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Proportional Study of Bluetooth and GPRS Technology

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Abstract-The main objective of this paper is to provide overview of wireless technologies which is a part of emerging technology for the new digital era. Sometimes it is not convenient or even impossible to inter connect the communication devices by wire, in which case wireless connections are the solution for communication needs. It is difficult to choose the proper technology in the wide field of wireless communication technologies. In this paper to study gives an overview of the most important methods of wireless communication and security and compares the merits and demerits in order to facilitate the design wireless communication devices. In this paper, some few other technologies are introduced and their capabilities are analysed.

Key words-- Network, Bluetooth, GPRS, wireless, WLAN, GSM

1. INTRODUCTION

Wireless is a term used to describe telecommunications in which electromagnetic waves (Rather than some form of wire) carry the signal over part or the entire communication path. Common examples of wireless equipment in use today include:

Cellular phones and pagers: provide connectivity for portable and mobile applications, both personal and business. Global positioning system (GPS); allows drivers of cars and trucks, captains of boats and ships, and pilots of aircraft to ascertain their location anywhere on earth[1]. Short range wireless communication technology provides a possibilities to implement various location based services to the users for a reasonable price. In this paper provides the wireless communication technologies are:

- BLUETOOTH Technology
- GPRS Technology

BLUETOOTH is a technology short range wireless data and real time two-way voice transfer provide data rate up to 3 Mb/s.

GPRS (General Packet Radio Service) is a packet oriented Mobile Data Service available to users of the 2G cellular communication systems Global System for Mobile Communications (GSM) and IS-136, as well as in the 3G systems. In the 2G systems, GPRS provides data rates from 56 up to 114 Kbit/s. Bluetooth, and GPRS are wireless communications technologies, which differ in terms of their features and data security solutions [2]. These two wireless communication technologies have been chosen for comparison, because they are widely used all over the world.

Bluetooth and WLAN represent the new and promising generation of wireless Communication, while GPRS is a new technology.

The rest of this paper is organized as follows. A theoretical background for this work and a review of some existing methods for location estimation using Bluetooth and analyze merits and demerits is given in Section 2. In Section 3 discuss about GPRS technologies and analyze the issues in GPRS. Section 4 presents the Time variations between Bluetooth and GPRS. Comparative study on Bluetooth – GPRS technologies' Experimental results are presented in Section 5. Finally, Section 6 contains the conclusion.

II. BLUETOOTH

Bluetooth is a wireless protocol utilizing short-range communications technology facilitating data transmission over short distances from fixed and mobile devices, creating wireless personal area networks (PANs). The intent behind the development of Bluetooth was the creation of a single digital wireless protocol capable of connecting multiple devices and overcoming problems arising from synchronization of these devices.

Bluetooth uses a radio technology called **frequency hopping spread spectrum.** It chops up the data being sent and transmits chunks of it on up to 79 different frequencies. In its basic mode, the modulation is Gaussian frequency shift keying (GFSK). It can achieve a gross data rate of 1 Mb/s. Bluetooth provides a way to connect and exchange information between devices such as mobile phones, telephones, laptops, personal computers, printers, GPS receivers, digital cameras, and video game consoles through a secure, globally unlicensed Industrial, Scientific, and Medical (ISM) 2.4 GHz short-range radio frequency bandwidth. The Bluetooth specifications are developed and licensed by the Bluetooth Special Interest Group (SIG). The Bluetooth SIG consists of companies. in the areas of telecommunication, computing, networking, and consumer electronics.

Bluetooth is a standard and communications protocol primarily designed for low power consumption, with a short range (power-class-dependent: 1 meter, 10 meters, 100 meters) based on low-cost transceiver microchips in each device. Bluetooth is a wireless technology for short-range (usually up to a maximum of 10 meters) networking. It is relatively robust, operates on low power, and is a low cost technology.

