common resources of the public telecommunications network. The amount of generated MDT, according to [2], is defined as the number of downloaded and uploaded bits based on the access to the mobile telecommunications network using a mobile device. In literature, MDT is often defined as the amount of data transferred over the mobile Internet, which according to [3] and [4] is a packet-switched data transmission based on IP (Internet Protocol) using a mobile telecommunications network and mobile device. In this paper, the term MDT includes all the traffic in the mobile communications network, generated by the mobile device, applying all available applications and functionalities of the device. The average individual level of MDT has lately been significantly increasing, and some argue that the amount of MDT per user is not increasing linearly but rather exponentially [5].

A few years ago, mobile devices were exclusively used for voice communication. The possibilities of the use of mobile devices are constantly growing. More advanced mobile devices, such as smartphones, connect with multiple broadband networks providing their users with constantly growing range of new services and applications, and leading to the explosive growth of MDT [6]. Increased functionality of smartphones indicates the increase of bandwidth and the amount of realized MDT [7]. Over the past few years, prices of mobile broadband Internet access have fallen, and the bandwidth communication networks and the use of mobile Internet speed has increased [8]. When the device characteristics are combined with faster and more intelligent networks there is a widespread use of the advanced multimedia applications which contribute to the increase of MDT [9].

A growing number of smartphones is the main growth driver of MDT. It is expected that the number of smartphone subscribers will double by 2020, which will result in the rapid growth of MDT. Total MDT monthly generated by the smartphones and the use of mobile networks will increase eight times between 2014 and 2020 [10]. The increasing use of smartphones will generate three quarters of total MDT by 2019 [9]. Accordingly and as reported by [11], MDT generated by smartphones takes up an increasing proportion of the total Internet traffic.

As the ability of the smartphones to transfer data is getting more powerful, the change is happening in the view of the telecommunication operators. Nowadays, for the first time, the quality and pricing of MDT is becoming more important than one of the voice

transmission [12]. Speed of data transfer via mobile networks has increased by 20% during 2014 [9], but there is a requirement for extensive investments in 3G and 4G networks to meet the growing demand for the mobile data transfer [2].

Due to individual differences and variations in the amounts of realized MDT, the goal of this paper is to identify all the relevant factors that affect the use of mobile Internet and the amount of realized MDT, specifically for smartphone users.

The knowledge about the factors affecting the amount of generated MDT of the smartphones has great importance to subscribers in the form of the selection of adequate tariff plans, as well as to telecom operators in order to design the required network capacity, planning of radio frequency spectrum and the development of customer-tailored tariff plans and services.

2. REVIEW OF PREVIOUS RESEARCH

A significant number of authors have analyzed the use of devices within different contexts, but little research has focused on the reasons of individual differences in the amount of generated MDT, specifically for the smartphones and the ability of their usage.

Many authors have analyzed the usage of mobile devices, related applications and information and communication services. Thus, in [13] using the smartphone control application, authors analyze the work of mobile applications, regardless of their type. Similar studies are presented in [14] and [15] which provide information on the monitoring of smartphone usage and analyze the usage of various information and communication mobile services in Finland.

The usage of smartphones in order to generate MDT is given through a series of studies, with links between users, smartphones and used information and communication services. Research [16] analyzes the behaviour and characteristics of users and their intentions for using mobile Internet, while research [17] gives a detailed analysis of forms and amounts of smartphone generated MDT with the use of different information and communication services and applications such as internet browsing, instant messaging, the use of navigation maps, and similar. Research [18] analyzes the amount of generated MDT of different smartphone applications. Research [19] provides on a large number of subjects an overview of user behaviour and usage patterns of information and communication services and applications based on MDT, while research [20] analyzes the patterns of generating MDT by different types of smartphones in order to design the required mobile network performance. Research [21] shows the relationship between the amounts of generated MDT, the applications associated with smartphones and the user's mobility and research [22] shows the development of mobile communications networks and information and communication services as factors that affect the use of mobile Internet in Latvia.

The correlation between the amount of generated MDT and voice and SMS services is analyzed within research [23], with the results of increasing mobile data volumes in correlation with reducing the number of sent / received SMS messages, while there was no significant correlation of increasing amounts of generated MDT and the use of voice information and communication services. The same author in research [4] determines three factors (tariff plan, type of devices, and Wi-Fi access) that are considered to affect the amount of generated MDT and analyzes their interdependence.

