Assessment of Wireless Communication Applications in the Society

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ABSTRACT

The study sought to assess wireless communication applications in the society. The study reviewed various wireless communication applications, their specifications and range of capacity. The rapid worldwide growth in cellular telephone subscribers has demonstrated conclusively that wireless communications is a robust, viable voice and data transport mechanism. The Telecommunications Standards Institute (ETSI) describes the protocols for each generation. For example, the second-generation (2G) digital cellular networks used by mobile devices such as mobile phones and tablets. Computer security, also known as cyber security or IT security, refers to the security of computing devices such as computers and smartphones, as well as computer networks such as private and public networks, and the Internet. The field has growing importance due to the increasing reliance on computer systems in most societies. The study concluded that wireless communications networks have become much more pervasive than anyone could have imagined when the cellular concept was first developed in the 1960s and 1970s. The widespread adoption of wireless communications was accelerated in the mid-1990s, when governments throughout the world provided increased competition and new radio spectrum licenses for personal communications services (PCS) in the 1800–2000 MHz frequency bands. One of the recommendations in the study was that the government should place a standard regulatory order that will curtail the excess abuse of wireless communication applications or gadgets in society.

KEYWORDS: Wireless Communication Applications

Introduction

Since the mid-1990s, the cellular communications industry has witnessed explosive growth. Wireless communications networks have become much more pervasive than anyone could have imagined when the cellular concept was first developed in the 1960s and 1970s. The widespread adoption of wireless communications was accelerated in the mid-1990s, when governments throughout the world provided increased competition and new radio spectrum licenses for personal communications services (PCS) in the 1800–2000 MHz frequency bands. The rapid worldwide growth in cellular telephone subscribers has demonstrated conclusively that wireless communications is a robust, viable voice and data transport mechanism. New standards and technologies are being implemented to allow wireless networks to replace fiber optic or copper lines between fixed points several kilometers apart (fixed wireless access). Similarly, wireless networks have been increasingly used as a replacement for wires within homes, buildings, and office settings through the deployment of wireless local area networks (WLANs). The evolving Bluetooth modem standard promises to replace troublesome appliance communication cords with invisible

wireless connections within a person's personal workspace. Used primarily within buildings, WLANs and Bluetooth use low power levels and generally do not require a license for spectrum use. (Garber 2014) asserted that wi-fi is a family of wireless network protocols, based on the IEEE 802.11 family of standards, which are commonly used for local area networking of devices and Internet access, allowing nearby digital devices to exchange data by radio waves. These are the most widely used computer networks in the world, used globally in home and small office networks to link desktop and laptop computers, tablet computers, Smartphone's, smart TVs, printers, and smart speakers together and to a wireless router to connect them to the Internet, and in wireless access points in public places like coffee shops, hotels, libraries and airports to provide the public Internet access for mobile devices.

Concept of Satellite System

A satellite system is a set of gravitationally bound objects in orbit around a planetary mass object (incl. sub-brown dwarfs and rogue planets) or minor planet, or its barycenter. Generally speaking, it is a set of natural satellites (moons), although such systems may also consist of bodies such as circumplanetary disks, ring systems, moonlets, minor-planet moons and artificial satellites any of which may themselves have satellite systems of their own (see Sub satellites). Some bodies also possess quasi-satellites that have orbits gravitationally influenced by their primary, but are generally not considered to be part of a satellite system. Satellite systems can have complex interactions including magnetic, tidal, atmospheric and orbital interactions such as orbital resonances and libration. Individually major satellite objects are designated in Roman numerals. Satellite systems are referred to either by the possessive adjectives of their primary (e.g. "Jovian system"), or less commonly by the name of their primary (e.g. "Jupiter system"). Where only one satellite is known, or it is a binary with a common centre of gravity, it may be referred to using the hyphenated names of the primary and major satellite (e.g. the "Earth-Moon system"). Many Solar System objects are known to possess satellite systems, though their origin is still unclear. Notable examples include the largest satellite system, the Jovian system, with 79 known moons (Sheppard, 2018) (including the large Galilean moons) and the Saturnian System with 82 known moons (and the most visible ring system in the Solar System). Both satellite systems are large and diverse. In fact, all of the giant planets of the Solar System possess large satellite systems as well as planetary rings, and it is inferred that this is a general pattern. Several objects farther from the Sun also have satellite systems consisting of multiple moons, including the complex Plutonian system where multiple objects orbit a common center of mass, as well as many asteroids and plutinos. Apart from the Earth-Moon system and Mars' system of two tiny natural satellites, the other terrestrial planets are generally not considered satellite systems, although some have been orbited by artificial satellites originating from Earth. Little is known of satellite systems beyond the Solar System, although it is inferred that natural satellites are common. J1407b is an example of an extra solar satellite system (Matthew, et. al., 2015) It is also theorized that Rogue planets ejected from their planetary system could retain a system of satellites (Sigurdsson, 2017).