A. Merits Of Bluetooth:

1) Bluetooth 3.0 (actual version number TBD)

The next version of Bluetooth after v2.1, code-named Seattle (the version number of which is TBD) has many of the same features, but is most notable for plans to adopt ultra-wideband (UWB) radio technology[8]. This will allow Bluetooth use over UWB radio, enabling very fast data transfers of up to 480 Mbit/s, while building on the very low-power idle modes of Bluetooth

B. Demerits Of Bluetooth:

Bluetooth wave less remains the greatest for short range wireless technology. Those who hold tried unfeigned love original, and they know for a reality that Bluetooth consign equate around for years to be present.

2) Bluetooth Security:

Bluetooth is a wireless technology for short-range (usually up to a maximum of 10 meters) networking. It is relatively robust, operates on low power, and is a low cost technology. Bluetooth uses a Time-Division Duplex scheme for full duplex transmission[10]. In other words, Bluetooth technology is simply used to connect an electronic device to another without the physical cable. Bluetooth is intended to be a standard that works at two levels:

- It provides agreement at the physical level (radio-frequency standard).
- It also provides agreement at the next level up, where products have to agree on when bits are sent, how many will be sent at a time and how the parties in a conversation can be sure that the message received is the same as the message sent.

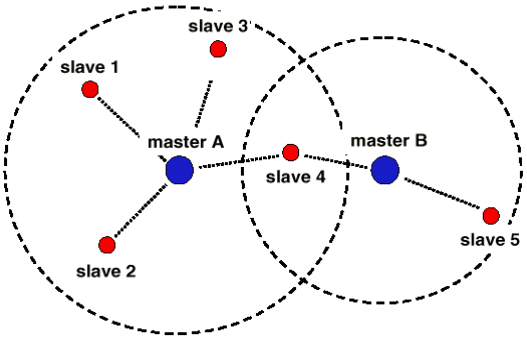

Fig 1: Bluetooth - Piconet formation

The Bluetooth protocol uses a combination of circuit and packet switching. To send/receive data Bluetooth uses a frequency-hopping spread spectrum technique which makes it difficult to track or intercept transmissions. The Bluetooth standard uses three transmit power classes. These are 1mW, 2.5mW and 100mW. Each Bluetooth device has a unique 48 bit hard-wired device address for identity, which allows for 2^48 devices. Bluetooth devices basically form **piconets** to communicate [11]. Each piconet comprises of up to eight active devices where one is the 'master' and the rest are 'slaves'. Piconet is range10m and transfer rate between 400 & 700 k/bits depending on whether synchronization & asynchronization connection is used.

The master searches for Bluetooth devices followed by invitations to join the piconet addressed to specific devices. The 'master' then assigns a member-address to each slave and controls their transmissions. Devices can belong to several piconets. Bluetooth also provides for easy integration of TCP/IP for networking. Bluetooth uses the radio range of 2.45 GHz. This is a globally available bandwidth used worldwide for compatibility.

III. GPRS TECHNOLOGY

General Packet Radio Service (GPRS) is a packet oriented Mobile Data Service available to users of the 2G cellular communication systems Global System for Mobile Communications (GSM) and IS-136, as well as in the 3G systems. In the 2G systems, GPRS provides data rates from 56 up to 114 kbit/s.

GPRS data transfer is typically charged per megabyte of traffic transferred, while data communication via traditional circuit switching is billed per minute of connection time, independent of whether the user actually is using the capacity or is in an idle state. GPRS is a best-effort packet switched service, as opposed to circuit switching, where a certain Quality of Service (QoS) is guaranteed during the connection for non-mobile users[3].

GPRS is to take care of the security. It is basically based on different ETSI documents. Before the details of the five issues, we have explained some keywords related to security [4]. Confidentiality, Integrity and Authentication (CIA) are three different services that computer and network security should cover. All the three services have to be protected, an attack against one or some of them are possible.