The research results presented in [2, 24, 25] prove that there are significant individual variances in the amounts of generated MDT and the users of different types of smartphones. Exhaustive research on mobile Internet usage is shown in [2] focusing on all types of mobile devices able to generate MDT. The analysis of the literature in this research provides information on the possible factors influencing the consumption of MDT of different types of smartphones. Many of the above described factors are related to personal characteristics of the user (e.g. age, gender, education) and country of residence, and some of them are included within this research and represent a separate factor or an element of differently defined factors.

Within research [24] authors describe the connection between the monthly generated MDT, personal user characteristics (e.g. age, gender, the time period of the use of subscription contract, the experience of using mobile Internet, operating system and screen size of devices) and for different kinds of smartphones (according to OS-s). The monthly usage of MDT is provided by the operators of mobile communications networks, and the results are directed to individual variations of generated MDT depending on these factors. The same authors in [25] show the characteristics of the users of laptops and tablet devices correlated with monthly consumption of MDT and the factors that correlate previously specified.

Many authors describe individual factors that influence the amount of MDT of a smartphone, but none of the studies gives an overview of the factors that may affect the listed. This research provides a systematic review and an identification of factors that affect the amount of smartphone-generated MDT, according to the current technical and technological environment and the habits of the smartphone users.

3. MOBILE DATA TRAFFIC GROWTH

In 2014 the number of mobile devices has exceeded the total world population [9]. Today, most of

cellular network connections are still based on the use of mobile devices with the basic functionalities, but the predicted number of smartphone users by 2016 exceeds the number of mobile devices with the basic features, owing to more affordable smartphones in the emerging markets [10].

The penetration of smartphones is among the largest in the world. By the end of 2020 over 70% of subscribers in Europe will choose smartphones as their personal mobile devices [26]. There will be regional differences in the future - for example, the number of smartphones in Europe will amount to about 95% by 2020, while the same share for the Middle East will be around 55% [10]. Globally, smartphones accounted for 26% of the total number of mobile devices and generated 88% of MDT during 2014 [9]. The average download speed of the mobile network in 2014 was up to 1,683 kbit/s, compared to 1,387 kbit/s during 2013. According to the forecasts, the above mentioned speed rate will exceed 2 Mbit/s by 2016 [9].

Over the past few years, the average volume of generated MDT by the individual users has increased significantly [2]. The progress in the development of mobile networks has enabled the users to access multimedia services which could not be accessed during the operation of mobile networks 1G and 2G. The development of mobile networks has provided a space for the creation of multimedia services, and consequently, caused the "explosion" of MDT [27]. Similarly, [26] states that the reason for the increase of MDT is the availability of data-intensive mobile devices which facilitate the use of mobile services, as well as the attractive tariff plans. According to [10] and [26], MDT is primarily generated by the smartphones, and 65-70% of all sold mobile devices in the third quarter of 2014 were smartphones. Predictions are that by 2020, ninety percent of the world population aged over 6 years is going to own a mobile device.

The expected increase of MDT with CAGR (Compound Annual Growth Rate) is around 40% in the period from 2014 to 2020 [10], while [9] predicts that MDT is to grow with a CAGR of 57% in the period from 2014 to 2019, with the amount of traffic of 24.3 exabytes per month by 2019. It is expected that the number of smartphone subscribers would double by 2020, which will result in the rapid growth of MDT [26]. According to [9], one smartphone can generate as much MDT as 37 basic mobile devices, while according to [28] smartphones can generate 35 times more MDT than the basic mobile devices.

According to [26], the amount of data transferred by each smartphone will increase substantially from the average 1.2 GB per month in 2014 to the anticipated average consumption of 4.6 GB per month in 2020, while in [10] it is stated that this growth will be 0.9 GB per month in 2014 to anticipated 3.5 GB per month in 2020. At the same time, the prediction of MDT of all mobile connections in 2020 is the amount of 17 EB.

