

International Journal of Mechanical Engineering & Computer Applications

Interconnected Computer Networks Security and Internet of Things: Wireless Sensor Networks

Inam Ullah Khan¹, Nazia Azim², Syed Bilal Hussain Shah, Yin Fuliang⁴, Muhammad Sameen⁵

¹Isra University, Islamabad Campus, School of Engineering and Applied Sciences (SEAS)

²Abdul Wali Khan University Mardan, Pakistan

²School of information and communication engineering Dalian University of technology P.R China

³ PhD scholar, School of information and communication engineering Dalian University of technology P.R China

⁴Centre for Advance Studies in Engineering (CASE)

Email addresses: ¹inamullahkhan05@gmail.com, ²n.azim@awkum.edu.pk,

³bilalshah@mail.dlut.edu.cn, ⁴flyin@dlut.edu.cn, ⁵msameen4@gmail.com

Abstract: A slowly and gradually technological change has resulted in many aspects of our lives being connected and affected by modern communication. Millions and Billions of people connected to global system of interconnected computer networks today. According to a survey the number of connected devices will exceeds 50 billion by the year 2020. The internet of things I would say a major transformation in a modern day to day world that have affected everyone and business as well. The internet of things was defined by ITU (International Telecommunication Union). Internet of things has moved from being a futuristic vision from last year. Nowadays smart homes automation, smart water networks that connects our world. Normally a wireless sensor network is formed by large sensor workstations where each workstation or node having sensors that would detect heat, light etc. This paper will briefly explain the network security, cyber security, internet of things and wireless sensor networks.

Keywords: ITU, IOT, WSN, Sensor

1. Introduction

Achieving the goals of the smart world we are having five areas to work like Wireless sensor networks [1-9], Mobile Computing, Cyber Physical Systems, Mobile Computing, Pervasive Computing. Now a day's every field is merged with one another in the modern day today life. Further research in these areas

often relies on real time technologies like computing, machine learning, internet of things, privacy, availability and others. Internet of things is the revolution in the field of internet. In internet of things almost every object is having microchips inside them. Through these microchips we can track these objects and many objects sense the surrounding areas then report to other machines as well. In real time example we can monitor water quality in sea or oceans through sensors through GPRS networks. The internet of things is the future for technology that is linking physical and virtual objects through communication capabilities. This structure includes existing and evolving internet and network developments. Cyber security involves security mechanism that typically has more than a particular algorithm or protocol. Having some security mechanism that either lies in which layer of OSI model or TCP/IP. The idea of internet of things was developed in parallel of wireless sensor networks. The development of WSNs was inspired by military applications, notably surveillance in conflict zones. Today, they consist of distributed independent devices that use sensors to monitor the physical conditions with their applications extended to industrial infrastructure, automation, health, traffic, and many consumer areas.

2. International Telecommunication Union Network Structure for Internet of Things:

1) Layer of Sensing

- 2) Layer of Access
- 3) Layer of Network
- 4) Layer of Middleware
- 5) Layer of Application

This Network structure is just like open system international model in data communication and networks [10-22].

2.1 Structure of Internet of things:

This structure is categorized in three parts which are show in figure 1

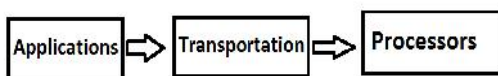


Figure 1. Structure of IoT

2.2 Internet of things as Interconnected Computer Network:

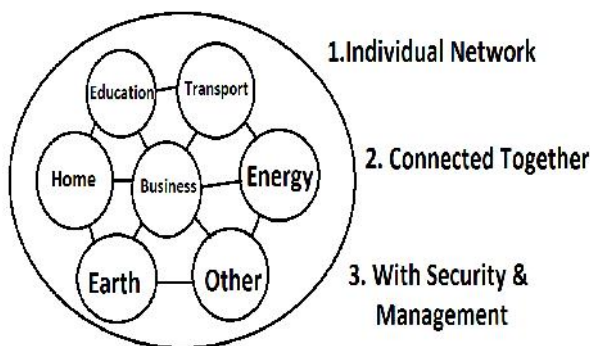


Figure 2. Network Setup

2.3 Internet of things Applications: Cows and Water Pipes: COW!

In future cow will also be connected. Dutch Start-up Company implemented sensors in the ears of cattle. Through this farmer will track the health and moment of animals.

Water Pipes:

We can also use sensors in the water pipes through this we will know where is the damage in the pipe.

