MACHINE TO MACHINE COMMUNICATION AND CONNECTIVITY WITH IOT

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I. Introduction Machine to Machine

The word M2M (Machine to Machine conversation) describes gadgets which can be related to the Internet, the use of a number of strong and wi-fi networks & talk with every different and the broader world. They are energetic conversation gadgets. The phrase is barely specious aleven though because it appears to just accept there may be no human withinside the equation, which pretty regularly there may be in a single manner or another. Machine to Machine is all approximately connecting severa gadgets for accumulating information from sensors.

Machine to Machine is ready connecting and speaking with „matters" from the Internet of Things wherein matters consult with severa Embedded Devices. Internet of Things refers back to the conversation of factors i.e. sensors. „Things" consists of sensors, machines, etc. The time period „Internet of Things" is mainly related to packages that contain RFID (Radio Frequency Identification), These employ so-known as tags, small chips with antennae that begin to transmit information whilst they arrive in to engage with an electromagnetic field. They are passive conversation gadgets, in assessment to active gadgets which can transmit due to the fact they have got get entry to to a energy supply much like a battery.

Machine to Machine functionality is used for connecting severa gadgets and matters. In this paper, Machine to device conversation used withinside the Internet of Things is discussed. The foremost cause for the focal point on M2M is to don't forget the recommendations for conversation infrastructure and services. Smart Living, Cities, Meters, Grids, and so forth, are packages with widereffectsfor financial and social development. The paper is prepared as follows: Firstly Introduction, Machine to Machine, Requirements for M2M Communication, New Business Models, Applications of M2M and ultimately Conclusion. MACHINE TO MACHINE (M2M) It rises to technology that permit each wi-fi and stressed out structures to talk with different gadgets of the identical type.

M2M is a extensive time period because it does now no longer pinpoint precise wi-fi or stressed out networking, statistics, and communications technology, this extensive time period is specially utilized by commercial enterprise executives . M2M is taken into consideration an important a part of the Internet of Things (IoT) and receives numerous blessings to enterprise and commercial enterprise in widespread because it has a extensive variety of packages along with commercial automation, clever grid, clever cities, logistics, health, the sector of defense, etc. often for tracking

however additionally for manipulate resolutions.

M2M can encompass the case of commercial instrumentation along with a tool along with a sensor or a meter to the detention of temperature, stock level, etc., this is relayed thru community wi-fi, stressed out or hybrid to an software that converts the captured end result into significant statistics. Such conversation become previously finished with the aid of using having a far off community of machines transmit statistics again to a significant hub for exploration, which could then be redirected right into a device much like a private computer.M2M become previously used for automation and instrumentation however now has been extensively utilized to consult telematics packages.

II. Machine To Machine System Development

In the early 1980s, Surveillance Control and Data Acquisition (SCADA) [4] introduced an early form of M2M. SCADA seeks to focus on features similar to M2M, but SCADA consists of several remote systems, making the technology more complex and rich. Initially, SCADA unlocked its new proprietary protocol and began releasing protocol specifications. But it was a transition from a proprietary system to a consistent, low-cost technology. 4 JOURNAL OF PLATFORM TECHNOLOGY VOL. 2, no. June 2, 2014 recently, various models similar to M2M have been proposed. These are device-to-device (D2D), machine-type communication (MTC) [3,8], Internet of Things (IoT) [4,5]. And ubiquitous sensor networks [9]. For the vast majority of research platforms, M2M solutions do not address some of the major issues. H. Service and application development is largely focused on power-saving technologies, networks (MAC, routing, transport), and other protocols. However, we believe there is still plenty of room to solve and address service and application issues. In addition,

M2M services and application platforms are a relatively new field of study. Apparently, some authors compared several M2M service and application platforms based on scope. It focuses only on platforms between people, object environments, and business systems. In addition, the requirements of the M2M platform are compared in terms of standards, adaptability and scalability. In contrast, classifying existing M2M platforms and architectures based on their network architecture and protocol design requires special intent. M2M classification transactions require the following topics: Classification of existing works, architectural design, communication and networking, cellular systems, mobility and management of devices and networks for sustainability.