MDT in Europe will reach up to 5.5 EB per month until the end of 2020, which is about seven times higher than the turnover achieved during the year 2014 [26]. According to [10] in Western Europe, the MDT is expected to increase eight times between 2014 and 2020. Although 4G mobile connections today account for only 6% of all mobile connections, they participate in the transfer of up to 40% of MDT, and by 2017 they will comprise more than half of the total MDT [9].

4. MOBILE DATA TRAFFIC FACTORS

In almost all studies relating to the amount of generated MDT, the variations between individual users are very large. This raises the question of which factors are really important for the prediction of the amount of generated MDT by a specific user [2]. Factors such as limitations on the amounts of data by telecommunications operators, tariff plans, the size and resolution of the user devices screens affect the amount of generated data traffic per subscriber [10]. The summary overview of the factors that influence the amount of generated MDT per smartphone user are listed below.

4.1 Size and resolution of smartphone display

The amount of generated MDT is also affected by the size of the display and the resolution of the device [10]. The use of the popular big screen on smartphones combined with different types of mobile data tariff plans, results in a continuous increase of the generated MDT on a monthly basis [9]. The tariff plans of telecom operators will need to consider the fact that the users of phablet devices (screen diagonal from 5.1 to 6.9 inch in size and features combining the ones of smartphones and tablet devices) are most likely to be among the most intensive users, when it comes to generating MDT [29].

According to [30], there is a significant correlation between the increase of the physical screen, the total screen diagonal and the amounts of generated MDT. There is also a correlation between the average period of device usage and the physical size of the smartphone screen. Smartphones with a five inches screen diagonal (about 13 cm) or more, on the average, are being used for a longer period of time than the devices with small screens. Paper [31] uses specific examples of devices to claim that the subscribers of the smartphone model iPhone 6 Plus generate the largest amounts of data; twice more than the users of iPhone 6, and ten times more than the users of iPhone 3GS.

According to [30], the use of the smartphones with a higher resolution screen results in a greater amount of generated MDT; however, the device screen resolution is not as important as the size of the screen, as

an indicator of larger amount of MDT usage. In order to increase the amount of MDT, the telecommunications operators encourage the usage and sale of smartphones with larger screens, and coordinate these devices with data tariff plans.

4.2 Mobile device operating system

The consumption of mobile data in most studies relates to the comparison of iOS and Android OS. Most authors state that the smartphones based on iOS platform generate larger amounts of MDT in relation to Android OS. Thus, [24] and [32] indicate that iPhone users generate significantly more MDT than the Android users. At the same time, according to [33], surfing the web on iPhone generates two times more data traffic in one minute than the same activity on Android smartphones.

Some of the authors, like [30] claim that Android OS generates a larger amount of data, and that Android OS users generate more MDT than the iPhone owners in each of the five analyzed countries in this research. Previously mentioned is augmented in [34], because the users of Android devices generate a significant amount of background MDT through applications that usually operate without the user's knowledge. In iOS, MDT is generated only by an active application (with a few exceptions) [34]. Some authors accredit similar characteristics of generating MDT by devices based on the iOS and Android OS, and so [35] states that the users of smartphone devices based on iOS and Android OS have had a similar profile of MDT generation in December 2014.

4.3 Device and app settings

Smartphones can generate MDT without the awareness of their user. There are some applications that use a significant amount of mobile data even if they're inactive; such as the application for synchronous e-mail receiving, weather information, upgrade of applications and devices, updates of statuses on the social networking applications and similar [36].

It is possible to edit the settings of devices and applications in order to form reductions in generating MDT, depending on the OS of the machine. This includes turning off the notifications (push notifications), changing the settings of access to Wi-Fi networks, awareness of using "free" applications, manually individual application deactivating, warning about messaging services based on the mobile data and the monitoring of MDT [37].

Instructions for the reduction of MDT generation through device settings and applications, according to [38, 39, 40, 41], include: having manually synchronized reception of e-mail, using custom websites made for smartphones, watching video content only via Wi-Fi network, performing application updates and file downloads only via Wi-Fi network, not using personal device as an access point (hot spot), configuring applications based on the mobile data, limiting the generation of the background data traffic, setting up the preferences of the social networks video content, watching of video streaming only when using Wi-Fi network, memorizing of maps before the trip, fine-tuning of the synchronization settings, temporarily turning off the synchronization option for the applications and the monitoring of MDT.