A. Security architecture in GPRS:

The GPRS is a new service that is offered to the mobile phone users. Netcom and Telenor, who are the two largest operators in Norway introduced GPRS on January 31 and February 1, 2001. So far it is just a small number of mobile phone on the marked that supports GPRS and it is also difficult to get hold of a mobile phone. The operators offer a limited numbers of services to the GPRS costumers[5]. One of the services that GPRS is supporting today is the Mobil Mail. Mobile Mail is possible to use with the entire mobile phone that use WAP, but with the GPRS functionality "always on" the email service Mobile Mail is more attractive. Quality of connection is very high[6].

GPRS is important that the security is taken care of. This is because the users; both private persons and companies, can feel safe and use the services that the operators offer. Services that demand a high level of security could be financial transactions transfer of medical information or exchange of personal e-mail messages.

In the next two subchapters we have explained which part in the GPRS system we are focusing on and the test we did in the Ericsson AS's lab environment.

B. Security issues in GPRS:

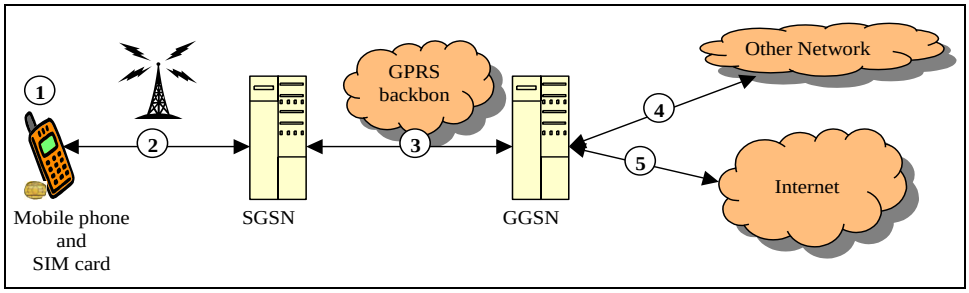

Fig 1. The security issues in GPRS

From the figure there are five main areas where security in the GPRS system is exposed. These five areas are:

1. Security aspect related to the mobile phone and the SIM card.
2. Security mechanics between the MS and the SGSN. These include also the air interface from the MS to the BSS.
3. The PLMNs backbone network security that mainly referred to the traffic between the SGSN and the GGSN. But also handling the flow of subscriber information, like triplets between the HLR and SGSN.
4. Security between different operators. Security between GGSN and the external connected networks, like Internet.

IV. TIME VARIATIONS BETWEEN BLUETOOTH AND GPRS

The Bluetooth & GPRS are tested time variations of multimedia files. The multimedia files voice call, text, and image. Bluetooth is tested via sample data files. Through Bluetooth voice calls in which size is 163 bytes can be sent within five seconds from one mobile to another mobile. Similarly, text files in which size is 3 KB can be sent within 2 seconds and image files in which size is 11 KB can be sent within 2 seconds. These files are transferred between the different types of mobiles with different distances. Performance of this method for sample data files are measured in terms of computing time.

GPRS is tested via sample data files. Through GPRS voice calls in which size is 163 bytes can be sent within five seconds from one mobile to another mobile. Similarly, text files in which size is 3 KB can be sent within 2 seconds and image files in which size is 11 KB can be sent within 2 seconds. These files are transferred between the different types of mobiles with different distances. Bluetooth and GPRS time were noted in milliseconds and the graphs are drawn using MS-Excel Sheet.

A. Comparison:-

From this research work it is found that the GPRS time performance is best when compared with Bluetooth. The comparison has been done by means of a graph with files as X-axis and time as Y-axis (in milliseconds) with different file size (in bytes). Bar char depicting the time of the Bluetooth & GPRS. The GPRS is more secure. The files can be transferred to the mobile at high speed. Bluetooth not securable. The files can be transferred to the mobile at low speed.

At final, performance analysis in terms of execution speed in GPRS seemed very good efficient manner.