2. Three kinds of WSN topologies:

The three wireless sensor network topologies are shown in the below figure 3

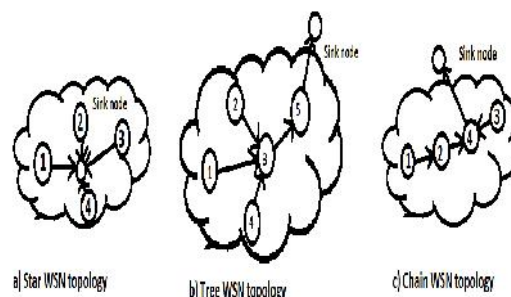


Figure 3. Different Topologies

4. Technologies:

4.1 Radio Frequency Identification (RFID):

The internet of things was started by radio frequency identification community. Radio frequency identification is a system that transmits the person or object wirelessly using radio waves in the form of a serial number. RFID device was for the first time used in World War 2. Later this technology is founded at the center of MIT in 1999. This technology was classified into three categories like

- a) Active RFID
- b) Passive RFID
- c) Semi Passive RFID

4.2 Internet Architecture & Internet Protocol:

Two computers, anywhere in the world having certain hardware, software, protocol can communicate even if they are not connected directly. Internet protocol is the primary network protocol used on the internet. Now a day's two versions of internet protocol is used one is IPV4 and another is IPV6. There are five classes in IPV4 like Class A, Class B, Class C, Class D, Class E while only three

classes are commonly used Class A, Class B, Class C. Class D address will begin with binary 1110 in the first octet. And first octet having range 224 to 239. In Class E first octet of internet protocol address will begin with 111. Its first octet range is 240 to 255. E class is used for experimental purposes.

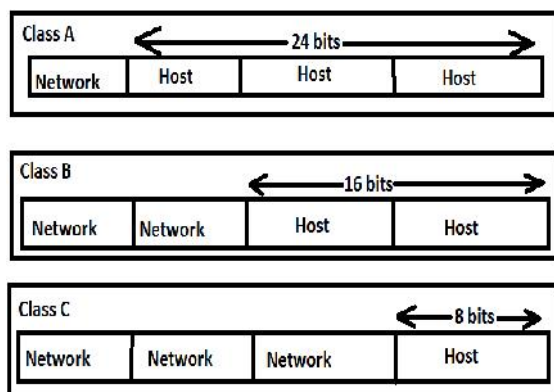


Figure4. IP classes

4.3 Wireless Fidelity (Wi-Fi):

Wireless Fidelity is a networking technology that allows devices to communicate over a signal. Now a day's Wi-Fi delivers high speed Wireless Local Area Networks (WLAN) connectivity to billion schools, colleges, universities, offices, homes, public locations, hotels, internet café and airports. Now a day's every mobile and handed electronic devices uses Wi-Fi. Now a day's in every city everyone communicate through Wi-Fi.

4.4 Bluetooth:

This is a inexpensive wireless technology also called radio technology. Normally PDAs, handed electronic devices, notebook PCs, cameras, and printers communicate these devices with one another through Bluetooth in a short range of 10-100 meters. It is used for data sharing like video, text, numbers, and audio. More than 1000 companies use this technology.

4.5 Artificial Intelligence:

AI refers to that electronic environment that is sensible due to the presence of peoples. In this intelligent world robots are used for day to day life

work in homes and industries. These systems are characterized by the following

- Embedded devices: Many devices are interconnected with one another, these are integrated in to the environment.
- Aware Devices: These devices can recognize you in every situation.
- Personal: They are mostly used for personal use.
- Change due to Environment: These devices are so smart and intelligent that they are adaptive.

5. Challenges to Internet of things:

There are several challenges that slow down the potential of internet of things. Some of the challenges are as under.

5.1 Internet Protocol Version 6 (IPv6):The following figure: 1.5 shows the IP Crises

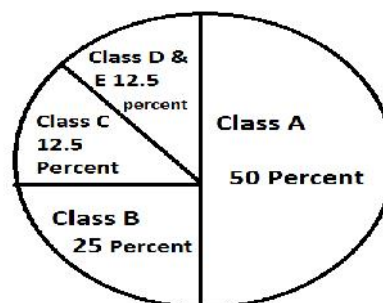


Figure 5.Pic chart of Classes

IP version 6 uses 128 bits rather than 32 bits currently used in IPv4. IPv6 uses hexadecimal numbers for representation. This is also called IP- the Next Generation. This is very slow process to arrive. Ipv6 needs new software's and IT staff must be trained. Some experts believe IPv4 will remain for more than 10 years. Due to this situation that will slow the potential and progress of Internet of things since potentially billions of new sensors will require for unique IP addresses.

5.2 Sensor Energy:

Internet of things [23-43] to reach the full potential and level sensors will be needed to auto generate and charge through nano-generators. Through these we can generate power electricity.

6. Conclusion:

In Future for making our life simple and easy internet of things will bring change in the field of technology. Internet of things having applications in many domains like education, health, Engineering, mining, habit, transportation and in many other areas as well. There are some flaws in Internet of things in implementation level like there is no definition available worldwide. There must be some standardized techniques available in architectural level. And for better governance we must have to build some standard protocols. Hoping for the better future of internet of things.

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