Fifth Generation Mobile Technology: A New Era of Communication

Physics

KEYWORDS : History of Technology, 4G, 5G, Wireless 5G, Functional Architecture

M R Chaudhari — Physics, Department, Sheth M. N. Science College, Rajamahal Road, College Campus, Patan-384265

D D Joshi — Physics, Department, Sheth M. N. Science College, Rajamahal Road, College Campus, Patan-384265

ABSTRACT

In this paper authors gives brief ideas of mobile technology. Authors also give brief history of mobile revolution start from 0G to 4G. Technology used in 4G described clearly by the authors. Concept of 5G technology discussed in the recent papers. Authors also described application of 4G and 5G technology. History of previous technology also included in current paper.

Introduction

Mobile wireless industry has started its technology creation, revolution and evolution since early 1970s. In the past few decades, mobile wireless technologies have experience 4 or 5 generations of technology revolution and evolution, namely from 0G to 4G. The cellular concept was introduced in 5G Technology stands for 5th Generation Mobile technology. 5G technology has changed the means to use cell phones within very high bandwidth. F. Boccard study lots of new research directions will lead to fundamental changes in the design of future fifth generation (5G) cellular networks[1]. C. Felita dicusses a framework answering the main question: In which technological area one may contribute to the innovation? The answer shall benefit countries, firms, universities and research institute which intends to contribute to the formulation of official 5G standard. First, we reviewed the key technologies of 5th generation mobile communication technology (5G). Mudit Ratana Bhalla discuss review the various generations of mobile wireless technology, their portals, performance, advantages and disadvantages of one generation over other[3]. Akhilesh Kumar Pachauri talks about 5G technology going to be a new mobile revolution in mobile market. Through 5G technology now you can use worldwide cellular phones and this technology also strike the china mobile market and a user being proficient to get access to Germany phone as a local phone[4].

History of Mobile Technology

The telecommunication service in World had a great leap within a last few year. 6 billion people own mobile phones so we are going to analyze the various generations of cellular systems as studied in the evolution of mobile communications from 1st generation to 3rd generation.

Table – 1 History of Mobile technology

Generation	Speed	Technology	Time period
1G	14.4 Kbps (peak)	AMPS,NMT,TACS	1970-1980
2G	9.6/14.4 Kbps	TDMA,CDMA	1990-2000
2.5G	171.2 Kbps(peak) 20-40 Kbps	GPRS	2001-2004
3G	3.1 Mbps (peak) 500-700 Kbps	CDMA 2000 (1xRTT, EVDO) UMTS, EDGE	2004-2016

4G Technology

The 4G system was originally envisioned by the Defense Advanced Research Projects Agency (DARPA). The DARPA selected the distributed architecture and end-to-end Internet protocol (IP), and believed at an early stage in peer-to-peer networking in which every mobile device would be both a transceiver and a router for other devices in the network, eliminating the spoke-and-hub weakness of 2G and 3G cellular systems. In 4G systems, the circuit-switched infrastructure is abandoned and only a packet-switched network is provided, while 2.5G and 3G systems require both packet-switched and circuit-switched network nodes, i.e. two infrastructures in parallel. This means that in 4G, traditional voice calls are replaced by IP telephony.

Key Features of Fourth Generation Technology

- Faster and more reliable
- 100 Mb/s
- Lower cost than previous generations
- Multi-standard wireless system
- Bluetooth, Wired, Wireless
- Ad Hoc Networking
- IPv6 Core
- OFDM used instead of CDMA
- Potentially IEEE standard 802.11n

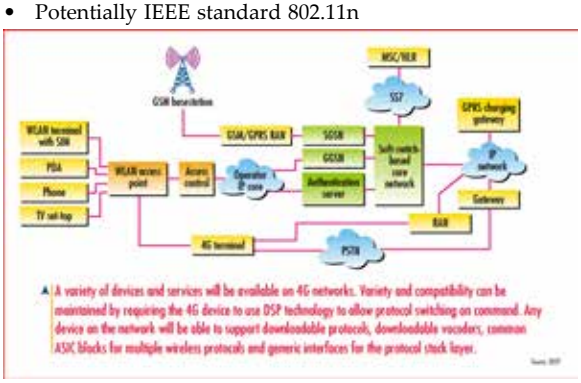

Figure – 1 Variety of Devices and Services available on 4G Network

The infrastructure and the terminals of 4G will have almost all the standards from 2G to 4G implemented. The infrastructure for 4G will be only packet-based (all-IP). But there is suggestion to have an open Internet platform. The 4G technology en suite with 802.16e mobile version of WiMax (also known as WiBro), and HC-SDMA, Adoptive Modulation and coding (AMC), Adaptive Hybrid ARQ ,MIMO AND OFDM and Open distributed AdHoc Wireless Network .

Components used in 4G technology

1. OFDMA (Orthogonal Frequency Divisional Multiple Access)

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2. MIMO (Multi Input Multi Output)
3. IPv 6.0
4. SDR (Software Defined Ratio)
5. Smart Antennas

5G Technology

5G is a packet switched wireless system with wide area coverage and high throughput. 5G wireless uses OFDM and millimeter wireless that enables data rate of 20 mbps and frequency band of 2-8 GHz. 5G being developed to accommodate QoS rate requirements set by further development of existing 4G applications.

Standard Wireless 5G:

1. WiMAX formed to provide conformance and interop erability of the IEEE 802.16 standard. It aims to pro vide wireless data over long distance from point-to-point link to cellular mobile type access.
2. WiBRO a part of IEEE 802.16e in process to provide collaborative and generic mobile iMAX.
3. 3GPP LTE a project aims to improve the mobile phone standard to cope with future requirements.
4. 5GPP 2 UMB a project to improve the CDMA2000 mo bile phone standard for next generation applications.

Benefits of 5G:

1. High speed, high capacity, and low cost per bit.
2. Support interactive multimedia, voice, streaming vid eo, Internet, and other broadband services ,more effective and more attreactive ,Bi directional ,accurate traf fic statistics.
3. Global access, service portability, and scalable mobile services.
4. The high quality services of 5G technology based on Policy to avoid error.
5. 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000 connec tions.
6. 5G technology offer transporter class gateway with unparalleled consistency.
7. Through remote management offered by 5G technol ogy a user can get better and fast solution.
8. Flexible channel bandwidth between 5 and 20MHz, optionally up to 40MHz.
9. Data rate of at list 1Gb/s between any two points in the world.
10. Increase system spectral efficiency of up to 3bit/s/Hz/ cell in the downlink and 2.25bit/s/Hz/cell for indoor usage.

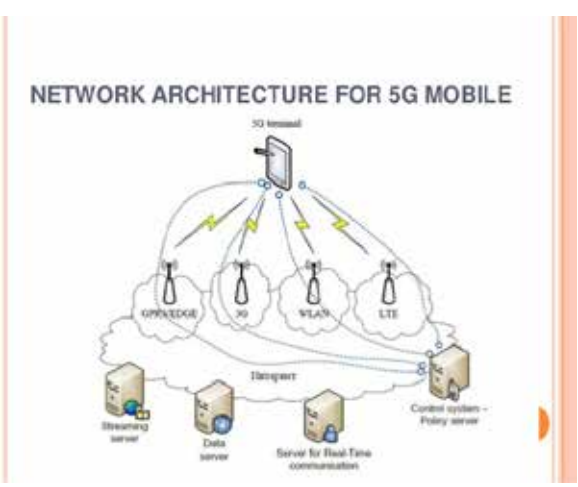

Figure – 2 Functional Architecture of 5G Network

Figure – 3 Networking model of 5G technology

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