Secured IoT Technology inWide Area Public Networks

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Abstract—In current scenario, worldis emerging with new technologies due to tremendous inventions and innovations day by day. Up gradations in existing systems and devices in engineering as well as technological domain are broadly getting increased. Physical objects are considerably integrated along with the information network for remote access. Major services are focused to interact industrial and domestic devices over the Internet to extend the functionality in broader sense. In this current digital era due to the availability of various embedded systems and smart sensors it helps to focus on automation using artificial intelligence. Networking them through (internet of things) IoT helps the modern world to greater extent. This paper focusses widely on the implementation of integrating IoT with industrial and domestic appliances and illustrating the benefits of integrating with each other.

Keywords—Internet of things, data, network, devices, sensors,technology, communication.

I. INTRODUCTION

IoT is the network, framework to connect various physical devices associated to use in day to day at different occasions which needs to be interacted whenever required. At present whatever objects needs to be monitored, interacted can be integrated to IoT with the help communication devices and smart sensor devices. In such conditions now a days vehicles, buildings are being networked for various reasons. The communication between these devices helps to reach the common goals. These itemsare embedded with hardware electronic components instruction algorithms i.e. software, data analyzing sensors, and intercommunicating networkconnectivity. The said items helps the objects in the collection and exchange of data items.. The IoT allows every objects to be analytically sensed and remotely controlled throughthe already existing network infrastructure. Theimmediate future is that the devices will use the existing networks such as internet to interact among each other.

According to the Gartner, 260 million objects will be connected by year 2020. To execute and implement the vision and mission several private companies and government organizationshave tried. Due to the continuous effort considerable growth and development happened in corresponds to the IoT network and systems [1].Internet of things helps in the exchange of data between sensing devices and the network connected to it. The IOT facilitates the objects to be sensed remotely using the existing networks. This is the basic working phenomenon in the IOT network.Many companies and government organizations are moving towards IOT for further improvements in the working phenomenon. The survey shows that there will be tremendous growth in the number of devices which will be connected in thenear future.
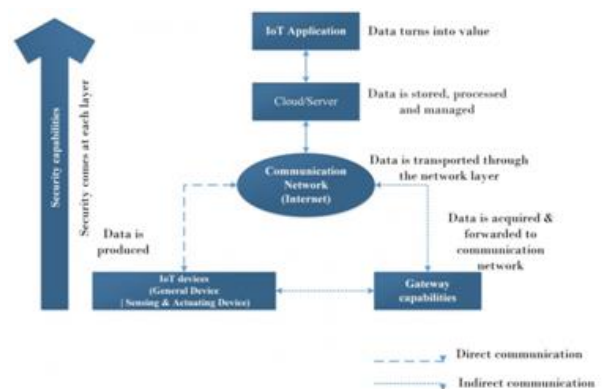

Fig. 1: IoT architecture model

II. SELF-ORGANIZING NETWORKS

In times of disasters, outages and adversities by cyber-attack the need for the data is very important.Though the communications and failure of sources of energy block the full benefits and potential of IOT. Hence there arise a need to standardize the interaction between IOT devices and its data during these critical period. There will be no communication support to provide the data from these during the conditions for the devices to survive. This paves the way for the need for a self-organized communication network for the IOT environment which builds the different way of communication among the devices.Self organization is a method of recovering and restoring the communications among devices after the allocated resource failed.
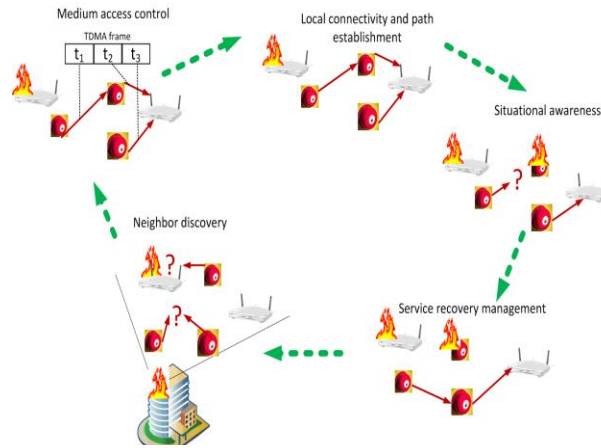
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Fig. 2: Self-organizationecosystem in the Internet of Things