Concept of Television Remote Control

The first remote intended to control a television was developed by Zenith Radio Corporation in 1950. The remote, called "Lazy Bones (Me-TV Network 2018) was connected to the television by a wire. A wireless remote control, the "Flashmatic, (Zenith Electronics 2018) was developed in 1955 by Eugene Polley. It worked by shining a beam of light onto one of four photoelectric cells, (Lawrence 2012) but the cell did not distinguish between light from

the remote and light from other sources. The Flashmatic also had to be pointed very precisely at one of the sensors in order to work. In 1956, Robert Adler developed Zenith Space Command, a wireless remote. It was mechanical and used ultrasound to change the channel and volume. (Gertner 2018). When the user pushed a button on the remote control, it struck a bar and clicked, hence they were commonly called a "clicker," but it sounded like a "clink" and the mechanics were similar to a pluck. Each of the four bars emitted a different fundamental frequency with ultrasonic harmonics, and circuits in the television detected these sounds and interpreted them as channel-up, channel-down, sound-on/off, and power-on/off.

Concept of Wi-Fi

Wi-Fi is the wireless technology used to connect computers, tablets, smartphones and other devices to the internet. Wi-Fi is the radio signal sent from a wireless router to a nearby device, which translates the signal into data you can see and use. (Garber, 2014) asserted that wi-fi is a family of wireless network protocols, based on the IEEE 802.11 family of standards, which are commonly used for local area networking of devices and Internet access, allowing nearby digital devices to exchange data by radio waves. These are the most widely used computer networks in the world, used globally in home and small office networks to link desktop and laptop computers, tablet computers, Smartphone's, smart TVs, printers, and smart speakers together and to a wireless router to connect them to the Internet, and in wireless access points in public places like coffee shops, hotels, libraries and airports to provide the public Internet access for mobile devices. Wi‑Fi is a trademark of the non-profit Wi-Fi Alliance, which restricts the use of the term Wi-Fi Certified to products that successfully complete interoperability certification testing (Schofield, 2007). As of 2017, the Wi-Fi Alliance consisted of more than 800 companies from around the world. As of 2019, over 3.05 billion Wi-Fi enabled devices are shipped globally each year. (Research and Markets, 2020). Wi-Fi uses multiple parts of the IEEE 802 protocol family and is designed to interwork seamlessly with its wired sibling Ethernet. Compatible devices can network through wireless access points to each other as well as to wired devices and the Internet. The different versions of Wi-Fi are specified by various IEEE 802.11 protocol standards, with the different radio technologies determining radio bands, and the maximum ranges, and speeds that may be achieved. Wi-Fi most commonly uses the 2.4 gigahertz (120 mm) UHF and 5-gigahertz (60 mm) SHF radio bands; these bands are subdivided into multiple channels. Channels can be shared between networks but only one transmitter can locally transmit on a channel at any moment in time.

Concept of Paging System

Paging Systems are wireless communication systems that are designed to send brief messages to a subscriber. It's a one-way messaging system in which Base Station send messages to all subscribers. The Paging System transmits the message also known as Page, along with Paging System access number, throughout the service area using Base Station, which broadcast the page on a radio link (Burns 2018). A paging system allows for one-way communication to a large audience. Regardless of the broadcast source, a one-way paging system lets the speaker provide clear, amplified instructions throughout a facility. Messages can also be recorded and broadcast at a later time. There are two type of paging system.