The main purpose of such classification is to facilitate the design of new architectures and protocols for M2M communication, and manage the efficiency of devices and users. Therefore, we planned the rest of the work below. Introducing the outline of

the current M2M work and its problems. In the classification of M2M networks and their functions, we first examine the M2M architecture and its communication patterns. The following is a classification of existing work in M2M communication. The following describes various challenges in the existing work of M2M communication and network protocols. The rest of the paper is organized as follows: Section 2 briefly described the M2M system architecture. Section 3 briefly described the different classifications of M2M communications. Section 4 describes the main challenges of M2M. Finally, Section 5 briefly concludes this article.

III. Relationships Between Mtom And IOT

The Internet of Things (IoT) is a network of physical objects or "things" that incorporate electronic devices, software, sensors, and network connections that enable these objects to collect and exchange data. The Internet of Things enables remote sensing and control of objects through existing network infrastructure, creating opportunities for more direct integration of the physical world and computer-based systems, efficiency, accuracy, and commerciality. Increase value . In the IoT, "things" are people with heart monitors and cars with built-in sensors. In the IoT, objects are assigned IP addresses. We already have IPv4, and electronic devices such as laptops and PCs are sophisticated to communicate over IPv6, which allows us to handle the IP addresses of almost everyone. The big difference from IPv4 is the increase in address space. The IPv4 address is 32 bits. The IPv6 address is 128 bits. With IPv6, a large number of IP addresses can be used to meet the needs of new IoT technologies . Objects collect data and send it over the network without intervention.

Embedded technology helps interact with the internal state or the external environment, which influences the next decision to be made. In short, the IoT is the technology we use to connect the Internet to what we use or see in our daily lives. The IoT is expected to go beyond machine-to-machine (M2M) communication to provide extended connectivity for devices, systems, and services that cover a wide range of protocols, domains, and applications.

The connection of these embedded devices (including smart objects) is expected to pioneer automation in almost every area. Key IoT technologies include RFID or near field communication, optical tags and fast response codes, and Bluetooth Low Energy.

Machine-to-Machine (M2M) Communications M2M is considered an integral part of the Internet of Things (IoT) movement, and the term is widely used by industry experts. When one machine communicates with another to collect information and exchange data, it is called machine-to-machine communication. You can use a variety of wireless and wired networks. Nowadays, machine-to-machine communication involves transferring data to personal devices.

M2M will revolutionize various areas such as security, emergency services and marketing. Machine-to-Machine (M2M) technology will continue to exist and remain one of the fastest growing technology areas in both the enterprise and consumer markets.

Devices like the Apple Watch not only notify you of time and provide restaurant recommendations, but also have sensors that monitor activity, collect data, and report information to other devices and applications. All of this is done without human intervention . ffor example when using a security camera in a secret place, and after an accident, we can identify the criminal from the camera records. But in the future, when m2m communication takes place, insert pictures of trusted people.

With the advent of the Internet of Things (IoT), the world is ready to become a global village. The vision of the IoT is to build a network of interconnected devices that can exchange data over the Internet. IoT devices can communicate with each other and can be automatically programmed to perform tasks. For example, you can set the lights to turn on automatically when it gets dark, or you can turn on the air conditioner when the room gets hot.

One of the most important aspects of machine-to-machine communication is connectivity. If there is no wireless or wired connection between the devices, the devices will not be able to communicate. The IoT has a variety of protocols, technologies, and applications used to connect devices.

First, we need to understand what the IoT is and what M2M means. The Internet of Things stands for Internet of Things, which incorporates physical devices, vehicles, household appliances, and electronics, software, sensors, actuators, and connections that allow these objects to connect and exchange data. A network of other objects. M2M is an abbreviation for machine-to-machine communication. This is a subset of the IoT that explicitly handles connections between machines. Machine-to-machine communication allows devices to communicate without human input. The

M2M aims to connect machines to the Internet so that they can communicate with each other, manage tasks and data, and usually do "business" with each other. Similarly, the IoT is the connection of devices to the Internet that are intended for remote monitoring by individuals or businesses. IoT devices are commonly used in industrial environments to monitor device performance, report operational data (such as temperature), and track assets (such as shipping containers). However, M2M communication is not limited to the industrial environment. It can also be used in home automation applications such as lighting, locking, security systems, and controlling appliances.

However M2M and Iot also has some key difference such as:

1. Definition

IoT stands for "Internet of Things" and M2M stands for "machine-to-machine communication" essentially without human intervention. It's also important

to understand that M2M has been around longer than the IoT. It can be said that M2M defines only a part of IoT. As the possibilities of connected objects increased over time, the term "IoT" also surpassed its predecessor, "M2M."

