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**STUDY CASE: PRESENT AND FUTURE MOBILE COMMUNICATION  
SYSTEMS**


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“I hereby declared that this report is a result of my own research idea except for the work that has been cited clearly in the reference.”

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## DEDICATION

This study could never have been completed without the help and support of many individuals. I wish to express my most sincere gratitude to all of the people who helped me to make this project successful especially to my supervisor, En. A. Nasoruddin Bin Mohammad, for providing the excellent guidance, concern and informative discussions regarding to my studies. Finally to my beloved family members for their unconditional love, support and patience and at last my friends who give me support and opinion to make my studies possible. Also to all the people who involve directly or indirectly in my way along to accomplish this task.

## ABSTRACT

The future mobile communication systems are expected to provide a wide variety of services, from high-quality voice to high-definition videos, through high-data rate wireless channels anywhere in the world. It will include not only cellular phones, but also many new types of communication systems broadband wireless access systems and intelligent transport systems. Key to the future generations of mobile communications are multimedia communications, wireless access to broadband fixed networks and seamless roaming among different systems. However, this research discusses future generation mobile communication systems. The purpose of this study is to study about the past, present and future mobile communication system. Here is also a comparison among present and future mobile communication system. The first generation communication system is found in 1970s, second generation in 1980s, third generation in 21st centuries and the fourth generation is expected in 2010. According to the fact the first generation is the past, second generation is present, third generation is the near future and the fourth generation is future. The first generation system was an analog technology based on the concept called Frequency Division Multiple Access (FDMA) where each user is given a frequency band to communicate. Second generation mobile communication is based on a concept Time Division Multiple Access (TDMA). Third generation mobile system will support other than voice, video telephony, video games, multimedia net-browsing, network games, email, downloading, all this while moving at a speed of 200 Km/hr. Third generation system is based on Code Division Multiple Access (CDMA). The fourth generation cellular systems should not only be high-speed but also high-capacity, with low bit cost and the ability to support the services of the 2010s. From these studies had found about frequency allocation, channel spacing, spectrum requirement, type of handoff, switching technique, frequency planning and the architecture of all generation communications systems. Also the future application, the benefits of future systems and the differences among the systems.

## ABSTRAK

Sistem komunikasi mudah alih pada masa hadapan dijangka menawarkan perkhidmatan yang mengandungi kualiti suara yang tinggi ke prestasi kualiti video yang tinggi dengan kadar data tinggi tanpa penggunaan wayar di serata dunia. Ia tidak hanya akan melibatkan telefon mudah alih tetapi juga beberapa jenis komunikasi yang baru seperti sistem lebar jalur tanpa wayar dan sistem pengangkutan bijaksana. Nadi kepada sistem komunikasi mudah alih masa hadapan adalah komunikasi multimedia, lebar jalur jaringan tanpa wayar dan pencantuman perantauan di kalangan pelbagai sistem. Walau bagaimanapun, kajian ini menerangkan tentang sistem komunikasi mudah alih masa hadapan. Tujuan penyelidikan ini adalah untuk mengkaji tentang sistem komunikasi pada masa lampau, semasa dan kelak. Perbandingan juga dapat dibuat di antara sistem komunikasi semasa dan kelak. Sistem komunikasi generasi pertama mula diaplikasikan pada tahun 1970an, generasi kedua pada 1980an, generasi ketiga pada abad ke 21 dan generasi keempat dijangka pada tahun 2010. Sistem komunikasi generasi pertama adalah berdasarkan teknologi analog dengan menggunakan konsep *Frequency Division Multiple Access* (FDMA) di mana setiap pengguna diperuntukkan lingkaran frekuensi untuk berkomunikasi. Sistem komunikasi generasi kedua berdasarkan konsep *Time Division Multiple Access* (TDMA). Sistem komunikasi generasi ketiga pula menggunakan konsep *Code Division Multiple Access* (CDMA) yang menawarkan bukan sekadar komunikasi suara sahaja, tetapi permainan video, video teleponi, penghayatan multimedia, permainan jaringan, email dan muat turun dalam keadaan di mana pengguna bergerak dengan kelajuan 200 Km/j. Sistem komunikasi generasi keempat bukan sekadar laju pengolahan data tetapi juga menawarkan kapasiti yang tinggi dengan kos yang rendah. Kajian ini merangkumi peruntukkan frekuensi, ruang saluran, permintaan spektrum, kepelbagaian handoff, teknik pensuisan, perancangan frekuensi dan rekabentuk kesemua sistem komunikasi. Selain itu, aplikasi pada masa hadapan serta kebaikan pada sistem komunikasi generasi akan datang dan perbezaan antara generasi telah dikenalpasti.



