

Personal communication system towards (3Gpp)

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الملخص العربي:

تطور الاتصالات كان ملحوظاً خاصة في مجال المنظومة الخلوية. هذه الورقة تناقش العوامل الرئيسية ما بين أنظمة الجيل الثاني بالمنظومة الخلوية والذي يتمثل في النظام الأوربي والأمريكي والياباني والمقارنة بينهم، كما توضح الأسباب والمشاكل التي عانت منها أنظمة الجيل الثاني وصولاً إلى طرح الجيل الثالث للمنظومة الخلوية. حيث أن الجيل الثالث صمم من أجل كفاءة الاتصال العالية الجودة، في الصورة، والصوت، والمعلومة.

1- Abstract:

The popularity of mobile phone service has grown so dramatically in every country, where available that it is becoming almost difficult to handle the incoming subscribers worldwide. In recent years, the revaluation in the personal communications service (PCN) is touring heads in the telecommunications word.

This paper discusses the various aspects between second generation digital mobile systems world wide and, address, how the 3 rd Generation partnership project (3Gpp).

will satisfy the needs for personal communication system. The 3GPP systems are designed for multimedia communication: with them personal –to-person communication can be enhanced with high quality images, video and high data rates.

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2- Introduction:

In recent years, the popularity of personal communications services has increased dramatically and the revolution in the (PCS) is increasing so fast in the telecommunication world-wide. The rapid increase in the (PCS) market has created problems, especially the availability of frequency allocation, interference, quality, security, and complexity, which could prevent these services from achieving their full potential.

Cellular radio systems can be classified as a first generation mobile telephone network. There are at least six incompatible analogue cellular standards world-wide, such as Nordic mobile Telephone system (NMTS), Total access communication system (TACS), Advanced mobile phone system (AMPS)...etc [1,2,6]. second generation mobile Telephones considered as digital standards. The main systems at present are: Globasystem for mobile communication (GSM), Japanese digital cellular (JDC) and American Digital cellular (ADC).

The paper addresses and clarities some of the specific differences between the present cellular digital systems and the third generation mobile system, how will solve the main mentioned problem, which the present and past systems suffer from. PCS has been based on a hybrid use of two classes of wireless technology, namely, low density, high power wide-area (macro-cellular) systems and high density, low power, small-area (micro telephones).

3- Digital Standard:

Second generation system world wide have reached the final stages of design. These digital systems were chosen to the problems which the first generation analogue systems suffered from. The main competing technologies are time division multiple access (TDMA), frequency division multiple access (FDMA), and code division multiple access (CDMA). TDMA is the chosen technology for the second generation systems. There are three incompatible digital cellular standards world-wide. The digital standard which been developed in Europe is (GSM) global system for mobile communication, specified by the Europe telecommunications standards institute (ETSI). The North American digital cellular (ADC) specified by the V.S telecommunication industry association (TIA), and the Japanese digital cellular (JDC) specified by the ministry of post and telegraph (MPT) [6].

4- American Digital Cellular (ADC):

There is a basic single standard in North America, it has been decided that the first digital mobile system should be capable of operating on both analogue and digital voice channel [2,3]. It has proposed that the digital system will use

the same band as the analogue standard. The system lies in the narrow bandwidth of 30KHZ, each burst is 6.7ms and for full rate users the TDMA frame length is 20ms. The gross rate is 48.6kcbps, the modulation scheme is differentially encoded QPSK. The ADC uses the 800MHZ band, the uplink band is 824-849MHZ and downlink is 869-894MHZ, the duplex separation is 869-894MHZ, the duplex separation is 45 MHZ [3].

5- Japanese Digital Cellular (JDC):

JDC is a unified dual model digital radio system, this system was due to go in to operation in the spring of 1993. The basic access technology for the system as in GSM and ADC, is NB-TDMA. The main difference between JDC and other systems lies in the narrower channel bandwidth of 25KHZ compared to the 30KHZ band with selected for the ADC system. The same type of modulation, DQPSK, each burst is 7ms and for full rate user the frame to be 21ms. The gross bit rate has to be lower than the ADC system (48.6Kbps) and has been chosen to be 42.6kbps [5].

