ANALYSIS OF THE EVOLUTION OF TERMINAL DEVICES IN THE USE OF SMS SERVICE

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ABSTRACT

The use of new services in communication systems often means reducing the use of existing services or even complete substitution with new services.

The development of smart mobile devices as well as reducing the price of data traffic in mobile internet access, makes changes in the current trends of exchanging (primarily text) messages into mobile communications. Statistics show reducing the current growth in the number of sent SMS (Short Message Service) messages, and alternative will represent services such as e-mail and IM (Instant Messaging) communications. An increasing number of applications that enable IM communication (Skype, Facebook, Viber, ...) and abundance of their use by end users are indicative factor that such a mode of communication is becoming a common.

This research is directed towards the analysis of forecasting the growth of smart mobile devices to the global data traffic and new offerings for service that meet customer expectations for multimedia. An important factor in increasing the popularity of new communication technologies is a cost of sending an IM and e-mail messages in relation to the cost of sending SMS messages and interactivity based on Web 2.0 technologies of social networks. Accordingly, the logical is the fact that for telecom operators is being reduced the profit for the sent SMS messages.

Keywords: SMS, IM**,** e-mail, terminal device, data traffic

## 1   DEVELOPMENT AND USAGE OF SMART TERMINAL DEVICES

Although there is no exact definition of what a smart terminal device (smartphone) is, we can say that smartphone is a device that extends the capabilities of conventional mobile terminal device. Additional functions expected of a smart terminal devices are not strictly defined and change over time, so this complicates the definition of a smartphone. For example, several years ago, a global positioning system (GPS) in the phone was thought as a function that own only smartphone devices. Today this function also have some terminal devices that we do not consider smart terminal devices. [1]

Key features of the smart terminal devices are: an operating system (OS), applications, a full QWERTY[1] keyboard and a permanent access to the Internet. Today's smartphones have touch screen that allows users intuitively usage of their mobile devices. Users have their smartphones always with them and they are often used as a substitute for GPS navigation, digital camera or video camera, media player, etc. Today's smartphones have more processing power and memory space than the personal computers from ten years ago. After year 2007., ie after the appearance of the iPhone and smartphone operating system Android, smart terminal devices assume a greater share of the market mobile devices. In the third quarter of 2011, the 26% of all sold mobile devices were smart terminal devices. More interesting is the fact that

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[1] The globally spreaded standard for the layout of a keyboard.

this share is growing: in 2010 the part of sold smartphones was 19%, which is an increase of 72% compared to year 2009. [1]
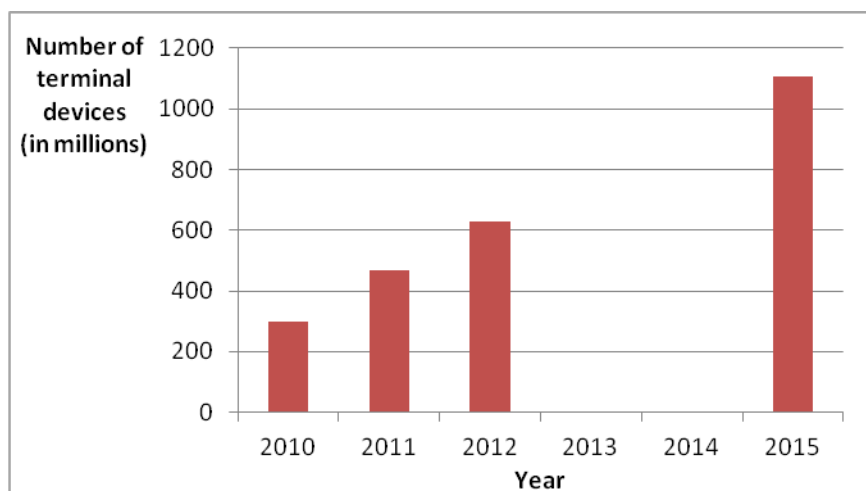
Graph 1: The current situation and predict the growth of smartphone usage in the world [10]
Source: Gartner

Prediction of analyst firm Gartner (Graph 1) indicate an almost linear increase in the use of smart terminal devices by the year 2015. According to their data, the average increase in the number of smart terminal devices is approximately 160 000 devices per year.

