Wireless Communication and Comparison of Wireless Technology

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Abstract: *This survey research theoretically analyses the Third Generation (3G) of mobile devices and services, which will revolutionize wireless communications by permitting many real-time connections. Thanks to 3G wireless technology, a single user will be able to immediately access all information-on-demand services. The earliest analog mobile phones of the first generation originally appeared in the 1980s. The second generation of wireless technology made its appearance in the 1990s. The first digital mobile networks were released ten years later. Throughout the second generation, the telecommunications industry experienced exponential growth in terms of both subscribers and a wide range of new service options. Landlines are increasingly being replaced by mobile devices as the main form of personal contact. The successful implementation of new wireless data and Internet services has emerged as a key concern for manufacturers of communications equipment. The architecture of the next-generation network is dependent on the network components that offer wireless data services. This article offers a summary of current wireless technologies to address the growing demand for wireless multimedia services.*

Keywords: 3G, Wireless Networks, Codes, 3G Parameters

I. INTRODUCTION

One of the most active sectors in the communication industry today is wireless communication. Although it has been a subject of study since the 1960s, there has been an increase in research in the field during the past ten years. This is the result of multiple variables coming together. First, there has been a sharp rise in the need for connection, which has been mostly driven by cellular phones so far but is anticipated to be quickly supplanted by wireless data applications. Second, the rapid development of VLSI technology has made it possible to apply complex signal processing algorithms and coding techniques in small-area, low-power systems. Thirdly, the success of second-generation (2G) digital wireless standards, particularly the IS-95 Code Division Multiple Access (CDMA) standards, is a tangible example of how sound concepts from communication theory may have a big influence on real-world applications. A considerably more varied range of ideas and methods on how to communicate through wireless channels have emerged as a result of research efforts over the past ten years, and the situation is still very much in flux.

The challenge and intrigue of the topic come from two essential elements of wireless communication. The importance of these factors in wireline communication is often much lower. The first is the fading phenomena, which includes both small-scale effects like multipath fading and larger-scale effects like path loss due to distance attenuation and object shadowing. Second, wireless users communicate across the air, where there is tremendous interference between them, in contrast to the wired world where each transmitter-receiver pair may frequently be thought of as an isolated point-to-point link.

1. Proving more domain-specific techniques

Instead of being used for commercial purposes, the majority of data mining systems incorporate several algorithms at the discretion of academics. The algorithms that best match the data to be processed must be more clearly identified. Offering domain-specific methods based on a general platform will be one strategy.

2. Better support for business application

The complexity of real-world commercial applications places a lot of demands on the data mining system. Scalability, dependability, recoverability, and security need to be improved in open-source data mining systems [1].

II. 3G IN UNITED STATES

According to Monet Mobile Networks, this is the first 3G network to be made available in the nation. This technology was previously known as CDMA2000 1xEV-DO. Eventually, the network provider had to stop running. After that, Verizon Wireless introduced the second US 3G network provider in October 2003. This was known as CDMA2000 EV-DO, with a fast-expanding network, as more countries welcomed the new technology and began utilizing 3G with mobile phones and handsets. 3G is becoming common among modern models and designs as additional improvements and increased efficiency are released each year. The term "3G cellular technology" refers to wireless broadband data and information services that are delivered to a user's mobile device.

III. ABOUT 3G

Cellular technology known as 3G is used to deliver wireless broadband data and information services to a user's mobile device. The 3G boasts a speed range of 144 Kbps to 2.4 Mbps, which is three times faster than the typical 56 Kbps dial-up modem connection, which is pretty similar to cable modem speed. Speedy web page surfing, on-demand video viewing, downloading and playing of music, movies, and 3D games, as well as streaming of music videos and video conferencing, are all made possible by 3G networks.

IV. DEVELOPMENTS

A new technology known as High-speed Downlink Packet Access (HSDPA), also known as 3.5G, delivers higher speeds of up to 7.2 Mbps and even promises rates of up to 14.4 Mbps. Although a mobile phone's UI is significantly different from a computer's, the functions of downloading, streaming, online surfing, and sending messages and emails seem to be very similar. Three major carriers have offered and launched 3G services as of right now. Additionally, a variety of 3G-capable phones are currently available. The devices were originally launched by Verizon Wireless in early 2005, and afterward by Sprint and Cingular. The former Cingular is now AT&T. In 2008, T-Mobile will launch its new 3G network, joining the group.

The Accesses:

The most recent advancement in mobile communications is now 3G technology. Real multimedia mobile phones, commonly referred to as smartphones, will use 3G technology. To support web-based apps and phone-based video and audio data files, these tools have increased bandwidths and transfer speeds. The three most popular are WCDMA or UMTS, which stands for Wideband Code Division Multiple, Time-division Synchronous Code Division Multiple Access, and CDMA2000, which is based on code division multiple access.