2. Connectivity

The M2M solution requires a direct connection (point-to-point) between any two devices. In comparison, IoT systems typically connect to a wider range of networks that can bring more power and sophistication to the device (cloud networking). While the IoT relies on connecting physical objects to the network, M2M is primarily a platform for interconnecting devices. IoT applications are designed as closed systems that interact only with their targeted hardware. In M2M, applications need to actively communicate with each other.

3. Components

The IoT is a network infrastructure that makes life easier by collecting data from a variety of sources using advanced tools and sensors. In contrast, M2M networks are primarily targeted at a single device that uses short-range communications.

4. Scalability

The two networks also have different scalability. The IoT is designed to connect "things", so it can scale more quickly than M2M. Individual devices are often integrated into existing systems. M2M networks are usually designed for small projects. They cannot grow quickly and have no internet connection, which can make it difficult to integrate with existing systems.

5. Communication

In machine-to-machine communication (M2M), data is not shared with the application. All you have to do is make measurements and collect data. However, Iot devices collect data from multiple machines, apps, and systems and share it with other methods to make the overall experience more efficient. Many devices connect to the network using a cellular or wired connection. The delivered data is delivered through the cloud-based middle tier. Internet of Things devices are internet-enabled, but M2M doesn't have to be connected all the time. This depends on the device and how it is used (for example, you can't connect to the internet because you don't need a refrigerator). In most cases, the device requires continuous internet access. This is because they must adhere to the same communication protocol and at the same time have limited integration possibilities.

IV. Requirements for m2m communication technologies

The ideal M2M communication technology provides instant and secure access to the Internet from anywhere in the world at any speed. It works indoors as well as outdoors. It has unlimited range, zero latency, unlimited throughput, evaluates virtually nothing, and consumes no power. It provides access to and control of the data needed for the imaginary use of M2M while maintaining confidentiality. Unfortunately, this is not the case, so all

technical choices are a compromise. It is these trade-offs that can make the choice of network technology difficult. The trade-offs with some common necessities related are:

• Range and penetration
• Power consumption
• Through
• Supported network types
• Ease of deployment and maintenance.
• User Interactions
• Supported Application Types
• Mobility
• Failover Capabilities How the system can operate.

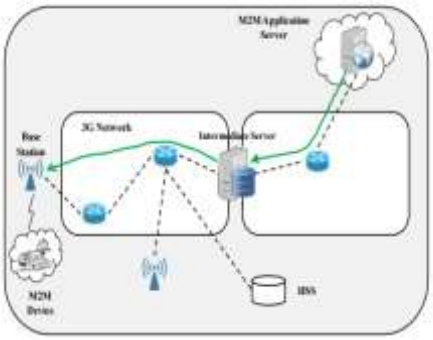

Figure 1. M2m Network

Whether it is "forward-looking" and able to meet changing demands depends on these decisions. Some M2M projects have already failed at the stage of selecting important parameters. For other projects, changes in demand will invalidate previous decisions. For example, smart metering has a number of pilot projects, but there is no market consensus as to which communication technology is best. Companies have found it difficult to find a single technology or group of technologies that meets all the requirements of Wal-Mart's measurement projects.

V. How M2M Works

Industry 4.zero`s underlying want is powerful and green conversation among a plethora of manufacturing units, services, diagnoses, hand-held gadgets, and business enterprise structures withinside the push to design, manufacture, and carrier the best in question. This is reasonably apparent to maximum forward-searching engineers, however the exploding variety of regularly advert hoc related sensors, controllers, and actuators is growing swarms of gadgets which are hard to interconnect and prepare in an commercial network.

For Industry 4.zero to prevail, conversation technology will want to effectively join equipment over various distances in a bendy way with excessive security, robustness, and availability at a low cost. One choice is self-organizing logistics, however logistics turns into hard as soon as the variety of product variations will increase and manufacturing volumes fluctuates. The danger of dealer shortages or mistakes withinside the deliver chain intensifies with complexity

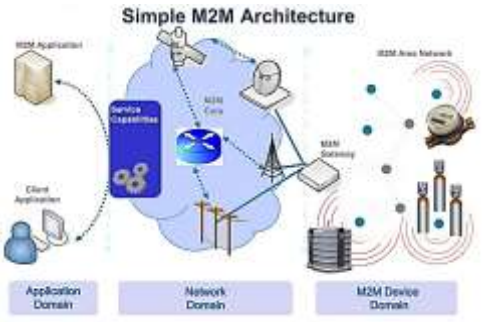

Figure 2. M2M Architecture

Machine-to-Machine (M2M) communication technologies provide capabilities for various devices to communicate between each other through wired and wireless systems. In M2M network, applying data aggregation to reduce the energy consumption is an efficient way. In data aggregation there are three significant issues i.e. choosing aggregation points, routing algorithm in data aggregation and the expiration conditions (e.g., the buffering time in time-based aggregation mechanism).