2   TRENDS IN THE USAGE OF MOBILE DATA TRAFFIC

One of the reasons for the unexpectedly strong growth in data traffic is rapidly adoption of smart terminal devices by mobile subscribers. Growth trend in mobile data traffic over the previous year is shown in Table 1.

Table 1: Growth of mobile data traffic on a global level [2]

Year	Increase in percentage
2008.	156 %
2009.	140 %
2010.	159 %
2011.	131 %
2012.	113 %

Source: Cisco Systems, Inc.

2.1   Indicators of growth of mobile data traffic in 2010

Increased use of mobile data traffic has been noticed in several previous years, and in the following analysis will show the research of Cisco Systems on the use of data traffic on a global level in 2010: [3]
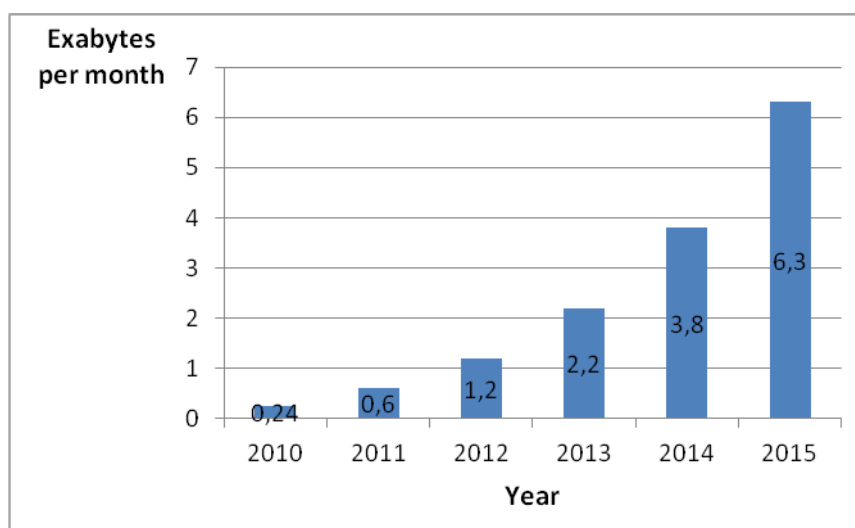1. Global mobile data traffic grew 2.6-fold in 2010.
2. Mobile data traffic was three times the size of the entire global Internet in 2000.
3. The typical smartphone generated 24 times more mobile data traffic (79 MB per month) than the typical basic-feature cell phone (which generated only 3.3 MB per month of mobile data traffic).
4. Average smartphone usage doubled in 2010. The average amount of traffic per smartphone in 2010 was 79 MB per month, up from 35 MB per month in 2009.

2.2 Prediction of mobile data traffic by 2015

Predictions show that the average smartphone will generate 1.3GB of traffic per month in 2015, a 16-fold increase over the 2010 average of 79MB per month. [2]

Aggregate smartphone traffic in 2015 will be 47 times greater than it is today, with a CAGR[2] of 116 percent. [2]

Predictions show that the mobile-only Internet population will grow 56-fold from 14 million at the end of 2010 to 788 million by the end of 2015. [2]

Graph 2: Predictions of increasing data traffic in exabytes[3] [2]
Source: Cisco Systems, Inc.

According to the predictions of the Cisco Systems company, global mobile data traffic will increase 26-fold between 2010 and 2015. Mobile data traffic will grow at a CAGR of 92 percent from 2010 to 2015, reaching 6.3 exabytes per month by 2015 (Graph 2). [2]

3 MODERN COMMUNICATION SERVICES

3.1 Short Message Service (SMS)

Short Message Service (SMS) represents the transmission of short text messages to and from a mobile phone, fax machine, and/or IP[4] address. Messages must be no longer than 160 alphanumeric characters and contain no images or graphics. SMS is a relatively simple messaging system provided by the mobile phone networks. Although services based on SMS have been feasible for many years, the recent mobile phone penetration and large scale adoption of the existing services by users, have made the SMS based services even more attractive to service providers. [5]

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2 Compound annual growth rate.
3 Amount of information. 1 EB = 100000000000000000B = 1018 bytes = 1000000000 gigabytes = 1000000 terabytes.
[4] Internet Protocol

3.2 Multimedia Messaging Service (MMS)

Like SMS, MMS enables messages to be composed easily and immediately between mobile devices (via the mobile network) without the need for Internet e-mail addresses or mailboxes.