3G Networks:

3G networks may carry data at speeds of up to 3 Mbps, which is around 15 seconds for each 3-minute MP3 music download. The lowest speed restriction is 144 Kbps, which is roughly 8 minutes for 3-minute MP3 song downloads. When downloading or collecting material online, as well as sending and receiving large multimedia files, the high data speeds of 3G are advised. When it comes to broadband applications like web surfing, streaming video, video conferencing, and sending and receiving faxes, 3G phones are similar to mini PCs. The towers are among the group's most crucial components since they enable data to flow from one Phone to another. 3G is a cellular phone network protocol [1].

3G Technologies:

There are several 3G technologies, including CDMA 2000, UMTS, GSM EDGE, Wi-Max, and DECT. Because it can function with earlier handsets, enhanced data rates for GSM evolution (EDGE) are known as a backward digital technology. Compared to the current GSM, EDGE enables quicker data transfer. A year later, in 2003, AT&T launched EDGE. The GSM coverage has expanded by up to three times with EDGE. A packet-switched system can employ EDGE, a 3G technology (third-generation technology). ITU standards include universal mobile telecommunications systems (UMTS). It is a sophisticated network that supports radio access, the core network, and SIMs (subscriber identification modules). Due to the need for new and distinct infrastructure to provide its coverage, EDGE is a rather

costly technology for network operators. The foundation of this technology is GSM. International Mobile Telecommunications - Multi carrier (IMTC) is another name for CDMA technology. This technology is comparable to 2G. DECT is a type of 3G technology (third-generation technology), which is another wireless technology. Since DECT operates across a frequency of 1900 MHz, it was created by the European Telecommunications Standards Institute and is now widely used in other nations. WiMax, also known as global interoperability for microwave access, is a 3G technology (or third-generation technology). A wireless technology, that is. It sends out many wireless signals. It may be used in both point and multi-point modes. This technology is portable and is based on a wireless internet connection. This technique eliminates the need for cables and can link hotspots at a speed of 10 Mbps.

Modern Technology:
UMTS and 1xEV-DO, with speeds ranging from 144 Kbps to 2 Mbps, are both parts of 3G technology.

Figure . 1 Connectivity via Mobile Wi-Fi Mini Router

V. COMPARISON OF WIRELESS TECHNOLOGIES 1G SYSTEMS:

AMPS is one of the analog systems that saw rapid growth in the 1980s and is still in use today. Many metropolitan areas construct 3G networks and merge 1G and 2G networks. The systems split the bandwidth into various frequencies that are assigned to individual calls via frequency division multiplexing.

System 2G: Either the TDMA (Time Division Multiple Access) or CDMA (Code Division Multiple Access) access mechanism is used by digital systems of the second generation. The European GSM (Global System for Mobile Communications) is a TDMA-based 2G digital system that uses special access methods. In addition to enhanced capacity and unique features like caller ID, call forwarding and brief messaging, 2G digital services initially appeared in the 1980s. A crucial element was easy roaming, which allows users to move.

3G Systems: Cellular data connections in 3G are represented by TA data rates of 2 Mbits/sec. The International Telecommunication Union (ITU), which specifies global wireless frequency ranges, data rates, and availability dates, defines 3G in its IMT-2000 standard. Implementing the global standard became difficult since different frequency allocations exist in various regions of the world. Using 3G technology, a personal, mobile, multimedia communications device will be capable of handling voice, color photos, video, and a range of informative content. 3G networks per cell will handle more phone calls. The following table shows the differences between the generations of wireless telecommunications. Each table covers a different aspect of the standards:

- Dates & Cool New Features
- Technology in Use
- Speeds
- Frequencies and Carriers
- Primary Countries

TABLE .1 It shows the differences in technology and its features.

	Year	Features
1G	70's to 80's	The first wireless phones are now available, only for voice.
2G	The 90s to 2000	Multiple users sharing a single channel increases throughput and allows for both voice and data traffic.
2.5G	2001- 2004	Transmission of data. enhanced streaming video and multimedia, but restricted online surfing.
3G	2004- 2005	The capacity for streaming video and multimedia has improved. accessibility and portability such as phones and PDAs.
4G	2006+	Speed of 40 Mbps. Improved multimedia, streaming video, enhanced access and mobility, and global roaming.

VI. CONCLUSION

This study concludes that 3G technology offers fresh developments and cutting-edge communications techniques. In contrast to older versions, the new 3G cell phones are more expensive. Users can only conduct video conferences with other 3G customers. With 3G, several improvements, features, and uses are feasible. The two most recent technologies are 3.5G and 4G. Faster transfer times, superior security, and more information exchanges are the major characteristics of 4G. Higher gigabit internet and wireless services are accessible with 4G. Wi-Fi, UMTS, EDGE, or any other upcoming access technology are all acceptable as technologies.

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