A significant amount of transmission overhead can be observed in M2M devices as the size of M2M networks becomes exceptionally large (e.g., the gas sensor in). In order to prolong the lifetime of M2M network data aggregation is an efficient way because an M2M devices has a capability of retrieving the sensing data from the same kind of devices .

To exploit data aggregation, we need to exercise message buffering in M2M devices. Therefore a time based mechanism utilizes message buffering in M2M devices. In addition to that if the message buffering time expires, M2M devices aggregate them into a new message upon retrieving data collected during the buffering time. Aggregate volume in a message and energy efficiency improves when the device extends the buffering time; however from sources to application server (or M2M gateway) the transmission delay increases. To address this issue, a scheme is designed on using data aggregation method to improve the transmission delay and energy efficiency. Machine-to-Machine conversation is the conversation among more than one gadgets in more than one methods at more than one scales with out human interventions. In current years, human-to-human conversation leads us to the brand new terminology of human-to-gadget conversation and gadget-to-gadget conversation, wherein we're status now. In a broader aspect, M2M contains numerous gadgets i.e. sensor nodes, cellular equipment, and different capillary gadgets that experience or obtain statistics from numerous different gadgets. The sensed or acquired statistics is then relayed closer to its vacation spot thru more than one hops which accomplish quit-to-quit connectivity withinside the stressed or wi-fi network.

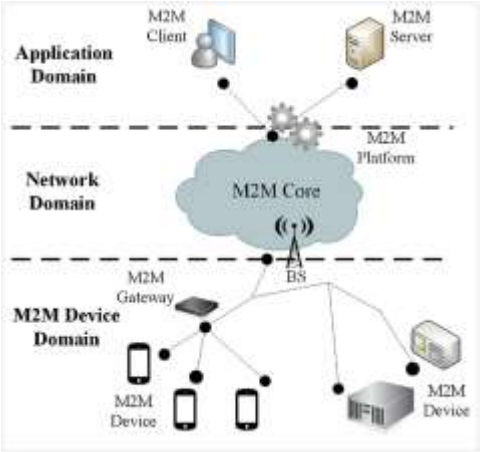

Figure 3. M2M Connection

Wired or wireless? Networks can be both wired and wireless, but the wireless M2M protocol is increasingly used today because of its convenience in installation, use, maintenance, and expansion. Wired technology is more traditional and is widely used due to its robustness and availability, especially in critical environments where safety and the risk of explosion must be considered. If these restrictions do not apply, wireless technology has the advantage of reducing engineering costs, providing access to remote and difficult locations, and eliminating the need for wiring.

The biggest merit is ubiquitous. With Wireless M2M, all factory-processed

locations and statuses are recognized at all stages and seamlessly connected to ERP and other enterprise-level IT environments. To determine the suitability of wireless technology, you need to know the characteristics of the various offers. Currently, the physical transport layer is based on the ISM band (2.4 GHz, 5 GHz, and 868 MHz). Various standards are available. B. IEEE 802.11 for wireless LAN, IEEE 802.15.1 for WPAN / Bluetooth, IEEE 802.15.4 for low speed wireless private area network (PAN).

Unfortunately, there are still very real problems with similar frequency bands overlapping, partially blocking frequencies, and causing interference. Obviously, M2M communication requires more than a discussion of physical and data link layer standards. The new protocol stack supports wireless network technologies and protocols for low bandwidth or memory-constrained communications (http://postscapes.com/internet-of-things-protocols).

The Internet of Things also imposes high demands on the device's address space and the way messages are sent. IPv6 facilitated M2M communication by solving address space issues, but IPv6 is a power-constrained application because only a small portion of the data is used for M2M applications and the rest is dedicated to messaging overhead. Is not efficient. To counter this, several energy efficient wireless M2M protocols are available.

