

## **4TH GENERATION OF THE MOBILE COMMUNICATION**

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4G - the perspective (fourth) generation of the mobile communication characterized in the high speed of data transmission and raised quality of a voice communication. It is accepted to carry the perspective technologies to the fourth generation, allowing to carry out data transmission with the speed exceeding 100 Mbit/sec.

Nowadays in many technically developed countries 3G and 3,5G technologies are still used. However, many countries aspire to pass to networks 4G, "having jumped" 3G. This standard of network is on a construction in such countries as: USA, Japan, Korea, China and Nicaragua. On December, 14th, 2009 Swedish telecommunication company "TeliaSonera" declared, start of the first-ever commercial network of the fourth generation of standard LTE in Stockholm and Oslo. The first city in Russia, that supports standard LTE is Kazan.

From the technical point of view, the basic difference of networks of the fourth generation from the third, consists that the technology 4G is completely based on reports of a packet transmission of data while 3G unites transfer of the vocal traffic and "packages". For "voice" in 4G technology VoIP is provided, allowing to make vocal calls, applying fast "package" data transmission.

The international union of telecommunication and 4G Alliance define technology 4G as the following stage of development of wireless telecommunication which will allow to reach speeds of data transmission to 1 Gbit/sec in the conditions of stationary application and to 100 Mbit/sec in the conditions of data exchange with mobile devices of access. The technology 4G, in particular, will allow subscribers to look multichannel teletranslations of high clearness, to make cheap long-distance phone calls.

For this communication system is used the range of centimetric waves (3600MHz), not so well passing through buildings, and 3G system is used decimeter waves. Centimetric waves at high levels of a signal can have biological influence, probably therefore the standard 4G is not accepted.

For the first time about networks of 4th generation (4G) has started talking known American Agency of perspective research defensive projects (Defense Advanced Research Projects Agency, DARPA), the number of which numerous workings out includes the Internet - without what the life of the modern person is practically impossible. Idea the Japanese company NTT DoCoMo, rendering at once has picked up cellular communication services, and began to advance it strenuously. Soon in 50 kilometres from Tokyo, in a cosy and picturesque place on seacoast, research centre DoCoMo with staff in 1200 persons (6th part of all employees of the company) has settled down. Simultaneously in the annual budget of firm have put in pawn expenses on the new project, the sum considerable - more than billion dollars, about 3 % from the general turn of the operator. Only one it shows, how much seriously Japanese have concerned a subject.

Yota — a provider of fast wireless Mobile WiMAX (4G) Internet services. One more feature the Yota, is possibility to use the high-speed and uninterrupted Internet in the car, at speed to 120 km/hour. You can freely move in cover zone Yota, remaining on communication even in movement! Speed of access allows to listen to music and to look online video without delays, quickly to download "heavy" files.

This process began with the designs in the 1970s that have become known as 1G. The earliest systems were implemented based on analog technology and the basic cellular structure of mobile communication. Many fundamental problems were solved by these early systems. Numerous incompatible analog systems were placed in service around the world during the 1980s. The 2G (second generation) systems designed in the 1980s were still used mainly for voice applications but were based on digital technology, including digital signal processing techniques. These 2G systems provided circuit-switched data communication services at a low speed. During the 1990s, two organizations worked to define the next, or 3G, mobile system, which would eliminate previous incompatibilities and become a truly global system. The 3G system would have higher quality voice channels.

Table 1: Mobile Communication History and Status

Property	1G	2G	2.5G	3G	4G
<b>Starting Time</b>	1985	1992	1995	2002	2010-2012
<b>Driven Technique</b>	Analog Signal Processing	Digital Signal Processing	Packet Switching	Intelligent Signal Processing	Intelligent Software Auto Configuration
<b>Representative Standard</b>	AMPS, TACS, NMT	GSM, TDMA	GPRS, I-Mode, HSCSD, EDGE	IMT-2000 (UMTS, WCDMA, CDMA2000)	OFDM, UWB
<b>Radio Frequency (Hz)</b>	400M-800M	800M-900M, 1800M-1900M		2G	3G-5G
<b>Bandwidth (bps)</b>	2.4K-30K	9.6K-14.4K	171K-384K	2M-5M	10M-20M
<b>Multi-address Technique</b>	FDMA	TDMA, CDMA			FDMA, TDMA, CDMA
<b>Cellular Coverage</b>	Large area	Medium area		Small area	Mimi area
<b>Core Networks</b>	Telecom networks			Telecom Networks, Some IP networks	All-IP networks
<b>Service Type</b>	Voice, Mono-service, Person-to-person	Voice, SMS, Mono-media, Person-to-person	Data service	Voice, Data, Some Multimedia, Person-to-machine	Multimedia, Machine-to-machine

Symbols:

AMPS = advanced mobile phone service

CDMA = code division multiple access

EDGE = enhanced data for global evolution

FDMA = frequency division multiple access

GPRS = general packet radio system

GSM = global system for mobile

NMT = Nordic mobile telephone

PDC = personal digital cellular

PSTN = public switched telephone network

TACS = total access communications system

TDMA = time division multiple access

WCDMA = wideband CDMA

HSCSD= High-Speed Circuit-Switched Data

UMTS= Universal Mobile Telecommunications System

OFDM= Orthogonal Frequency Division Multiplexing

UWB= Ultra Wideband

FDMA= Frequency-Division Multiple Access

#### Problems

Experts notice, that on a way of introduction to operation of networks 4G there is a number of obstacles. First, in the market there are no user's devices. Such phones if existed, would consume too much energy and could not work long on accumulators (now similar problems are and at 3G-devices). Secondly, high-speed access to the Internet and video services will demand big on the size and better displays, than what are established in phones now. But the main problem nevertheless has essentially other character. The matter is that capital investments in expansion of networks of the fourth generation should be much more solid, than in 2G and even in 3G. Meanwhile, investors including venture while are very cautious - they are not assured of due economic return from 4G-projects. Besides, some manufacturers suggest to "cross" 4G and wireless broadband networks. In different situations the user will have possibility to choose the most suitable ways of connection. But in any case in the basic variant of use 4G technology Wi-Fi will receive the terrible competitor.

#### Content for 4G

New possibilities in transfer of huge volumes of data which are given by technologies of group 4G, already now force suppliers of a mobile content to reflect on expansion of the business. If today the basic goods in this market are melodies and unpretentious games occurrence 4G will make much more actual mobile TV, video-on-demand (VOD - «video on demand»), the "advanced" games, etc. Besides, thanking 4G become possible mobile videoconferences (video chats) and mobile peer-to-peer-networks. Under forecasts of research company Screen Digest, by 2011 at least 140 million subscribers of services of mobile TV all over the world will be. The annual cumulative income of this market in five years will reach an indicator in 4,7 billion euro. Analysts believe, that potentially services of mobile TV can make much bigger profit, than games and music for cellular devices.