

STUDY ON IOT USING REFERENCE OF M2M

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Abstract—Machine to Machine (M2M) transmission or the Internet of Thing (IOT) is evolving by way of a novel form of communications in our humanity. Using some propagation of the IOT/M2M, we have happening to involvement multiple smart facilities like smart home, associated car, e-health, smart network, etc. These IOT/M2M facilities are fixed to progress our life knowingly. However, in IoT/M2M many things only exchange a small amount of data while generate a large amount of requests such as network connectivity requests, notification requests and storage requests. Triggered by the explosion of mobile subscriptions and emerging services such as machine-to-machine (M2M) and internet of things (IoT) in the coming 5th generation time, a suitable totaling design is a crucial part to simplify entrance of companies and people to infrastructures facilities. The field of M2M and IoT communications is rapidly expanding, and this will have impact on national numbering plans because machines need to be uniquely identified and addressed in sequence to interconnect by them. The possible quantity of M2M and IOT campaigns can be enormous.

Keywords— IOT, M2M, oneM2M, Architecture on oneM2M, Technologies in IOT.

I. INTRODUCTION

In Internet of Thing (IoT) / Machine to Machine (M2M) many smart services and many “things” exchange only a small amount of data once in a while, use no voice or SMS services at all, while generate a large amount of storage requests, notification events and network connectivity requests. If service providers and network operators still utilize charging models of the past such as amount of data transfer, they would not receive the fair amount of revenue from the subscribers.

The Internet of Things (IoT) is part of the future Internet technology that enables people and things to be connected together. The basic idea of IoT is the pervasive presence of things and devices that are network connected and can cooperate with one another to provide human users useful facilities using M2M communications. The IoT collects useful information from devices and make smart use of this information in various IoT/M2M applications.

A great challenge for the IoT/M2M service provider is how to configure and manage a large number of IoT/M2M devices after they are sold and deployed. Machine to Machine Communications (M2M) is proposed to allow the machines (or devices) to interact with each other without much human intervention through wireless or wired communication N/Ws. M2M is deliberated as an important part of the IOT to allow a huge range of M2M uses. Unfortunately, most M2M applications nowadays are for independent vertical silos only with little interoperability. Consequently, new applications cannot be easily developed, merged or integrated into the existing system deployment.

Machine-to-machine (M2M) devices are the devices that have communication interface(s) to interact with other devices or servers but have no or limited human interaction. The examples of M2M devices include smart meters, cleaning robots, smart appliances, blood pressure monitors, surveillance cameras, unmanned aerial vehicles (UAV, intelligent drone), and telematics control units. M2M devices may connect to a wireless or fixed wide area network (WAN) directly or via a M2M gateway (portable or fixed) and be centrally managed by the M2M server in the core network area or in the Cloud. The M2M server provides the following key device management functions: (a) initial provisioning and registration (b) service activation and de-activation (c) device diagnostics and monitoring, besides service capability enablement, which is being addressed by the oneM2M and is not covered in this paper. The remote M2M device management and provisioning are considered as critical aspects for a successful deployment of M2M communications and Internet of Things (IoT) due to the large number of M2M devices. [1]

II. OVERVIEW OF IOT

IOT or the internet of things influences the internet and communication technologies. It connects living and non-living things with the help of internet. These devices that use the internet can be roughly considered as the primary things on the internet. But these campaigns want more human interaction and use observing. Internet of things generally excludes personal computers tablets and smart phones and it is expected to increase almost 30 fold times from 0.9 million to around 26 billion units by 2020. The main challenge in the internet of things is regarding the vulnerability of IOT devices to malevolent program. The gadgets of IOT sense the information and pass the question to interpersonal organization.

By taking into consideration correspondence people searching for information given by objects which is known as human object communication with the help of RFID we can associate self-sufficient route as indicated according to the guidelines of proprietor. Internet of things is commonly referred to as “smart object networking” according to the internet engineering force .Smart objects are actually devices which have significant constraints. These limitations or constraints could be of much type. They can be commonly classified as constraints related to limitation of power, memory and processing resources and bandwidth. According to the concept of the Internet of things, new things are often connected to serve many applications. There is also a fairly heterogeneous mix of communication technologies for addressing the needs of the various applications related to the

IOT delivers broad interconnectivity. It means that with the help of the internet of things we can connect devices to access global information and communication infrastructure. In addition to that the internet of things is known to provide services that ensure consistency semantically between the virtual and the physical things. These things are often heterogeneous based i.e. they run on different hardware platforms and networks. There are multiple technologies recycled in IOT are:

1. Radio Frequency Identification (RFID).
2. Near Field Communication
3. Machine-to-Machine (M2M) Communication.
4. Vehicle-to-Vehicle (V2V) Communication.