***Manual Paging System*:** In a manual paging system, a message is sent to the paging operator through telephone call by the caller. The message is then delivers to the pager through paging network by the operator.

***Automatic Paging System*:** In an automatic paging system, the incoming requests are automatically processed by the paging terminal and then this information is delivers to the pager. Automatic Paging Systems are mostly used. (Arunkumar, et al 2020). Paging systems vary widely in their complexity and coverage area. While simple paging systems may cover a limited range of 2 to 5 km, or may even be confined to within individual buildings, wide area paging systems can provide worldwide coverage. Though paging receivers are simple and inexpensive, the transmission system required is quite sophisticated. Wide area paging systems consist of a network of telephone lines, many base station transmitters, and large radio towers that simultaneously broadcast a page from each base station (this is called simulcasting). Simulcast transmitters may be located within the same service area or in different cities or countries. Paging systems are designed to provide reliable communication to subscribers wherever they are; whether inside a building, driving on a highway, or flying in an airplane.

Concept of Wi-Max

Wi-MAX (Worldwide Interoperability for Microwave Access) is a family of wireless broadband communication standards based on the IEEE 802.16 set of standards, which provide multiple physical layer (PHY) and Media Access Control (MAC) options. The name Wi MAX was created by the Wi MAX Forum, which was formed in June 2001 to promote conformity and interoperability of the standard, including the definition of predefined system profiles for commercial vendors. (Pinola 2008) The forum describes Wi MAX as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL". IEEE 802.16m or Wireless MAN-Advanced was a candidate for 4G, in competition with the LTE Advanced standard. Wi MAX was initially designed to provide 30 to 40 megabit-per-second data rates, with the 2011 update providing up to 1 Gbit/s (Carl, 2010) for fixed stations. The latest version of Wi MAX, W iMAX release 2.1, popularly branded as WiMAX 2+, is a backwards-compatible transition from previous WiMAX generations. It is compatible and interoperable with TD-LTE. WiMAX refers to interoperable implementations of the IEEE 802.16 family of wireless-networks standards ratified by the WiMAX Forum. (Similarly, Wi-Fi refers to interoperable implementations of the IEEE 802.11 Wireless LAN standards certified by the Wi-Fi Alliance.) WiMAX Forum certification allows vendors to sell fixed or mobile products as WiMAX certified, thus ensuring a level of interoperability with other certified products, as long as they fit the same profile. The original IEEE 802.16 standard (now called "Fixed WiMAX") was published in 2001. WiMAX adopted some of its technology from WiBro, a service marketed in Korea (Roger, 2006). Mobile WiMAX (originally based on 802.16e-2005) is the revision that was deployed in many countries and is the basis for future revisions such as 802.16m-2011. WiMAX was sometimes referred to as "Wi-Fi on steroids" (Walton, 2006) and can be used for a number of applications including broadband connections, cellular backhaul, hotspots, etc. It is similar to Long-range Wi-Fi, but it can enable usage at much greater distances. Today the initial WiMax system is designed to provide 30 to 40 megabit-per-second datarates. The scalable physical layer architecture that allows for data rate to scale easily with available channel bandwidth and range of WiMAX make it suitable for the following potential applications:

- Providing portable mobile broadband connectivity across cities and countries through various devices.
- Providing a wireless alternative to cable and digital subscriber line (DSL) for "last mile" broadband access.
- Providing data, telecommunications (VoIP) and IPTV services (triple play).

- Providing Internet connectivity as part of a business continuity plan. Smart grids and metering.

Internet Access

WiMAX can provide at-home or mobile Internet access across whole cities or countries. In many cases, this has resulted in competition in markets which typically only had access through an existing incumbent DSL (or similar) operator. Additionally, given the relatively low costs associated with the deployment of a WiMAX network (in comparison with 3G, HSDPA, xDSL, HFC or FTTx), it is now economically viable to provide last-mile broadband Internet access in remote locations.