4.4 Device capabilities depending on the mobile network

Device capabilities, depending on the type of mobile network, are defined through categories or classes of devices. According to [42], the category of device specifies the networking capabilities of the device in the form of: peak speed of data download and upload, supported antenna systems, defining the size of the data transport blocks and used modulation procedures.

The categories of mobile devices operating on the LTE (Long Term Evolution) network are needed to ensure that the base station, or eNodeB, eNB can communicate correctly with the user's equipment. By relaying the LTE category information to the base station, it can determine the performance of the mobile device and communicate with it accordingly. As the LTE category defines the overall performance and the capabilities of the mobile device, it is possible for eNB to communicate using capabilities that it knows the mobile device possesses. Accordingly, the eNB will not communicate beyond the performance of UE. According to [43], the categories of mobile devices of LTE network and their peak speed of data download and upload are shown in *Table 1*.

When capabilities of the device combine with broadband network of a wider bandwidth it results in appliance of advanced multimedia applications which contribute to the increase of the generated MDT [9].

Table 1 – Categories of smartphones operating the LTE network [43]

Peak speeds of data transmission (Mbit/s)	Device category							
	1	2	3	4	5	6	7	8
Download	10	50	100	150	300	300	300	1,200
Upload	5	25	50	50	75	50	150	600

4.5 Additional possibilities of applications

Some of the applications have the possibilities to reduce the amount of MDT due to their software characteristics. According to [44], Data Saver extension for Chrome helps in reducing bandwidth usage by compressing the websites visited over the Internet. How much data it saves depends on the type of content which is loaded. Another way of saving MDT is that the pages visited by the user go through one of the servers of the service provider. The server identifies the pieces of the page that can be compressed. It reduces image pixels and corrects video buffering. Then, it sends back these smaller-sized pieces to the user's device [45].

4.6 Mobile network communication technology

Large capacity networks and advanced devices enable the growth of data-intensive applications. The existing subscribers of 2G networks migrate to 3G and 4G connections to benefit from advanced mobile devices with greater functionality and higher data rates offered by these networks. LTE network users tend to transfer almost twice the amount of data compared to the users of other mobile generation networks [6].

The amount of MDT generated by the user who had access to generation networks with higher transmission speeds significantly exceeds the amount of generated data of the user who had the option of access to the previous generation (with smaller transmission speeds) mobile networks [46]. This is also proven in [35] since the Android smartphones with the possibility of access to 4G network transferred 13.1 GB of MDT per user in a month. Android smartphones with the possibility of access to 3G network have transferred 5 GB of MDT per user in the same month. Sixty percent (60%) of the total MDT is generated in 3G and 3.5G networks. Assuming the growth of network 4G [9] it is expected that the 2/3 of the total amount of MDT in 2019 will be generated by 4G networks, as seen in *Figure 1*.

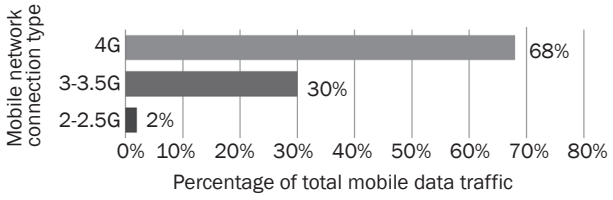

Figure 1 – Prediction of generated MDT per connection type in 2019, globally [9]

Currently, 4G network connectivity allows the realization of almost ten times more MDT than any other types of networks, and that is for two reasons. The first reason is that many of today's 4G connections are intended for technologically advanced devices that allow the generation of large amounts of data. The second reason is that the wider-bandwidth network promotes the adoption and the use of applications that require higher data rates [9].

Generating MDT is most intensive on the markets where LTE network is widely accepted; such as Japan, South Korea and the United States [30]. In the UK's download speed 4G network is two times faster than 3G network, while the upload speed of 4G network is up to seven times faster than the 3G [47]. Using 4G network in relation to 3G network leads to increased amounts of generated MDT [35].