Table 1:- Time variations between Bluetooth and GPRS (Motorola-Motorola)

Mobiles	Files	Capacity	distance	Bluetooth	GPRS
Motorola-Motorola	Voice call	163kb	1.5 meters	5	3
	Text	3kb	1.5 meters	4	2
	Image	11kb	1.5 meters	3	2
Motorola-Motorola	Voice call	163kb	5 meters	9	5
	Text	3kb	5 meters	5	2
	Image	11kb	5 meters	3	1

Motorola-Motorola	Voice call	163kb	8 meters	13	8
	Text	3kb	8 meters	7	3
	Image	11kb	8 meters	3	0.5

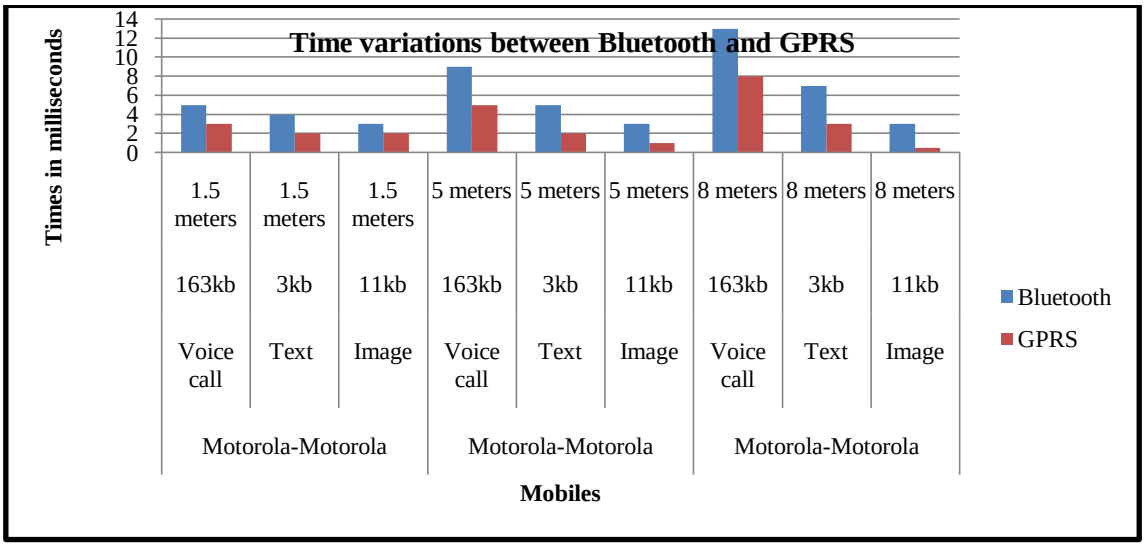

Fig:2 Time variations between Bluetooth and GPRS (Motorola-Motorola)

Table 2:- Time variations between Bluetooth and GPRS (Sony-Sony)

Mobiles	Files	Capacity	distance	Bluetooth	GPRS
Sony-Sony	Voice call	163kb	1.5 meters	6	4
	Text	3kb	1.5 meters	5	2
	Image	11kb	1.5 meters	3	2
Sony-Sony	Voice call	163kb	5 meters	11	8
	Text	3kb	5 meters	6	2
	Image	11kb	5 meters	3	0.3
Sony-Sony	Voice call	163kb	8 meters	14	10
	Text	3kb	8 meters	8	3
	Image	21kb	8 meters	3	0.3