As with SMS, MMS does not require a network mailbox, so users do not have to log on to receive messages. Each message is automatically pushed to the users MMS enabled mobile device. Likewise, if the recipient's mobile device is switched off or temporarily out of coverage, the message is stored by the network until it can be safely delivered. Users can send, receive, reply to, delete and forward messages. Unlike SMS, however, virtually no limits are put on the size or the sophistication of MMS message content. What is more, MMS messages can be exchanged between MMS enabled mobile devices and Internet e-mail accounts.

MMS overcomes the character limit of SMS. It also allows sending formatted text, photos, drawings, graphics, animations, audio samples, and video clips. For users, MMS enhances personal connectivity and productivity through a more immediate exchange of rich content. For instance, while on the road, users can receive a localized city map; or while at a conference, an up-to-the-minute graph or layout. [6]

3.3 Mobile e-mail

Mobile email is a function of reading, replying and forwarding e-mail using mobile devices. Mobile e-solutions for real-time synchronization between e-mail servers and mobile devices have the following services:
- Electronic mail
- Calendar
- Personal contacts

Traditional mobile e-mail is accessed using a smart terminal devices.

3.4 Instant messaging (IM)

Instant messaging (IM) is an service with application based on TCP/IP[5] protocol that enables real-time communication between users using a variety of terminal devices. With this type of application, the people who signed up to the network (online) can receive the answer in a short time after sending the message, and this is the type of communication in real time. Most of these applications rely on a central server that manages user and inform others about their presence and location so that users can send messages directly to another user, if its position is already known.

4 APLICATIONS FOR INSTANT MESSAGING SERVICE

Represent aplications that enable the exchange of messages in real time, while their main characteristics are:
- Real time exchange of text messages of unlimited size
- Creating networks and groups
- Sharing own thoughts, status, pictures and location
- Messaging and sharing video and music clips to a user group
- Report of a time when the message is delivered and read

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[5] Transmission Control Protocol/Internet Protocol

Some of the most popular are BlackBerry Messenger (BBM), iMessenger, Skype, Viber WhatsApp and Facebook.

5   ANALYSIS OF THE IMPACT OF NEW COMMUNICATION SERVICES IN THE USE OF SMS SERVICE

Over the past 15 years the change in the domain of exchanging messages was not great. The main part of the revenue in exchanging messages was the SMS service. Although SMS service today is still dominating service in exchanging messages it is visible the apparent role of additional messaging services such as mobile instant messaging, mobile e-mail and social networks as mobile services.

5.1   Reducing the growth of SMS messaging - global indicators

Considering to compound annual growth rate of mobile IM (46.3%) and mobile e-mail (32.8%) it is expected the reduction of sent SMS messages. [4]

Over-the-top (OTT) messaging services are mentioned as the next generation of messaging services, and they include mobile e-mail, mobile IM and social networks that allow the exchange of messages as it provides SMS service. OTT messaging services take an increasing share in a total messaging exchange.

According to predictions, OTT services will slow down the growth of SMS service in the next few years, and a decline in the number of SMS messages sent globally is expected for several years (Table 2). [3]

Table 2: Trends in the number of exchanged messages for the SMS service and OTT [3]

| Worldwide		SMS traffic (in billions)						
		2010.	2011.	2012.	2013.	2014.	2015.	2016.
Total	SMS traffic	6,834.5	7,843.6	8,599.7	9,162.9	9,443.5	9,639.3	9,554.3
	OTT traffic	1,297.1	3,491.6	5,846.2	8,993.7	12,682.1	16,426.1	20,293.1

Source: Portio Research Ltd.

According to the data and predictions (Table 2) the number of sent SMS messages will grow until 2015 and was followed by a decline in the number of exchanged messages on a global scale. At the same time, there is a significant growth in exchanging messages using the OTT services. Those services shall be a substitution for SMS service in communication needs.