4.7 Software and applications updates

Users are often not aware of the network, application or device-initiated generating MDT, which is not under the (direct) control of the user. Generating MDT is not always initiated by the end user (e.g. web browsing, downloading of applications or video content) but rather by the mobile network operator, by the so-called silent system updates or applications after the installation by the user (for example, updates of social network information, synchronization of e-mail application and similar) [2]. According to [18], there is a growing generation of background MDT due to the popularity of applications like Facebook, Skype, email clients, etc., who exchange information with the relevant servers, regardless of whether the application is active or not, of which the user is often completely unaware.

4.8 Offload communication technologies

One way to solve the problem of increasing MDT is to switch (offload) MDT on the Wi-Fi networks [48]. For users with Wi-Fi access to fixed broadband networks, a significant proportion of the generated MDT switches from the mobile network to the fixed network. The prediction is that by 2019, the percentage of the previously mentioned switched data will be 54% [9]. According to [49], the share of MDT switched from cellular to Wi-Fi networks was driven primarily by the availability and ease of an automatic access to Wi-Fi networks.

Half of smartphones and over 90% of 3G enabled laptops and notebook PCs are already Wi-Fi enabled. Hundreds of millions ubiquitous Wi-Fi access points provide large enough complementary capacity space for mobile networks [50]. WiFi offloading seems the most viable solution at the moment. Building more WiFi hotspots is significantly cheaper than network upgrades and build-out [51].

4.9 The tariff plan

The tariff plan has a significant impact on the level of generated MDT [2]. According to [9], limited tariff plans of MDT result in lower consumption of monthly mobile data per user, compared with unlimited tariff

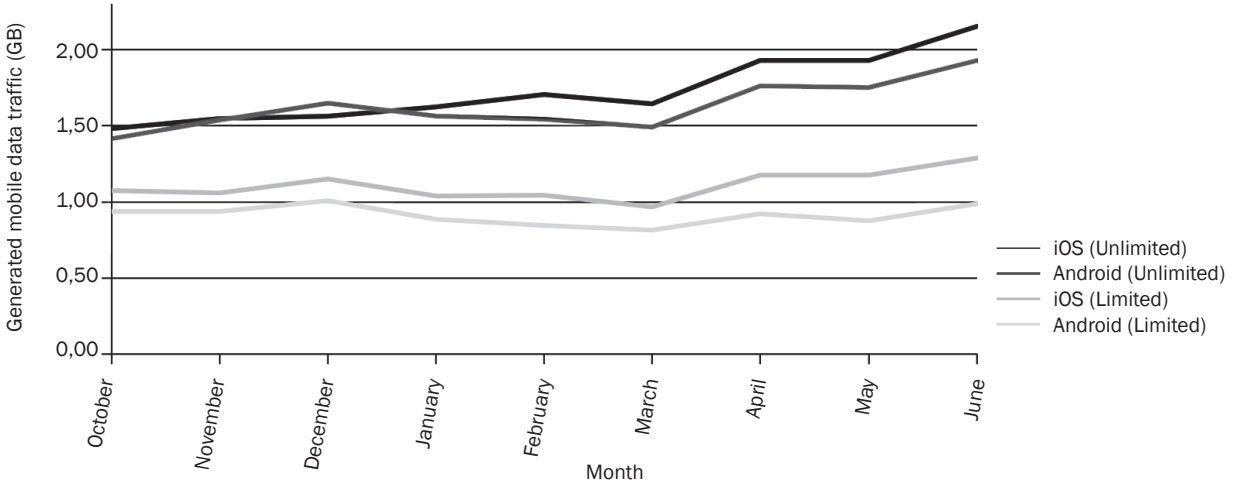

Figure 2 – Comparison of trend in MDT for limited and unlimited tariff plans [9]

plans (flat rate) depending on the used platform in the time period from October 2013 to June 2014, as shown in *Figure 2*.

Customers who use 3G and/or 4G connections (28%) claim to restrict the use of applications that generate MDT to avoid paying additional costs beyond the standard costs that are covered by the agreement and the tariff plan [47].

According to [10], the use of an unlimited data plan of MDT points out the overview of larger amounts of video content than in the case of user with limited tariff plan.

4.10 The use of services and applications

The popularity of smartphone devices has led to fast increase and development of the applications that generate large amounts of MDT, such as social networking applications, file downloading applications, video and music streaming applications, personalized magazines, and similar [52].