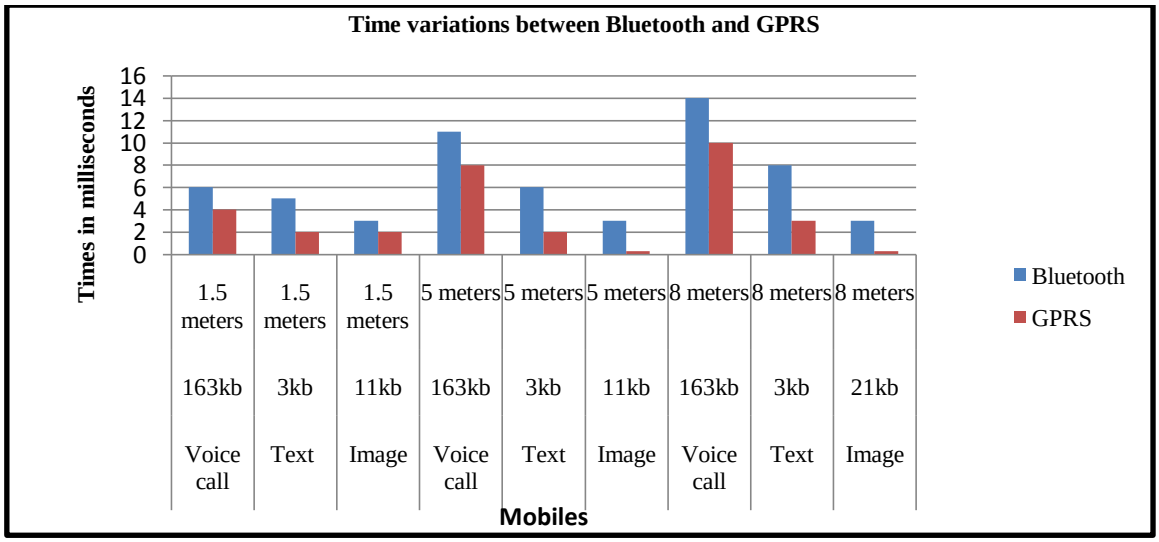

Fig:3 Time variations between Bluetooth and GPRS (Sony-Sony)

Table 3:- Time variations between Bluetooth and GPRS (Sony-Nokia)

Mobiles	Files	Capacity	distance	Bluetooth	GPRS
Sony-Nokia	Voice call	163kb	1.5 meters	6	3
	Text	3kb	1.5 meters	5	2
	Image	11kb	1.5 meters	5	3
Sony-Nokia	Voice call	163kb	5 meters	10	7

	Text	3kb	5 meters	5	3
	Image	11kb	5 meters	3	0.3
Sony-Nokia	Voice call	163kb	8 meters	12	8
	Text	3kb	8 meters	7	2
	Image	11kb	8 meters	3	0.2