The International Telecommunication Union (ITU) shows that the number of sent SMS messages has increased three times between 2007 and 2010. ITU forecasts show that in 2010 sent 6.1 trillion SMS messages were sent, which means about 16.7 million messages sent every day. [10]

Although the number of SMS messages sent through the three years has increased threefold, it is visible the reduction in the growth of the number of sent SMS messages. Between the 2007 and 2008 visible is the growth of 58% in the number of sent SMS messages, while between 2008 and 2009 growth in the number of sent messages was reduced to 53%. Even greater changes are evident in the following year when the growth of sent SMS messages (compared to the previous year) decreased to 41%. [10]

Given that, globally, the number of exchanged SMS messages grows, but there are also regional differences as regards the exchange of SMS messages. Regionally, North America and Europe are the regions where is a decrease in the exchange of SMS messages (Graph 3). Real reason is the fact that they are two most developed regions in terms of using the latest IT technologies and services, and thus the greater use of smartphones and mobile data traffic. In contrast, in other regions there is still a growing trend in exchanging SMS messages (Graph 3), thus proving the fact of the less developed regions of IT services and technology.
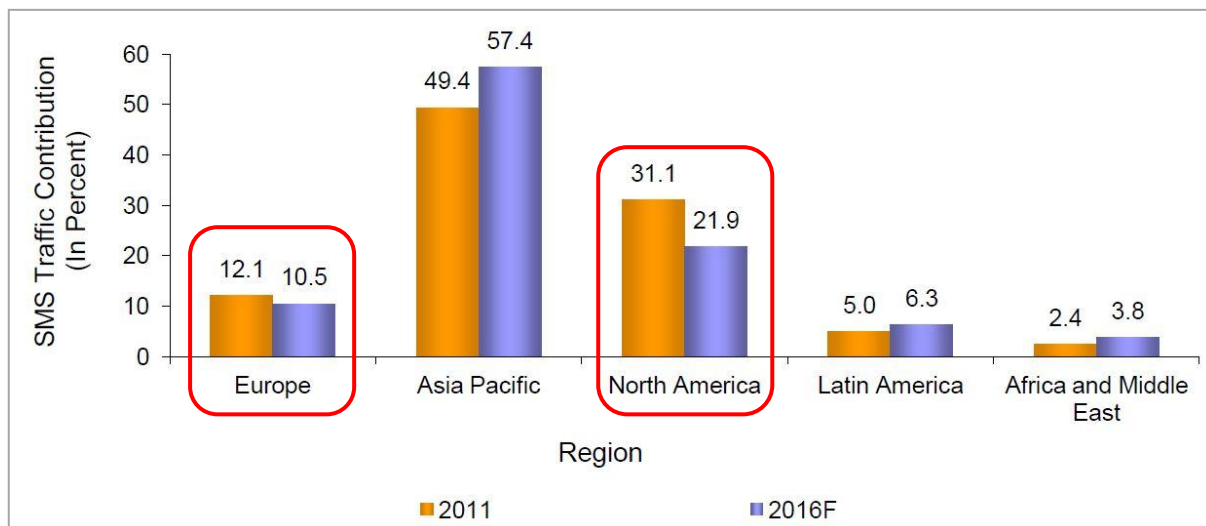
Graph 3: Trends in the exchange of SMS messages per region [3]
Source: Portio Research Ltd.
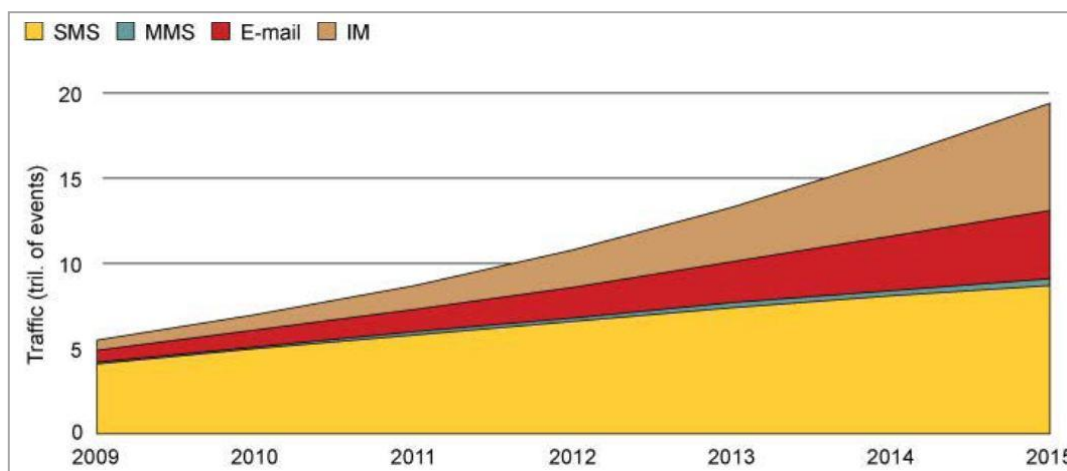
Graph 4: Prediction of the number of sent messages by the type of services on a global scale [4]
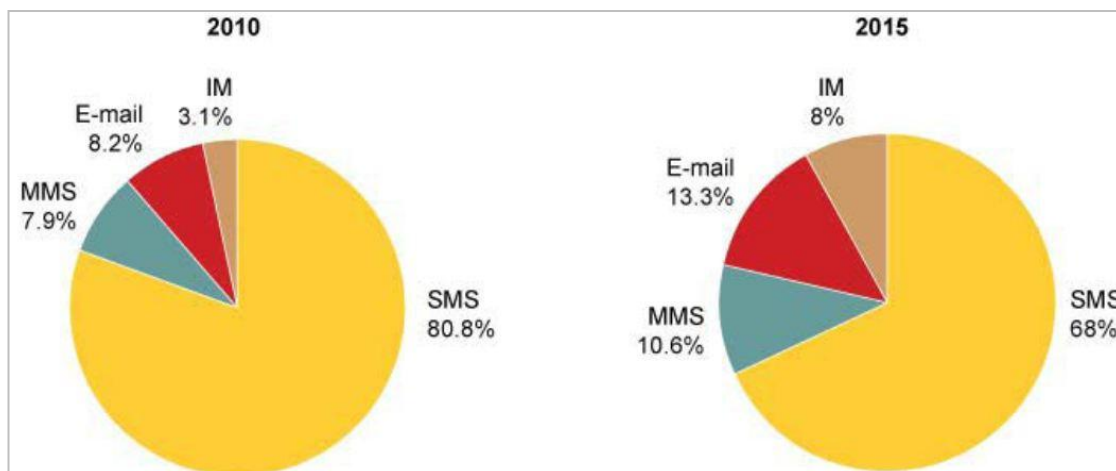*Source: Informa Telecoms & Media*