According to [30], applications of social networks daily generate on the average three to seven times more MDT than the applications for messaging or entertainment games. In general, according to [53], text files generate relatively small amounts, graphics and music files generate higher amounts, while video contents generate large amounts of MDT.

One of the key drivers of the increase of MDT among users is the increase on the use of video transmission service, at home as well as during movement [26]. Moreover, the use of "video-on-demand" will continue with the growth and the resolution of the video content will be improved. A High-resolution video content (1,080) requires a bit rate of 3.8 Mbit/s, while the videos containing 240 pixels require transmission speed of 400 kbit/s, which is almost ten times less [27]. According to [10], video contents continue their domination within mobile networks, and typically take up 45-55% of the entire generated MDT within 4G network. Applications and services for data synchronization among multiple devices based on cloud computing; such as iCloud, Dropbox and similar, can be a significant factor of the increase of MDT [52].

4.11 Context of use

Standard ISO 13407:1999 defines the context of use as a characteristic of the users, their tasks and the effects in the environment within which the system is used. Mobile devices are not only used outdoors or during the stay outside home; they can be used at home or in the office, as well. Considering the previously listed, there is a wide variation in the context of use, which can be changed even during a session of use [54].

Given the nature of the use of mobile device depending on different contexts, mentioned further affects the amount of realized MDT. According to [49], generating MDT is unevenly distributed throughout the day, but there is a greater variation in the distribution of MDT depending on the location. According to [2], generating of MDT follows a clear pattern throughout the day: the use is increased from 5 a.m. to the first peak value with the first peak in time for lunch, and it reaches maximum value in the evening at about 9 p.m. After that, generating of MDT declines (to a still relatively high level) until about midnight when declining almost stops between 3 and 5 a.m.

The location context (for example, when the user is at home or at work) has a significant impact on the use of mobile device. During their time in the office, the users will very often use their mobile devices to make calls or to check their schedule for the next meeting, while at home users mostly use their phones for surfing the web pages or watch movies [55]. The potential

value of context-sensitive information lies in the ability to predict potential difference in the user's behaviour and the usage habits depending on different user's contexts / situations [56, 57].

4.12 User personality profile and the use of multiple devices

According to [26], some users have the need to use multiple devices throughout the day to meet their information and communication needs. For example, in Italy, within the analysis of mobile devices, tablets and computers, more than one of the two observed persons regularly use two types of devices and more than one of three selected uses all three types of devices. According to [28], users own multiple devices; precisely in India the users use on the average 2.2 SIM (Subscriber Identity Module) cards. Given the above, which is an individual decision and the possibility of an individual, the realization of MDT often shifts to more smartphones or tablet devices, which makes it difficult to predict the consumption of MDT per single user.

5. DISCUSSION

Technological development and evolution of mobile telecommunication network ecosystems, devices and information and communication services have significant effect on the identification of the factors that affect the amount of smartphone mobile data traffic. Some of the previous studies did not identify the specific factors mentioned in this paper since the individual factors were not known, did not exist or were not important in the period of prior research.

Methods of assessing the amount of generated MDT for smartphone users are mostly not based on real factors but random predictions, estimates based on historical experience or advices of other users that often do not take into account all the relevant factors which are mentioned in this research.

Using the analysis of previous studies, and given the technical and technological evolution of the smartphones and the information and communication service, it is obvious that there is need for identification and systematic review of relevant factors that affect the amounts generated MDT, specifically for the smartphones. This research provides a summary of factors that affect the amount of smartphone generated MDT, according to the current technical and technological environment and the habits of the smartphone users, as seen in *Table 2*.