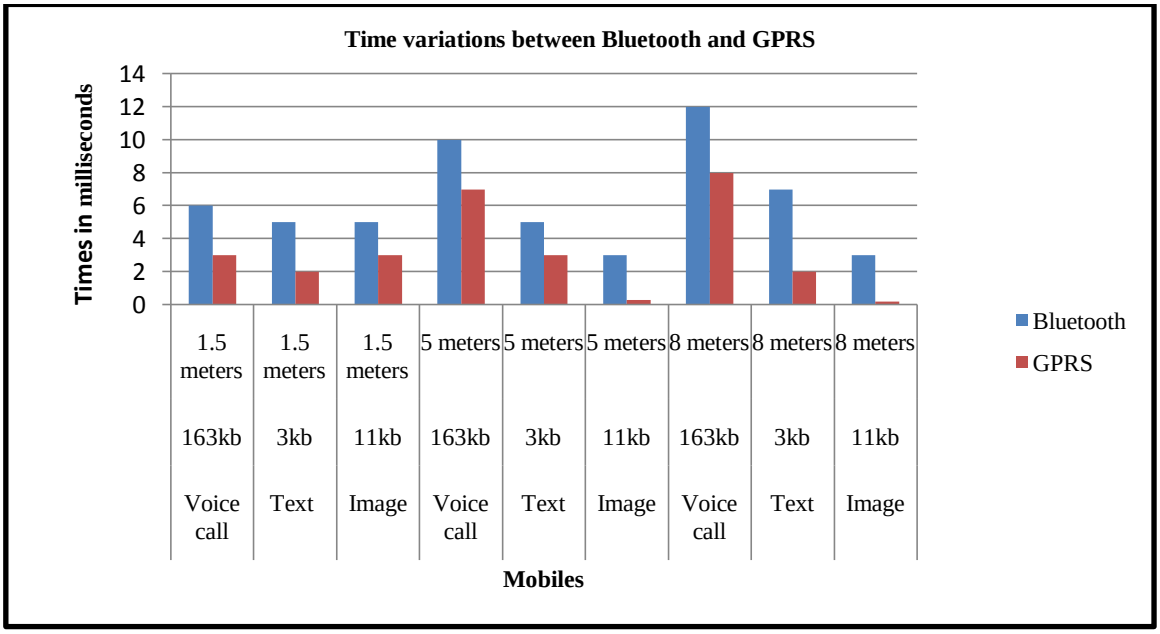

Fig:4 Time variations between Bluetooth and GPRS (Sony-Sony)

Table 4: Time variations between Bluetooth and GPRS (Nokia-Nokia)

Mobiles	Files	capacity	distance	Bluetooth	GPRS
Nokia-Nokia	Voice call	163kb	1.5 meters	7	4
	Text	3kb	1.5 meters	5	2
	Image	11kb	1.5 meters	4	2
Nokia-Nokia	Voice call	163kb	5 meters	10	8
	Text	3kb	5 meters	6	2
	Image	11kb	5 meters	4	2
Nokia-Nokia	Voice call	163kb	8 meters	12	8
	Text	3kb	8 meters	5	2
	Image	11kb	8 meters	3	0.5

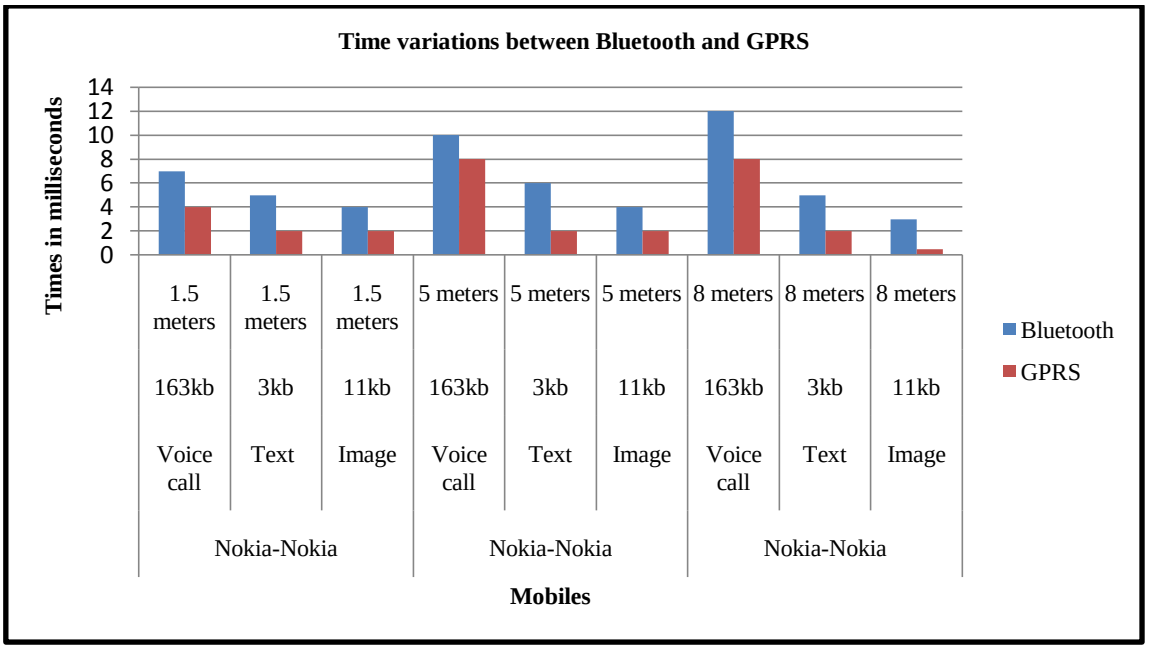

Fig:5 Time variations between Bluetooth and GPRS (Nokia-Nokia)