III. OVERVIEW OF M2M

According to the internet of things concept machine to machine communication refers to communication between devices directly with the aid of communication channel. Machine to machine is often done using sensors and other wireless technologies like Wi-Fi. In the industrial implementation of machine to machine communication, we often use sensors and meters to communicate all the recorded data to the software applications. Originally some of the communications in M2M communication was consummate with a remote network of mechanisms. M2M communication is a current technology which allows in conveying smart facilities to broader viewers. Currently the wireless communication networks are designed and optimized in such a way which is quite different from a regular human to human communication. M2M communication does not want involvement of persons. In other words it is communicating between machines using various sensors and wireless technologies without any human help. Over these recent years machine to machine communication has gradually found popularity and foothold in various industries like utilities, health care and manufacturing and distribution of consumer products. Machine to machine capabilities enable smart services.

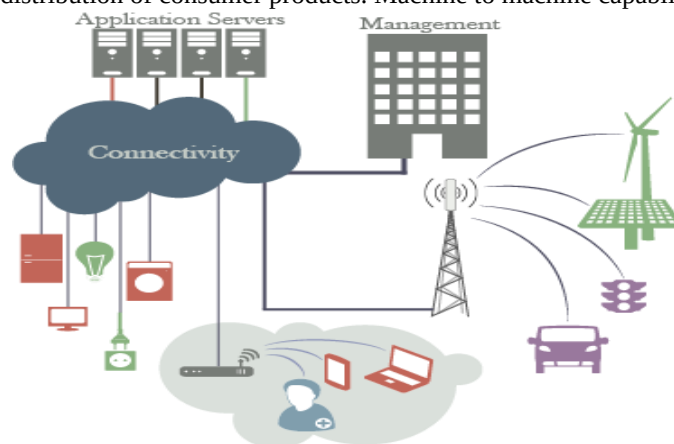


Fig.2.1. M2M Communication.

The current wireless network requires human intervention for mobility and interactive experience. However with the machine to machine connection allows developing interactive networks which are more reliable and resilient and self-balancing as compared to the remaining wireless N/Ws that want human intermediation. The wireless machine to machine communication devices are expected to be more enhanced and these M2M devices are expected to gain more popularity. Enhancement in M2M communications can be found with growing the tractability of wireless communication. One way of doing it is done by software defined radio. Further latest M2M communication has altered in a structure of N/Ws that transfers information to particular uses.

Every machine to machine network is composed of mainly these elements:

1. Machine to machine component is one of the main elements of every M2M communication. These components are often used for transmitting data and replying requests over a communication network.
2. The next significant section is the M2M server. It server workings as a middleware level. This server is recycled to pass information using several uses.
3. The connectivity between the various components and the network in a machine to machine communication is facilitated by M2M gateway.

Improvement in wireless machineries has removed the obligation of cables for M2M communication. Wireless M2M components are more effective for using in remote locations.

The high level architecture of oneM2M is organized into three layers. OneM2M defines reference points provides a clear boundaries between these layers which enables interoperability between infrastructures of One M2M providers.

1. M2M application terms like Application Entities are the parts of the Application layer.
 2. Common Service Function acts as terms for M2M architecture are the parts of the Common Service Layer. The instances which are organized known as Common Service Elements are the sets of CSF.
 3. Network Services Entities are present inside the Network Service Layer which exposes its capabilities.
- The vision of network connectivity and computing capability divulges into future enhancement in the field of technology named as IOT.

IV. Architecture on oneM2M

However there are certain areas in machine to machine communication which needs to be researched further. These areas are:

1. Normalization of M2M communication. Machine to machine communication requires standardizations for integrating and converging different systems of communication. Standardization of machine to machine architecture is required for the rapid development and applications of communications.
2. Re-designing of protocol related to the machine to machine communication is very much essential and necessary. It is because the existing protocols do not prove to be efficient enough for machine to machine communication. Therefore protocols dedicated for machine to machine communication need to be specially designed.
3. Management of spectrum for machine to machine communication is very essential for achieving optimal management of spectrum. Secondary spectrum markets are essential to achieve the optimality.
4. Characterization of traffic exchanged among various machine to machine communication components need to be studied for providing quality service.
5. Need for designing a network which enables to reduce the cost of machine to machine communications and its maintenance. [2]