Concept of Security System

Security is freedom from, or resilience against, potential harm (or other unwanted coercive change) caused by others. Beneficiaries (technically referents) of security may be of persons and social groups, objects and institutions, ecosystems or any other entity or phenomenon vulnerable to unwanted change. Refugees fleeing war and insecurity in Iraq and Syria arrive at Lesbos Island, supported by Spanish volunteers, 2015. Security mostly refers to protection from hostile forces, but it has a wide range of other senses: for example, as the absence of harm (e.g. freedom from want); as the presence of an essential good (e.g. food security); as resilience against potential damage or harm (e.g. secure foundations); as secrecy (e.g. a secure telephone line); as containment (e.g. a secure room or cell); and as a state of mind (e.g. emotional security). The term is also used to refer to acts and systems whose purpose may be to provide security (e.g.: security companies, security forces, security guard, cyber security systems, security cameras, remote guarding). Security is not only physical but it can also be Virtual. The range of security contexts is illustrated by the following examples (in alphabetical order):

Computer security: also known as cyber security or IT security, refers to the security of computing devices such as computers and Smartphone's, as well as computer networks such as private and public networks, and the Internet. The field has growing importance due to the increasing reliance on computer systems in most societies (Wikipedia, 2013). It concerns the protection of hardware, software, data, people, and also the procedures by which systems are accessed. The means of computer security include the physical security of systems and security of information held on them.

Corporate security: refers to the resilience of corporations against espionage, theft, damage, and other threats. The security of corporations has become more complex as reliance on IT systems has increased, and their physical presence has become more highly distributed across several countries, including environments that are, or may rapidly become, hostile to them.

Ecological security: also known as environmental security, refers to the integrity of ecosystems and the biosphere, particularly in relation to their capacity to sustain a diversity of life-forms (including human life). The security of ecosystems has attracted greater attention as the impact of ecological damage by humans has grown (United Nations General Assembly, 2010)

Concept of Cell Phones

A mobile phone, cellular phone, cell phone, cellphone, hand phone, or hand phone, sometimes shortened to simply mobile, cell or just phone, is a portable telephone that can

make and receive calls over a radio frequency link while the user is moving within a telephone service area. The radio frequency link establishes a connection to the switching systems of a mobile phone operator, which provides access to the public switched telephone network (PSTN). Modern mobile telephone services use cellular network architecture and, therefore, mobile telephones are called cellular telephones or cell phones in North America. In addition to telephony, digital mobile phones (2G) support a variety of other services, such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, video games and digital photography. (Wikipedia, 2020) Mobile phones offering only those capabilities are known as feature phones; mobile phones which offer greatly advanced computing capabilities are referred to as smart phones. A portable telephone that uses wireless cellular technology to send and receive phone signals. This technology works by dividing the Earth into small regions called cells. Within each cell the wireless telephone signal goes over its assigned bandwidth to a cell tower, which relays the signal to a telephone switching network, connecting the user to the desired part (Dictionary.com 2021).

Concept of Computer Interface Devices

In computing, an interface device (IDF) is a hardware component or system of components that allows a human being to interact with a computer, a telephone system, or other electronic information system. An interface is a shared boundary across which two or more separate components of a computer system exchange information. The exchange can be between software, computer hardware, peripheral devices, humans, and combinations of these. (Hookway, 2014). Some computer hardware devices, such as a touch screen, can both send and receive data through the interface, while others such as a mouse or microphone may only provide an interface to send data to a given system. (IEEE, 2000). Hardware interfaces exist in many components, such as the various buses, storage devices, other I/O devices, etc. A hardware interface is described by the mechanical, electrical, and logical signals at the interface and the protocol for sequencing them (sometimes called signaling) (David, 2005). A standard interface, such as SCSI, decouples the design and introduction of computing hardware, such as I/O devices, from the design and introduction of other components of a computing system, thereby allowing users and manufacturers great flexibility in the implementation of computing systems. Hardware interfaces can be parallel with several electrical connections carrying parts of the data simultaneously or serial where data are sent one bit at a time (Govindarajalu, 2008)