V. COMPARATIVE STUDY ON BLUETOOTH-GPRS TECHNOLOGIES

Bluetooth and General Packet Radio Service (GPRS) are used widely today to make devices on the move Internet accessible. Bluetooth is a low-range wireless technology that can be made a part of almost any device due to its low cost and power consumption; GPRS offers always-on connectivity to the Internet. Bluetooth and GPRS can provide standalone network connectivity to your PDA or laptop. Bluetooth roaming enables continuous connectivity when you move your device from one floor of your building to another, and GPRS roaming preserves your Internet connection when you are on the road and move from one service provider's area to another.

Table -5 Comparisons between the Bluetooth and GPRS Technologies.

	Bluetooth	**GPRS**
Communications medium	RF Waves	Mobile communication
Typical range	10-100 meters	Megabyte of traffic transferred.
Size of network	2-8 devices	Multiple networking
Direct-of-sight requirement	NO	Yes
Maximum data rate	3 Mb/s	56 up to 114 k bits.
Real time two-way links	Yes	Multi-way links
Power consumption	Low	High
Component cost	Low	High
Authentication, authorization and encryption.	Yes	High

VI. CONCLUSION

The maximum speed of a GPRS connection offered in 2003 was similar to a modem connection in an analog wire telephone network, about 32 to 40 kbit/s, depend upon the phone used. Latency is very high; a round-trip ping is typically about 600 to 700 ms and often reaches 1s. GPRS is typically prioritized lower than speech, and thus the quality of connection varies greatly. Bluetooth are wireless RF communication systems using mainly Antennas, there is always a great possibility that their transmissions could be jammed, deliberately intercepted, or false/altered information would be passed to the network members.

REFERENCES

[1] UMTS Security Architecture (USECA)
[2] General Packet Radio Service (GPRS): Architecture, Protocols and Air Interface. http://zzz.com.ru/art61.html.
[3] Authentication and Security in GPRS Environment: An Overview, Lasse Huovinen, Helsinki University of Technology.
[4] GPRS Security – Security Remote Connections over GPRS, Jussi Rautpalo, Helsinki University of Technology.
[5] GSM and GPRS Security, Chengyuan Peng, Helsinki University of Technology,GPRS System Survey, Student Text, Ericsson GPRS Security Solutions.
[6] IEEE Standards Association, IEEE 802.11 specifications. IEEE Standards.Association,technical,specifications,1999-2004. http://standards.ieee.org/getieee802/802.11.html.
[7] Bluetooth SIG, The Official Bluetooth Membership Site { About the Bluetooth, SIG, homepage, 2005. https: // www. bluetooth.org / foundry / sitecontent/document/About the SIG.
[8] Davis, Peter T. and McGuffin, Craig R. 1995. Wireless Local Area Networks: Technology, Issues, and Strategies. New York: McGraw-Hill.
[9] Morrow, Robert. Connecting With a Bluetooth Piconet, Wireless System Design, Bluetooth Winter Issue 2001.
[10] Behrouz A. Ferouzan, Data Communication and Networking-TATA McGraw-Hill Publication.
[11] Hae-Duck J. Jeong et al, Utilizing a Bluetooth remote lock system for a smartphone, Pervasive and Mobile Computing, Volume 24, December 2015, Pages 150-165.
[12] Ashish Bhaskar, Edward Chung, Fundamental understanding on the use of Bluetooth scanner as a complementary transport data, Transportation Research Part C: Emerging Technologies, Volume 37, December 2013, Pages 42-72.
[13] www.palowireless.com/i802_16/WiMAX.asp
[14] www.tutorial reports.com.
[15] www.bluetooth.com, Specification of the Bluetooth Version 4.0, April 2009.