V. LITERATURE SURVEY

Rami Akeela et.al. [2017] In sequence to proficiently provision the Machine-to-Machine and Internet of Things uses, a novel adjustment on behalf of the Wi-Fi average called as IEEE 802.11ah is presented. In 802.11ah (or Wi-Fi HaLow), multiple improved MAC modules are further in sequence to deliver scalability for a great number of places, access the variety of process, when at the similar time decrease the energy ingestion related to the remaining Wi-Fi principles. In this paper, a Verilog RTL execution of the new average is accessible. It is appropriate meant for IoT, M2M, and V2V (Vehicle-to-Vehicle) communication, and smart networks that want extended battery life and large variety consistency. Software simulations using Xilinx Vivado are also provided to verify the design. The design is then synthesized using the same tool, and performance, power, and area are reported. [3]

Chih-Nan Hu et.al. [2017] Triggered by the explosion of mobile subscriptions and emerging services such as machine-to-machine (M2M) and internet of things (IoT) in the coming 5th generation period, a suitable totaling strategy is a crucial section to ease entrance of businesses and people to communications facilities. The field of M2M and IoT communications is rapidly expanding, and this will have impact on national numbering plans because machines need to be uniquely identified and addressed in sequence to interconnect by them. The probable sum of M2M and IOT campaigns can be huge. A mobile access E.164 totaling source is the most feasible result for addressing M2M and IOT uses minimum in the small and average run. This paper examines and analyzes strategies for national numbering plans for M2M and IoT services. [4]

Dong-hyu Kim et.al. [2016] this paper examines how official ethics form the M2M/IoT technical course. We, initially, pictured the obvious mention networks of M2M/IOT, sketch upon the public network examination and Hummon and Dereian's (1989) connectivity size, and recognized the technical course of M2M/IOT. With the consideration, we initiate that 3GPP ethics concerning the complete M2M/IOT system design (TR 22.868, TR 33.812, TS 22.368, TR 22.888, in actual) host an essential role in situation the border circumstances of the M2M/IOT variant and selection method. 2nd, we initiate the significance of official standards on path-creation through catch-up practices (example LG and Huawei), since they provide access to external knowledge and opportunities to build up their knowledge base. These discovery are estimated to create assistances to origination and principles studies with provisionally illustrative the relationship among a technical course and ethics. Besides, they may cast light on the current M2M/IoT ethics enmity and suggestion real suggestions for catch-up approaches. [5]

Fuchun Joseph Lin et.al. [2016] M2M communications or the IOT is evolving as a novel form of communications in our humanity. Using some propagation of the IOT/M2M, we have happening to involvement several smart facilities like smart home, linked car, e-health, smart network, etc. These IOT/M2M facilities are fixed to progress our life considerably. However, in IoT/M2M many things only exchange a small amount of data while generate a large amount of requests such as network connectivity requests, notification needs and storage appeals. The traditional indicting models like those depend on quantity of data transfer are no longer sufficient for M2M communications. As per original charging issues and charging models are recognized for M2M communications, a novel charging building wants to be

considered for M2M communications. This paper proposes such an M2M charging architecture that is designed to collect charging information for M2M communications based on the notions of charging factors and charging models. [6]

Pohan Peng et.al. [2016] In IoT/M2M platforms such as those defined by ETSI and oneM2M, all data collected by sensors are transmitted and stored in the platforms before they are processed. These data consume much of platform resources including network bandwidth, storage, CPU and memory. Yet, in reality not all these information are wanted via the IoT/M2M uses. In this paper, we propose to add a Streaming Data Preprocessor in the IoT/M2M platform to deal with fast velocity and large volume data from the IoT/M2M sensors. We try and associate the information handling ability of our improved platform by the one lacking a preprocessor dependent on an ETSI M2M obedient platform Exposed MTC. Our experiment was conducted for a factory management use case from which we show that our enhanced system demonstrates better performance. [7]