Global mobile messaging traffic will total 19.3 trillion events by 2015. SMS is also forecast to contribute the majority of this traffic, with 8.1 trillion events, but its share will slide from 71% of total messaging traffic in 2010 to 45% in 2015 (Graph 4). [4]

5.2 Changes in income structure

Predictions show that SMS will continue to generate the bulk of global messaging revenues through 2015, though its low compound annual growth rate of 5.4% over the

forecast period means that its share of revenues would drop from 80.8% in 2010 to 68% by 2015 (Graph 5) [4]

Graph 5: Global mobile messaging revenue share by type of service, 2010 and 2015 [4]
Source: Informa Telecoms & Media

Analysis of the Ovum[6] company has shown that the use of applications like BlackBerry Messenger, Facebook chat and WhatsApp, thanks to which users can send messages over the Internet instead of typing SMS messages, telecom operators lost 13.9 billion dollars of revenue from SMS messaging. But the study did not take into account the profits of telecom companies in using mobile data traffic. [8]
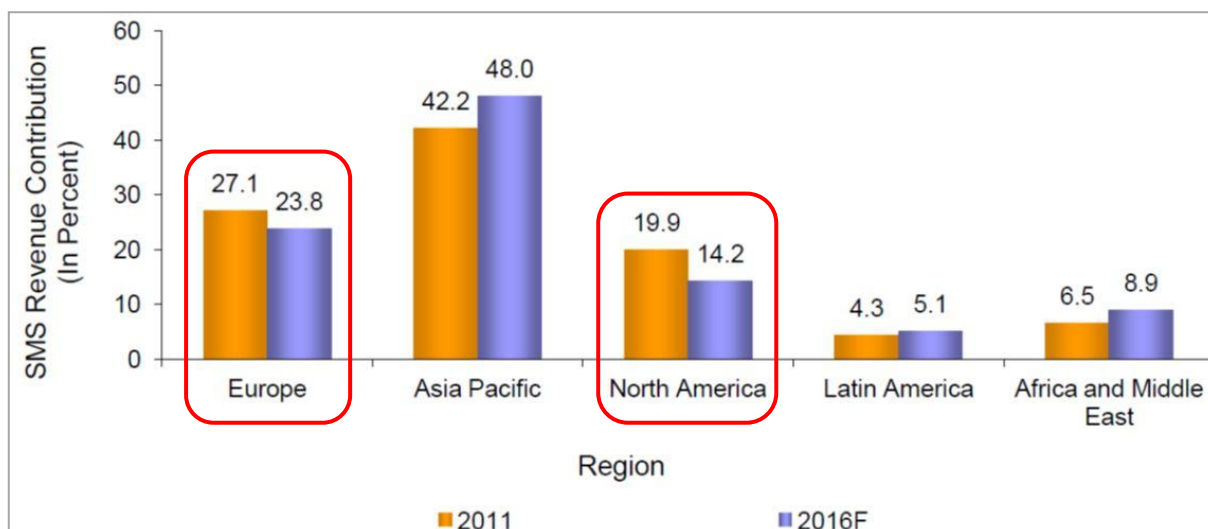
Graph 6: Trends in the revenues from SMS service per region [3]
Source: Portio Research Ltd.

In parallel with the analysis of trends in the movement of SMS messaging by region (Graph 3), looms the logical fact that there are regional differences in the amount of revenue that will generate SMS service on a global level. The statistical predictions (Graph 6) show how will be reduced the amount of revenue that is being generated by SMS service in

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[6] The research house in the area of telecommunications, software and IT services.

technologically more advanced and more developed regions such as Europe and North America.

Given the reduction in the number of exchanged SMS messages logical is a fact that precisely those regions decline in revenues from SMS service. Other regions will record increased revenue from the SMS service and the biggest reason to this fact is increasing the exchange of SMS. SMS services are still dominating in the number of messages exchanged in the market and earned income.

SMS service still dominates in the number of messages exchanged in the market and earning income. Predictions are that:
• SMS service will dominate the global messaging in mobile communications over the next five years, until 2016 [9]

Although the MMS service has maintained its position as the second most successful messaging services, year 2011 has shown that:
• MMS service is behind the mobile e-mail service by the revenue obtained in exchanging messages [9]

Revenues generated by the mobile IM were the lowest in messaging market in mobile communications in 2011, but according to the predictions:
• until 2016 mobile IM will exceed the income that generate MMS services [9]

SMS gave the largest contribution to revenue in the worldwide exchange of messages in 2011 with a 63.5% share. In 2016 it is expected that the SMS service will still have the largest share of revenues from messaging in mobile communications, but the share of income will be reduced below 50%. [9]

6   CONCLUSION

Starting from the development of smart terminal devices, it can be seen how smartphone devices are more and more present as a "small computers" in a way that the majority of jobs, primarily related to communication, are possible to be done with such devices. Given this, the logical is the fact that the usage of smartphones globally has increasing growth.

Indicator of growth of mobile data traffic in the world is one of the segments that are closely linked to the increased use of smartphones. Mobile data traffic is one of the fastest growing segments of mobile communications technology. In line with this growth comes changes in other parts of the system, and primarily it is the use of mobile e-mail, mobile IM and social networks in the form of exchanging messages.

The current dominating service in exchanging messages is the SMS service, which with new trends and development of hardware and software equipment gets competition. Prediction of reputable research firms say that the number of sent SMS messages on a global, regional and local levels is reducing. The reason for this lies in the synergy of the penetration of smart terminal devices, the growth of (mobile) data traffic and new communication services in the form of mobile e-mail, mobile IM and social networks.

The fact is, that, globally, the traffic generated by SMS service for several year will have the highest proportion in the total message traffic, but that growth will be weak until 2015, and after that will be followed by decline in volumes of traffic, and in line with this and the revenue obtained by using the SMS service.

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