III. DATA ANALYSIS AND VISUALIZATION FOR IOT

Data Analysis is the method of extracting meaning conclusion by evaluating the existing big and small data sets with its available properties.The output will be mostly in the form of patterns, statistics and trends which helps the organizations during business in their effective decision making. In the growth and success of the various applications in IOT and business investments Data Analytics shows a great role .The below list shows the data analytics tool helps the business in making their datasets effective.[5]

The data virtualization tool is not just graphs or graphical images showing something. But it's actually what the enterprise need which will help the industry to find the hidden patterns and trends in the IOT data to make decisions to improve their business .This is how virtualizations tools helps in business development using IOT data. [3]

Decision makers will learn how indispensable it is for enterprises to use data visualization tools in order to transform IoT data into meaningfulinsights.

IoT organizations are more likely to use the interactive data visualization tools than others. Data is derives form connected sources ,with this the analyst involved in getting information by drilling deeply for intriguing findings to develop understanding in a deep way. As an example a plant manager will be involved in the virtualization of machine performance for determining the output which is maximized or they will compare the data with others in a side by side manner.[4] The infrastructure performance data is investigated by an IT Analyst to find the problem root or finding area which needs extra investments.Only static visuals are used for working by more than 50% of IOT organizations. Also only the top layer information is used by decision makers and analysts. The remaining data needs IT request or inefficient workarounds.
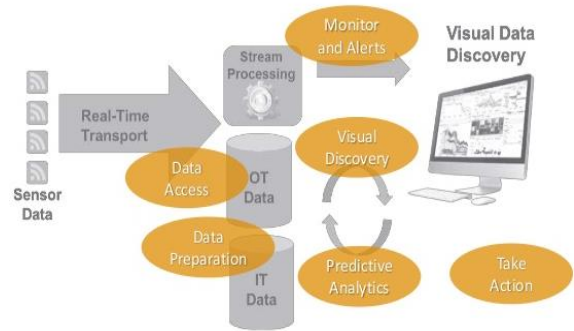

Fig. 3:Visualization for IoT.

IV.MACHINE-TO-MACHINE COMMUNICATION

For IOT Environment M-2-M plays an integral role and is widely used in most industries by experts. Machine to Machine Communication is one in which one machine communicates with other fro accumulating and exchanging information. For communication in M2M both wired and wireless technologies are used. Nowadays machine to machine transmission includes transmission of information to personal appliances also. M-2-M brings revolution in all the sectors.

For Example: Security, emergency services, marketing etc.

M-2-M is the method of communication between devices through wired or wireless communication networks.M-2-M helps to capture data about events from assets. It's also helpful to achieve productivity gains, reduce costs and increase safety and security. It's also used in remote monitoring and control of enterprise assets all without human interventions. Nowadays CCTV cameras are used to capture culprits and also trace out accident prone reasons with those cameras embedded in the secret places. It is predicted that when M-2-M communication happens, even a camera taking pictures of odd persons reporting the security system automatically which will alert the happening of the event.This is what referred as M-2-M communication.[7]