The Jdc user the 800MHZ band together with the newly allocated 1.5GHZ band to increase system capacity. The operating frequency in the 800MHZ band occupies 2, the uplink (mobile –to-base) band is 870-885 MHZ and the downlink (base –to-mobile) band is 925-940MHZ, with a duplex separation of 55MHZ.

6- Global System for Mobile Communication (GSM):

GSM is the European standard for digital cellular system operating in the 900 MHZ band i.e.124 radio carriers in the conference of European postal and Telecommunication Administration (CEPT) paired band. This technology was developed out of the need for increased service capacity due to the analogue system, limited growth [5, 8].

This technology offers international roaming, high quality speech, and increased security. The operating frequency in the 900MHZ band, the uplink band is 890-915MHZ and the downlink is, 935-960MHZ, the duplex separation of 45 MHZ. Each channel occupies 200 kHz, each channel operates with speech coding of 13kbps and each radio carrier is time division multiplexed with basic frame requirements for high quality, high capacity [8, 9].

7- Third Generation partner ship project (3GPP):

7.1- Standardization.

Third generation systems are designed for multimedia communication: with them person-to-person communication can be enhanced with high quality voice,

image and video, and access to information and services on public and private networks will be enhanced by the higher data rates [4, 7].

In the standardization forums, wide band code division multiple Access(WCDMA) has emerged as the most widely adapted third generation air interface. Its specification has been created in 3GPP(the 3rd Generation partnership project) which is the joint standardization project of the standardization bodies from world with range such as, Europe, Japan, Korea, the USA and china. Within 3GPP, WCDMA is called UTRA (Universal Terrestrial Radio Access) FDD (Frequency Division Duplex), the name WCDMA being used to cover both FDD AND TDD operations [4, 7].

7.2- Spectrum Allocation.

Work to develop third generation mobile systems started when the world Administrative radio conference (WARC) of the ITU (international telecommunication union), at its 1992 meeting; in this meeting, identified the frequencies around 2GHZ, based on CDMA [9].

The spectrum allocation in Europe, Japan, Korea and the USA is shown in Table (1). In Europe and in most of Asia the IMT-2000 band of 2x60MHZ (1920-1980 plus 2110-2170 MHZ) will be available of the TDD use in the 1900-1920MHZ and 2020-2025MHZ bands [9]. FDD systems use different frequency bands for uplink and for downlink, separated by the duplex distance, while TDD systems utilize the same frequency for both uplink and downlink [4, 5]. This can be seen in table (1).

Table (1) the uplink and downlink frequencies.

	Uplink	Downlink
GSM 1800	1710-1785	1805-1880
UMTS-FDD	1920-1980	2110-2170
UMTS-TDD	1900-1920	2010-2025
Americas PCS	1850-1910	1930-1990

The first IMT2000 licences were granted in Finland in March 1999, and followed by Spain in March 2000, Sweden granted the licenses in December 2000. However, in other countries, such as the UK, Germany and Italy, an auction similar was conducted [7, 9]. Table (2) shows the UMTS operators used in some countries.

Table (2) the number of UMTS operators used in some countries

country	No of operators	No of FDD carrier per operator	No of TDD
Finland	4	3	1
Japan	3	3	0
Spain	4	3	1
UK	5	2-3	0-1
Germany	6	2	0-1
Netherlands	5	2	0-1
Italy	5	2	1
Austria	5	2	0-2

It is worth noting that some of the bands listed, especially below 2GHZ, are partly used with system like GSM, the main new spectrum in Europe for IMT-2000 will be 2500-2690 MHz [9]. In the USA, the 1.7/2.1 GHZ spectrum will be for new band.

8- Conclusion:

This paper addresses and clarifies the second generation cellular system worldwide: it can be concluded that the 3GPP system described as the target for mobile communication, it will evolve smoothly into era of personal communications systems. With the enhanced voice, data, image and very high system capacity. Note, however:

- CDMA cellular system can accommodate more subscribers at one time than other systems.
- The concept of CDMA cellular system is being applied by assigning each mobile telephone a unique pseudo-noise code for better security.
- The technology of TDMA and CDMA cellular system promises to significantly improve the capacity than other systems.
- JDC considered as better spectrum efficiency than ADC and GSM.
- Second generation cellular systems based on digital radio technology were being developed and deployed worldwide.
- The 3GPP system are now being developed and deployed for multimedia communications.

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