An Evaluation of Different Network's Architecture Design

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ABSTRACT: Since the last few years there has been a phenomenal growth in the wireless industry. Widespread wireless technologies, increasing variety of user-friendly and multimedia-enabled terminals and wider availability of open source tools for content generation has lead encouraged user-centric networks resulting in a need for efficient network design. There has been a shift from fixed to mobile cellular telephony, resulting in Network Planning and Optimization related services coming in to sharp focus. Evolution of wireless access technology is about to reach its fifth generation and different with their features. Wireless access technology have formed different evolutionary path but with a common aim related to performance and efficiency. This paper has the perception of the different networks and its network Architecture separately and description of the comparative analysis of the different network's features.

KEYWORDS: Network, Architectures 1G, 2G, 3G, 4G and 5G
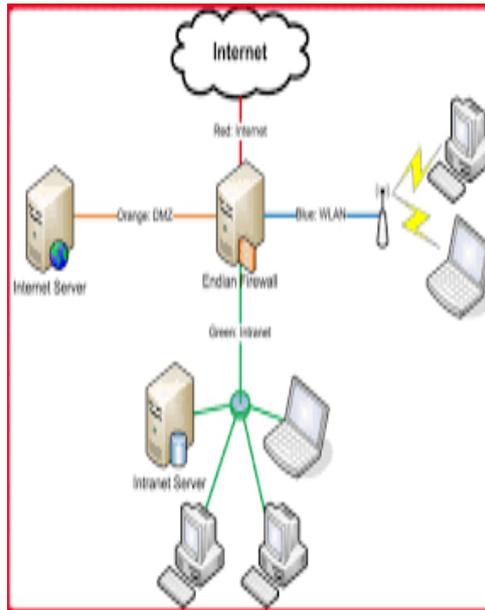
I. INTRODUCTION

The purpose of this paper to present different technology trends and generation of network and it's network architecture. The investigation of Mobile Generation and its features has been discussed. Mobile network have limited battery and resources e.g. network bandwidth, storage capacity. The main objective of this paper is to highlight and compare between 1G,2G,3G, 4G and 5G Mobile network. The issues in previous generation of mobile network have been discussed and finding of 3G and 4G Network highlighted. 3 rd generation technologies of Mobile network allow network operators to offer users a wider range of advanced services while attain greater network capacity through improve spectral efficiency. 3 rd generation makes use of wireless voice telephony, video calls, and broadband wireless data, all in one in mobile environment. 4G fourth generation of mobile network that is it is based on wireless technology standard. It is a descendant of 3 rd generation and 2 nd generation of mobile network. Mobile generation generally refers to change in the technology and nature of the service, the first was the move from 1981 analogue 1G to digital 2G transmission in 1992. 4G is essentially the extension in the 3G technology with more bandwidth and services offers in the 3G. The prospect from 4G technology is principally high quality audio/video streaming over end to end internet practice. The 5 th generation of mobile wireless network will be a extremely amazing communication system with no restraint. The 5G generation technology will be completely available in the market by 2020; the 5G is a revolution to 4G. 5G Mobile system must meet the requirements of increased rate and capacity needed ahead of 2020 and requirements on compact latency. 5G provides ideal real wireless or worldwide wireless web. The 5G comprise all advance features and it is inconceivable technology

II. NETWORK ARCHITECTURE:

1G TECHNOLOGY

1G (or **1-G**) refers to the first generation of wireless telephone technology (mobile telecommunications). These are the **analog**telecommunications standards that were introduced in the 1980s and continued until being replaced by 2G digital telecommunications .The main difference between the two mobile telephone systems (1G and 2G), is that the

by 1G networks are analog, while 2G networks are digital.1G refers the first generation of wireless telephone technology, mobile telecommunication which was first introduced in 1980s and completed in early 1990s. It's speed was up to 2.4kbps   It allows the voice calls in 1 country. AMPS was first launched in USA in 1G mobile system. 1G network use analog signal.
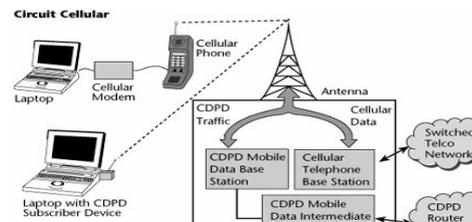
2G TECHNOLOGY

2G is short for second-generation wireless telephone technology. Second-generation 2G cellular telecom networks were commercially launched on the GSM standard in Finland by (now part of Elisa Oyj) in 1991.Three primary benefits of 2G networks over their predecessors were that phone conversations were digitally encrypted; 2G systems were significantly more efficient on the spectrum allowing for far greater mobile phone penetration levels; and 2G introduced data services
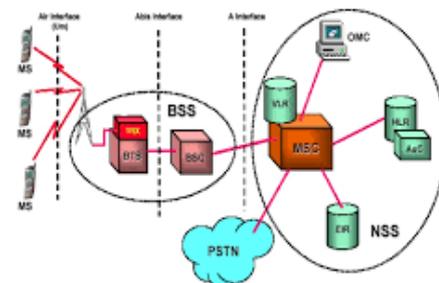
for mobile, starting with SMStext messages2G technologies enabled the various mobile phone networks to provide the services such as text messages, picture messages, and MMS (multimedia messages).All text messages sent over 2G are digitally encrypted, allowing for the transfer of data in such a way that only the intended receiver can receive and read it.2.5G is a technology between the second (2G) and third (3G) generation of mobile telephony. 2.5G is sometimes describe as 2G cellular Technology combined with GPRS.All text messages sent over 2G are digitally encrypted, allowing for the transfer of data in such a way that only the intended receiver can receive and read it.2.5G is a technology between the second (2G) and third (3G) generation of mobile telephony. 2.5G is sometimes describe as 2G cellular Technology combined with GPRS.
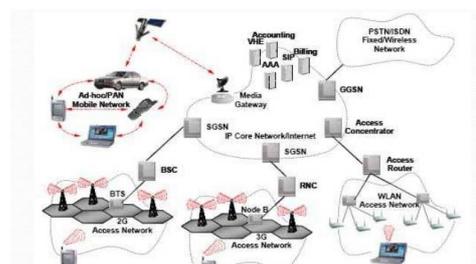
3G TECHNOLOGIES:

Providing Faster Communication Send/Receive Large Email Messages High speed web/ more security video Conferencing /3D gaming TV streaming/Mobile TV/phone calls Large capacities and broadband capabilities 11 sec- 1.5 min time to download a 3 min mp3 songs. Telecommunications-2000 (IMT-2000) specifications by the International Telecommunication Union. 3G finds application in wireless voice telephony, mobile Internet access, fixed wireless Internet
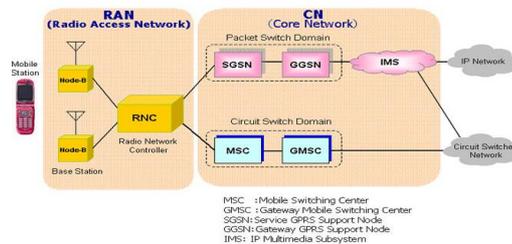
access, video calls and mobile TV. A new generation of cellular standards has appeared approximately every tenth year since 1G systems were introduced in 1981/1982. Each generation is characterized by new frequency bands, higher data rates and non–backward-compatible transmission technology. The first 3G networks were introduced in 1998 and fourth generation 4G networks in 2008.phone, a caller hears less of the tonality of someone's voice.

4G TECHNOLOGY

4G is the fourth generation of wireless mobile telecommunications technology, succeeding 3G. A 4G system must provide capabilities defined by ITU in IMT Advanced. Potential and current applications include amended mobile web access, IP telephony, gaming services, high-definition mobile TV, video conferencing, 3D television .Two 4G candidate systems are commercially deployed: the Mobile WiMAX standard (first used in South Korea in 2007), and the first-release Long Term Evolution (LTE) standard (in Oslo, Norway, andStockholm,

Sweden since 2009). It has, however, been debated whether these first-release versions should be considered 4G, as discussed in the technical-definition section below.

5G TECHNOLOGY

5th generation mobile networks or 5th generation wireless systems, abbreviated 5G, are the proposed next telecommunications standards beyond the current 4G/IMT-Advanced standards. Rather than faster peak Internet connection speeds, 5G planning aims at higher capacity than current 4G, allowing higher number of mobile broadband users per area unit, and allowing consumption of higher or unlimited data quantities in gigabyte per month and user.This would make it feasible
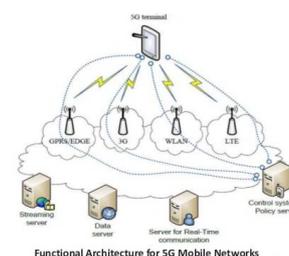
Functional Architecture for 5G Mobile Networks

portion of the population to stream high-definition media many hours per day with their mobile devices, when out of reach of wifi hotspots. 5G research and development also aims at improved support of machine to machine communication, also known as theInternet of things, aiming at lower cost, lower battery consumption and lower latency than 4G equipment.

III. COMPARATIVE ANALYSIS

Parameters	1G	2G	3G	4G
Name	1st Generation Mobile Network	2nd Generation Mobile Network	3rd Generation Mobile Network	4th Generation Mobile Network
Introduced in year	1980s	1993	2001	2009
Location of first commercialization	USA	Finland	Japan	South Korea
Technology	AMPS (Advanced Mobile Phone System), NMT, TACS	IS-95, GSM	IMT2000, WCDMA	LTE, WiMAX
Multiple Address/Access system	FDMA	TDMA, CDMA	CDMA	CDMA
Switching type	Circuit switching	Circuit switching for Voice and Packet switching for Data	Packet switching except for Air Interface	Packet switching
Speed (data rates)	2.4 Kbps to 14.4 kbps	14.4 Kbps	3.1 Mbps	100 Mbps
Special Characteristic	First wireless communication	Digital version of 1G technology	Digital broadband, speed increments	Very high speeds, All IP

Features	Voice only	Multiple users on single channel	Multimedia features, Video Call	High Speed, real time streaming
Supports	Voice only	Voice and Data	Voice and Data	Voice and Data
Internet service	No Internet	Narrowband	Broadband	Ultra Broadband
Bandwidth	Analog	25 MHz	25 MHz	100 MHz
Operating frequencies	800 MHz	GSM: 900MHZ, 1800MHz CDMA: 800MHz	2100 MHz	850 MHz, 1800 MHz
Band (Frequency) type	Narrow band	Narrow band	Wide band	Ultra Wide Band
Carrier frequency	30 KHZ	200 KHz	5 MHz	15 MHz
Advantage	Simpler (less complex) network elements	Multimedia features (SMS, MMS), Internet access and SIM introduced	High security, international roaming	Speed, High speed handoffs, MIMO technology, Global mobility
Disadvantages	Limited capacity, not secure, poor battery life, large phone size, background interference	Low network range, slow data rates	High power consumption, Low network coverage, High cost of spectrum licence	Hard to implement, complicated hardware required

IV. CONCLUSION

This paper has the study of comparative analysis of the different type of network's architecture. Further study is mainly focused on the ways which these type of different architecture affecting the network security with applying the cryptography theories.

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