TABLE1.DIFFERENCE BETWEEN M-2-M ANDIOT

| M2M	IoT
Point-to-point communication usually embedded within hardware at the customer site	Devices communicate using IP Networks, incorporating with varying communication protocols
Many devices use cellular or wired networks	Data delivery is relayed through a middle layer hosted in the cloud
Devices do not necessarily rely on an Internet connection	In the majority of cases, devices require an active Internet connection
Limited integration options, as devices must have corresponding communication standards	Unlimited integration options, but requires a solution that can manage all of the communications
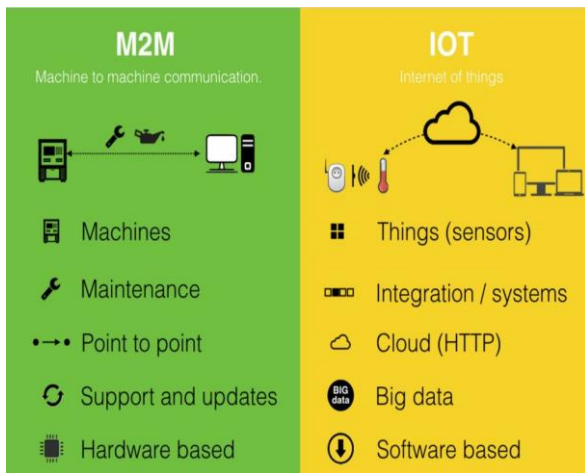
Fig. 4: Difference between M-2-Mand Internet of Things.

V. DEVICE-TO-DEVICE COMMUNICATION

The use of core networking technology can be avoided, which will be replaced by peer to peer or device to device communication directly.It is called D-2-D communication& it has different structurewhich is different from that of a traditional cellular network.
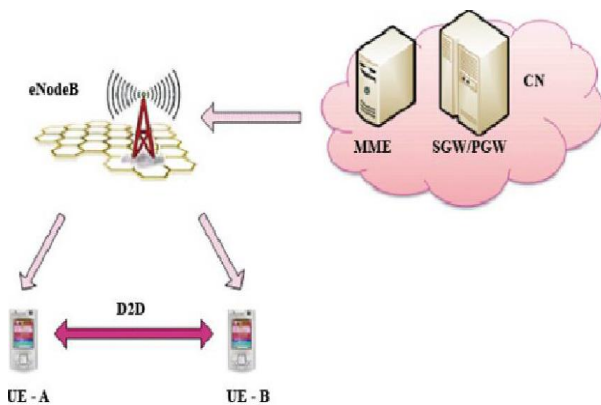

Fig. 5: Device-to- Device communications

It increases the spectral efficiency, user experience, and communication applications.D-2-D communication is a communication process in which different types of devices communicating with one another and devices e using frequency spectrum or sharing frequency spectrum for its maximumadvantage. The main advantage is that it uses frequency spectrum for sharing to transmit the data. It improves overall throughput, spectrum utilization, and energy efficiency. The other important feature is, it will work even when the network system is downdue to any reason. It will be the proximity based connectivitybetween two devices which will help in following sections.

a) The communication between human beings for social networking, entertainment, gaming purposes
b) This will help in location based marketing and advertising purposes. It also supports fastercommunication in emergency time like fire etc.

Due to the advancements in technology 4GLTE, 5G helps in transmitting gigabytes of data in ahigh data rate between devices. The latest mobiles and systems are introduced with configurations to suit the advancements in the technology. The technology not only supports speed but also provides high security, privacy and trustworthiness for the data.

Due to the advancements in the communication and the usage of high end upgraded services like Social Media, Live Streaming, Advanced browsing web applications which are transmitting data in a high rate between devices. Nowadays all the industries using IoT technologies are moving towards high-end transmitting devices.

This helps to get better experience as the high capacity applications which chooses high capacity spectrum. Peopleare also working on 5G of mobile communication where thedata will travel from one device to another at more faster and safer. [10]

VI. ENERGY EFFICIENCYAND GREEN SOLUTIONS

In IOT the things ranges from simple sensing nodes to complex sensors, actuators etc.The IOT application ranges from simple monitoring applications to complex applications which provides complete automation for the entire campus. As IOT communications requires offline work, information be exchanged on demand, or will allow online real time control.But in the traditional approach of method Building Management Systems (BMS) interconnected with the help of Programmable Logical Controllers which ends order to actuators from the sensed data received. In this the system will be able to take multiple parameter data like weather forecasts. [11]

A) Impactof IoTin Efficient Energy Management

The IoT not only helps in remote control of devices but also the usage of energy in an efficient manner. It is widely in most of the applications with good energy efficiency.