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## LIST OF ABBREVIATIONS

1G	-	First Generation
2G	-	Second Generation
3G	-	Third Generation
4G	-	Fourth Generation
AC	-	Access Channel
AM	-	Amplitude Modulation
AMPS	-	Amplitude Mobile Phone System
AUC	-	Authentication Center
BS	-	Base Station
BSC	-	Base Station Controller
BSFK	-	Binary Frequency Shift Keying

BTS	-	Base Transceiver Station
CAI	-	Common Air Interface
CC	-	Call Controls
CDMA	-	Code Division Multiple Access
CDPD	-	Cellular Digital Packet Data
CEPT	-	Conference of European Posts and Telegraphs
CN	-	Core Network
DAMPS	-	Digital Amplitude Mobile Phone System
DN	-	Directory Number
EDGE	-	Enhanced Data Rates for GSM Evolution
EIA	-	Electronic Industry Association
EIR	-	Equipment Identify Register
EMS	-	Electronic Messaging System
ESN	-	Electronic Serial Number
ETSI	-	European Telecommunications Standard Institute
FCC	-	Forward Control Channel

FDD	-	Frequency Division Duplex
FDMA	-	Frequency Division Multiple Access
FM	-	Frequency Radio
FVC	-	Forward Voice Channel
GPRS	-	General Packet Radio Service
GSM	-	Global System for Mobile Communication
HLR	-	Home Location Register
IDEN	-	Integrated Digital Enhanced Network
IMEI	-	International Mobile Station Equipment Identify
IMSI	-	International Mobile Subscriber Identity
ISDN	-	Integrated Services Digital Network
IWF	-	Interworking Function
JTACS	-	Japanese Total Access Communication System
MIN	-	Mobile Identification Number
MPE	-	Multipulse Excited

MS	-	Mobile Station
MSC	-	Mobile Switching Center
MTS	-	Mobile Telephone System
MTSO	-	Mobile Telephone Switching Office
MTX	-	Mobile Telephone Exchange
NAMPS	-	Narrow Band Amplitude Mobile Phone System
NMT	-	Nordic Mobile Telephone
PCS	-	Personal Communication System
PDC	-	Pacific Digital Cellular
PDN	-	Public Data Network
PHS	-	Personal Handyphone System
PSTN	-	Public Switched Telephone Network
RCC	-	Reverse Control Channel
RF	-	Radio Frequency
RNC	-	Radio Network Cellular
SCM	-	Station Class Mark

SIM	-	Subscriber Identity Module
SMS	-	Short Messaging Service
SS7	-	Signaling System No.7
TA	-	Traffic Area
TACS	-	Total Access Communication Service
TC	-	Transmission Convergence or Transactions Capabilities
TDD	-	Time Division Duplex
TDMA	-	Time Division Multiple Access
TIA	-	Telecommunication Industry Association
UE	-	User Equipment
UMTS	-	Universal Mobile Telecommunications System
VLR	-	Visitor Location Register
WCDMA	-	Wide-Band Code Division Multiple Access



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## CHAPTER I

### INTRODUCTION

#### 1.1 INTRODUCTION

**“Mr. Watson, come here: I want you.”**

*Alexander Graham Bell (1847-1922).*

*First intelligent words transmitted by telephone (March 10, 1876). Bell had just spilled acid on his clothes and was calling for his assistant, Thomas Watson.*

Pickup any newspaper or general magazine today, we are sure of finding an article some where relating to mobile communication. This is because of the simple reason that it is virtually affecting everyone’s life in one way or other. Let us try to understand what this “Mobile Communication” all about is: what is its past, present and future and how it is going change in future, the way we communicate today.

Mobile communication in its simplest sense means ‘Communication while in move’. The technologies which enables us to communicate with the rest of the world while we are in move is called mobile communication and this is why it must be wireless unlike conventional telephones.

When we talk of wireless technologies, it involves all types and forms of wireless mode of communication. However, here we will just focus mainly on mobile communication and try to understand how mobile communication is going to change the very concept of communications.

The first generation of mobile cellular telecommunications systems appeared in the 1980s. The capacity of these early networks was much lower than that of cellular networks and the support for mobility was weaker. In mobile cellular network the coverage area is divided into small cells, and thus the same frequencies can be used several times in the network without any interface. This increases the system capacity. There was no dominant standard but several competitions among most successful standards were Nordic Mobile Telephone, Total Access Communications System and Advanced Mobile Phone Service.

The second generation mobile cellular systems use digital radio transmission. Thus, the boundary line between first and second generation systems is obvious. The second generation networks have much higher capacity than the first generation systems. There are four main standards for second generation systems is Global Systems for Mobile Communications, Digital Advanced Mobile Phone Service, IS-95, Personal Digital Cellular. GSM is by far the most successful and widely used second generation system.

In third generation communication systems, the two main standards are Universal Mobile Telecommunications System and Wideband Code Division Multiple

Access. The promises of the third generation mobile phones are fast internet surfing advanced value-added services and video telephony. Third generation technologies improves second generation systems in one main way. It is a move towards packet switching from circuit switching. While third generation hasn't quite arrived, there was already thinking about fourth generation technology. Fourth generation is intended to provide high speed, high capacity and low cost per bit. Most probably the fourth generation network would be a network which is combination of different technologies to provide high data rates up to 20 Mbps.

## 1.2 OBJECTIVE

- 1) To study about the past, present and future communication system.
- 2) To study about the advantage of the future communication system.
- 3) To do comparison about present and future communication system.
- 4) To study future system applications