Concept of Bluetooth

Bluetooth technology is a short-range wireless communications technology to replace the cables connecting electronic devices, allowing a person to have a phone conversation via a headset, use a wireless mouse and synchronize information from a mobile phone to a PC, all using the same core system. Bluetooth is a short-range wireless technology standard that is used for exchanging data between fixed and mobile devices over short distances using UHF radio waves in the ISM bands, from 2.402 GHz to 2.48 GHz, and building personal area networks (PANs) (Muller, 2002). It was originally conceived as a wireless alternative to RS-232 data cables. It is mainly used as an alternative to wire connections, to exchange files between nearby portable devices and connect cell phones and music players with wireless headphones. In the most widely used mode, transmission power is limited to 2.5 milliwatts, giving it a very short range of up to 10 meters (30 feet). Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 35,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The IEEE

standardized Bluetooth as IEEE 802.15.1, but no longer maintains the standard. The Bluetooth SIG oversees development of the specification, manages the qualification program, and protects the trademarks. A manufacturer must meet Bluetooth SIG standards to market it as a Bluetooth device. (Bluetooth.com, 2009). A network of patents applies to the technology, which are licensed to individual qualifying devices. As of 2009, Bluetooth integrated circuit chips ship approximately 920 million units annually.

Concept of GPS

The Global Positioning System (GPS) is a space-based navigations system that provides location and time information in all weather conditions, anywhere on or near the earth where there is an unobstructed line of sight to four or more GPS satellites. The Global Positioning System (GPS), originally Navstar GPSis a satellite-based radionavigation system owned by the United States government and operated by the United States Space Force GPS (2008) It is one of the global navigation satellite systems (GNSS) that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. (GPS, 2018). Obstacles such as mountains and buildings block the relatively weak GPS signals. The GPS does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

Concept of GSM

The Global System for Mobile Communications (GSM) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile devices such as mobile phones and tablets. It was first deployed in Finland in December 1991. (Anton, 2003) By the mid-2010s, it became a global standard for mobile communications achieving over 90% market share, and operating in over 193 countries and territories. (4G Americas, 2014) 2G networks developed as a replacement for first generation (1G) analog cellular networks. The GSM standard originally described a digital, circuit-switched network optimized for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via General Packet Radio Service (GPRS), and Enhanced Data Rates for GSM Evolution (EDGE). Subsequently, the 3GPP developed third-generation (3G) UMTS standards, followed by the fourth-generation (4G) LTE Advanced and the fifth-generation 5G standards, which do not form part of the ETSI GSM standard. "GSM" is a trade mark owned by the GSM Association. It may also refer to the (initially) most common voice codec used, Full Rate. As a result of the network's widespread use across Europe, the acronym "GSM" was briefly used as a generic term for mobile phones. The Nigeria's telecom sector witnessed a major revolution in 2001 with the granting of the global system for mobile telecommunication (GSM) license to providers.

Conclusion

The study concluded that Wireless communications networks have become much more pervasive than anyone could have imagined when the cellular concept was first developed in the 1960s and 1970s. The widespread adoption of wireless communications was accelerated in the mid-1990s, when governments throughout the world provided increased competition and new radio spectrum licenses for personal communications services (PCS) in the 1800–

2000 MHz frequency bands. The function and capacity of those wireless communication applications varies slightly to each other. Also, that it Provide portable mobile broadband connectivity across cities and countries through various devices.

Recommendations

1. Government should place a standard regulatory order that will curtail the excess abuse of those wireless communication applications or gargets in the society.

2. With the global rapid growth and development in wireless communication applications, individuals or subscribers of the wireless network should manage and protect their wireless garget properly to avoid loss of data or essential documents because we are in a fraudulent society.

3. Government should also subsidize the price of those wireless communications applications or gargets and its parts to help their citizens reduce burdens and easy access in acquiring it.

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