Table 2 – Systematic overview of factors affecting the SMDT

Factor Level	Individual factor	Acronym
Device	Size and resolution of smartphone display	D_{SR}
	Mobile device operating system	D_{OS}
	Device and app settings	D_{AS}
	Device capabilities depending on generation of mobile network	D_{DC}
	Additional possibilities of applications	D_{PA}
Network	Mobile network communication technology	N_{CT}
	Software and applications upgrades	N_{SA}
	Offload communication technologies	N_{OF}
User	Tariff plan	U_{TP}
	The use of services and applications	U_{SA}
	Context of the use	U_{CU}
	User personality profile and the use of multiple devices	U_{PP}

$$SMDT = f(\mathrm{D} \cup \mathrm{N} \cup \mathrm{S})_{s,t} \quad (1)$$

where:
D – device factors level;
N – network factors level;
S – user factors level;

and summary

$$SMDT = f\{(D_{SR}, D_{OS}, D_{AS}, D_{DC}, D_{PA}) \cup (N_{CT}, N_{SA}, N_{OF}) \cup (U_{TP}, U_{SA}, U_{CU}, U_{PP})\}_{s,t} \quad (2)$$

Most of the data usage issues are for unknown reasons to users, regarded as Phantom Data Usage (PDU), which refers to the unexpected mobile data usage that does not accord with user's perception [58]. Considering that the smartphone users are often unaware of the factors affecting the amount of generated MDT, the same encounter the problem of prediction of the above mentioned, and accordingly, the selection of appropriate tariff data plan.

6. CONCLUSION

A growing number of mobile subscribers, increasing demand for mobile broadband access, the development of mobile access networks and their peak data transfer speeds as well as the advanced mobile devices and the access to modern information and communication services create an environment that globally leads to large amounts of generated MDT. Forecast of the future amounts of generated

MDT is important mostly for the operators of mobile communications networks and end-users of devices and services.

For operators of mobile telecommunications networks, who are facing increasing price competition, substitutes for voice services and reduced profits by voice calls, data services today represent a new source of income. Increased amounts of generated MDT reflect on the operators of mobile telecommunications networks and lead to question forecasting of the amount of generated data for the purpose of design of the required network capacity, plans for use of the radio frequency spectrum and the development of customized tariff plans and information and communication services. The understanding of the amount of generated MDT is also important for the providers of information and communications equipment who provide mobile network operators with adequate network management and the use of network resources.

From the user's point of view it is important to point out that many smartphone users pay for tariff plans that include more mobile data than they need. Some of the smartphone users are not aware of and do not understand the possible factors influencing the consumption of MDT, and they do not understand its monthly amount. Generally, it can be determined that the users often decide about their mobile data needs based on historical experience, random guesswork or the advice that is usually not based on objective assessments.

These arguments are an indicator that there is no systematic review of the factors that affect the amount of MDT generated by smartphones, which is the fundamental goal of this research. Based on this, the research paper has identified and explained the factors that affect the amount of generated data traffic, specifically for the users of smartphones. Further research will focus on defining models in order to predict the resulting amount of MDT based on the factors mentioned in the work.

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RELEVANTNI ČIMBENICI KOJI UTJEČU NA KOLIČINU OSTVARENOG PODATKOVNOG PROMETA PAMETNOG TELEFONA

SAŽETAK

Pametni telefoni koriste se za pristup širokom spektru raznovrsnih informacijsko komunikacijskih usluga kao i za realizaciju funkcionalnosti temeljenih na prijenosu podataka. Broj pretplatničkih ugovora povezanih s pametnim telefonima ubrzano raste, a razvoj pokretnih komunikacijskih mreža pruža sve veće brzine prijenosa podataka. Kontinuirani porast prosječno ostvarenog podatkovnog prometa po pretplatničkom ugovoru uzrokuje porast i u ukupno ostvarenom mobilnom podatkovnom prometu u svijetu. Ovim istraživanjem obuhvaćen je pregled čimbenika koji utječu na količinu ostvarenog podatkovnog prometa pametnog telefona. Prethodna istraživanja identificiraju samo neke od čimbenika koji utječu na ostvareni mobilni podatkovni promet pametnog telefona. Rezultati ovog istraživanja razjašnjavaju čimbenike koji utječu na količinu ostvarenog podatkovnog prometa pametnog telefona te povećavaju osviještenost korisnika o mogućnostima generiranja podatkovnog prometa korištenjem pametnog telefona. Uz navedeno, istraživanje korisnicima omogućuje specifikaciju parametara koji utječu na predviđanje generiranog podatkovnog prometa pametnog telefona.

KLJUČNE RIJEČI

podatkovni promet; Internet; pametni telefoni; mobilna komunikacija;

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