Rapeepat Ratasuk et.al. [2016] in 3GPP, a narrowband system based on Long Term Evolution (LTE) is being introduced to support the Internet of Things. This structure, termed Narrowband Internet of Things (NB-IoT), can be arranged in 3 altered process modes – (1) stand-alone such as a enthusiastic carrier, (2) in-band inside the engaged BW of a wideband LTE carrier, and (3) contained by the guard band of an remaining LTE carrier. NB-IoT can conquer 1 GSM channel (200 kHz) when for in-band and guard-band operation modes, it will usage one somatic resource block of LTE (180 kHz) in stand-alone operation mode. The scheme objectives of NB-IoT contain low cost strategies, high analysis (20-dB enhancement over GPRS), lengthy scheme battery life (more than 10 years), and enormous capacity. Invisibility is calm while a stay budget of ten seconds is the aim for exclusion reports. The provisions for NB-IoT are predictable to be confirmed in 2016. We define the goals for NB-IoT and current a primary system scheme in this paper. In addition, coverage, capacity, latency, and battery life analysis are also presented. [8]

Christian Antonia Lusiarta Putera et.al. [2015] IoT/M2M aims to integrate a large number of heterogeneous devices which are constantly required to be discovered and reconfigured in order to bring them up to date or to recover from their failures. A method organization protocol allows the concept of an IOT/M2M method as an accomplished entity to simplicity the administration of the method. The M2M standards, such as ETSI and OneM2M, have adopted the use of OMA Lightweight M2M Device Management Protocol to manage and configure the IoT/M2M devices from the IOT/M2M stage. Yet, how to integrate and prepare reserve planning of OMA LWM2M in the IoT/M2M average design is not well addressed by those standards. In this paper, we present and analyze how to incorporate the OMA LWM2M in the IoT/M2M standard architecture. Through this seamless incorporation, an IoT/M2M application is enabled to manage IoT/M2M devices from the IoT/M2M service platform at a higher level of abstraction. [9]

VI. TECHNOLOGIES IN IOT

In the network and service infrastructures, IoT is described an incredible evaluation. This approach is used for various purposes and each application is built on its proprietary IOT technologies and infrastructure. This can be divided into several phases they are

- (i) Collection phase.
- (ii) Transmission phase.
- (iii) Process, management and utilization phase.

Each phase has different functions, protocols and interacting or communicating technologies.

(i) Collection phase: This phase is used for collecting the physical objects which are presented in the physical environment. It provides the processes for knowing the somatic atmosphere and collecting real time somatic information or entities like RFID and sensors which delivers documentation of physical objects and physical parameters also. IEEE802.15 and Bluetooth are used for data collecting in the physical environment. In the RFID, two tags are used, they are passive and Active tags passive tags are used to transmit the data, they are very small and inexpensive and long life also then it delivers restriction capability. Specific prepared power supply transmission b/w the tabs and bibliophiles revenue place in 4 altered occurrences. Low, High, Ultra high and higher.

(ii) Transmission phase: It contains several mechanisms to produce the collected data to different applications and servers. Network gateways and heterogeneous technologies for addressing and routing. In wired technology transmission can be using Ethernet IEEE 802.3 from 10mbps to 1000GBPS over twisted, coppers, coaxial cables. The main advantages of this wired technology is robust and reliable. In wireless technology transmission can take over the Wi-Fi family which operates in different frequency bands. IoT mostly implemented in the wireless technology because it gives more efficient scare networks in cellular technology.

(iii) Processing, managing and utilization phase: It associations using handling and evaluating for flows of data and furthering information to use and facilities and giving feedback to the final control applications. It should hiding the hardware, software data, technologies and communications protocols in heterogeneity platform and also service oriented architecture can be used in this concept. As SOA approach applications are running on static computers, it requires

adaptive to various context. Normally SOA can be deployed on three layers. Each layer participating for different functionalities in the IoT.

These are very useful for industries and other perspectives. In this section we will discuss about the other important paradigms such as social networks and context aware computing. The main idea is objects that contains own consciousness and they exhibit or produce social behaviors allowing to creating own networks of objects. These networks can improve the trust level between the users and to increases the applications and services more efficient. [10]

VI. CONCLUSION

Billions of devices will be connected to the Internet. How to manage such a huge number of devices efficiently is a big issue. In the future we plan to expand our research to the management issues of a massive number of M2M devices. We will analyze how to perform device management by grouping them based on their functionalities and locations.

As more and more IoT/M2M devices are connected to the Internet, the IoT/M2M platforms normally deployed in the Cloud are increasingly overloaded with a large amount of data traffic. Though more resources in the cloud may be allocated to alleviate such overloading issues. The paper illustrates our system design and demonstrates our system scalability capacity using an industrial IoT (IIoT) use case. Finally, we compare the performance of our dynamic scaling mechanism with those based on a static and fixed pool of serving instances.

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