Nowadays the main user interface to IOT is the various smart phones or apps. The emission of polluting agents into the environment is reduced using the green network of IOT.

In a short period of time in the near future our environment is filled with millions of sensors, devices and thins which acts intelligently using 5G technologies .It will surely bring massive change in our life style. Everything be Green Internet of Things. It makes our work smart to be done in a fraction of seconds intelligently and accurately.The rapid advancements in the field of smart object makes things happens automatically and autonomously , creating communication between people and thins in a smart manner with less power utilization and optimized bandwidth consumption. It will surely help the human beings of all categories in making work done in a smart manner. [12]

The Green Solution is making the IoT environment more energy efficient to work with. Also it will help the industries to cut down the high energy usage by using the old technologies.

Potential topics include but are not limited to the following:

1) Green services in IoT
2) Green communications
3) Mobility management in green IoT
4) Green IoT Localization

5)   5G IoT Technologies

VII. DATA MINING

The vast amount of data generated from the IoT is of high importance in the field of every business transactions. Different mining algorithm are present in Data Mining to mine the data. [13]The smart commodities connected viathe internet could be sensor network, and various handheld or mobile devices.The data produced by these commodities is huge involume. [14].

In an IoT Environment to get a valid data mined, various algorithms are used. It is a very changeling task to choose the appropriate algorithm

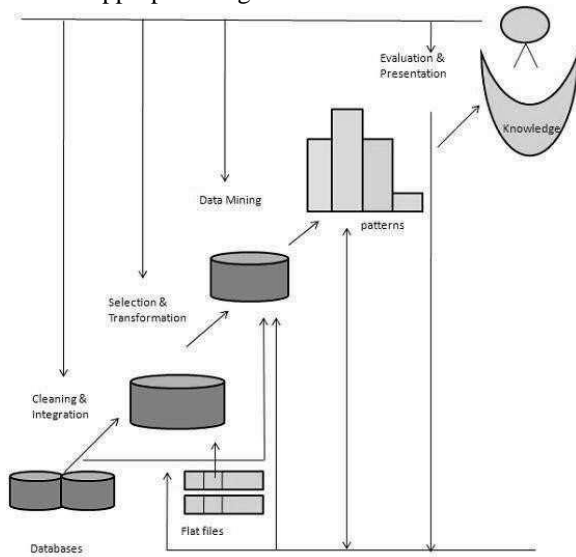Fig. 6: IoT Data process model

Data miningrefers to the process of extracting valuable or sensible information from a huge set of data.[15]To solve the present scenario which is tomanage the huge data from IoT and apply suitabledata mining technique, we will first look up the sevenstages in the KDD processwhich are as follows –

a)   Cleaning: This is the process of removing inconsistent data which is not providing any valuable information.

b)   Integration: Associating the different types of data is known as integration.

c)   Selection: The restoration of relevant data from the database to get proper knowledge by analyzing the relevant data.

d)   Transformation of data: The process of transformation of data from source format to the destination format by using the various operations like mapping or summation

e)   Data Mining: The special process of extracting require patterns from the database using some algorithms.

f)   Evaluation:It is the process of ensuring the correctness of the information extracted in the previous phase.

g)   Presentation:The collected data is presented in the required formats like graph or any statistical method for the better understanding of the user.

The above KDD process to applied to the suitability of the IOT as needed

VIII. CONCLUSION

The architecture model of integrating IoT network system to various industrial and domestic devices had been discussed and detailed analysis of the benefits obtained were illustrated. The use of self organizing network and how it can be implemented in future for increasing performance in the IoT environment were briefed in the paper.

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