Message Queuing Telemetry Transport (MQTT) (www.mqtt.org) is a simple and lightweight messaging protocol designed for constrained devices and low bandwidth, high latency networks with low reliability requirements. Invented in 1999, it is now standardized by the Organization for the Advancement of Structured Information Standards (OASIS). The Constrained Application Protocol (CoAP) is another low-power protocol used to communicate interactively over the Internet, translating the HTTP of sensors and switches, making it easier to connect machines to the IoT with little overhead. To. The Data Distribution Service (DDS) protocol is a special M2M middleware that enables reliable, real-time, high-performance communication between computers.

VI. IoT and machine-to-machine applications

A. IoT application

You may misplace small items such as keys, chargers, and diaries. Then I think our stuff is related to the phone. You can find it by ringing it. These concepts are technology IoT (Internet of Things). With the Internet of Things (IoT), you can use technology to improve comfort, improve energy efficiency, simplify the tasks that occupy your personal and work life, and give you more control over your life. Devices that support HVAC and UPnP.

Connected homes can have different meanings for different people, but basically they are homes with one or more (or more) devices connected to allow homeowners to control, customize, and monitor their environment. Is. -Building management

solutions such as elevator management-Wireless control and monitoring of fuel dispensers. Develop cloud integrations with microcontroller-based and sensor-based products such as Nest and Fitbit. · Develop applications on popular M2M platforms such as Pele Force, Net4things and Ayla Networks. ·

Figure 4. Applications of IOT

a. Smart metering. Measures the energy, water, or natural gas consumption of a building or house.
b. Gas leak monitor. Monitor gas line leaks and remotely control gas valves to prevent further leaks.
c. Industrial automation and industrial Internet of Things with wireless connectivity, advanced sensor networks, and machine-to-machine communication.
d. Water management solutions such as smart valves, flow / pressure / temperature sensors Home automation solutions such as smart thermostats,

B. M2M application

Opportunities for M2M are evident in the following:

Figure 5. Applications of M2

a. Home Appliances: M2M-enabled washing machines can send a notification to the owner's smart device when washing or drying is complete, and smart refrigerators can be ordered automatically as soon as you order groceries from Amazon. The finished stock is gone.

b. Medical Device Management: M2M technology enables hospitals to automate processes and ensure the highest levels of treatment. ·

c. Smart Utility Management ·

d. Telematics: Private and commercial vehicles can report location, provide engine management information, track logistics and provide driver services such as remote assistance.

e. Household appliances: e-readers and home appliances that can send data and monitor remotely.
POS (Point of Sale) for electronic payment and inventory management terminals that can be connected to retail and supply chain systems. –

f. Offshore wind turbine-A smart meter that sends energy and utility fuel consumption data every few seconds. ·

g. Banking, finance, insurance and credit card readers, point-of-sale systems (EPOS systems) for electronic payments, and solutions for energy data management across buildings.

h. Health: Remote patient monitoring, patient tracking devices, and medical devices for enhanced clinical research. ·

i. Public services: Smart cities where smart streetlights guide emergency vehicles, waste and water management, electrical mobility and smart building solutions. · Security: Alert system, CCTV, connected intelligent security for asset tracking.

j. Transportation and Logistics: Inventory tracking and real-time information such as vehicle position, driver speed, mileage, fuel consumption, employee working hours and more.

It's relaxing to see why there are so many applications in machine-to-machine communication. With improved sensors, wireless networks, and enhanced computing power, the use of M2M makes sense for many industries.

Utilities, for example, use M2M communications both when extracting energy products such as oil and gas and when billing customers. In the field, remote sensors can capture important parameters of the well site. Sensors can wirelessly send information to your computer, including specific details about pressure, flow, temperature, and even fuel levels in your field facility. The computer can automatically adjust the equipment in the field to maximize efficiency.

• Traffic control is another dynamic environment that can benefit from M2M communication. In a typical system, sensors monitor variables such as traffic and speed. Sensors send this information to computers that use special software that controls traffic control equipment, such as lights and variable information signs. The software uses incoming data to operate traffic control equipment and maximize traffic flow. Researchers are looking for ways to build M2M networks that monitor the status of infrastructure such as bridges and highways [Source: Southern Illinois University News].

•Telemedicine has another advantage. For example, some heart disease patients wear special monitors that collect information about how the heart works. The data is sent to the embedded device, providing a shock to correct the anomalous rhythm.

• Enterprises can also use M2M communication for asset tracking and security. In late 2007, M2M communications helped dismantle the theft ring of heavy equipment. There seems to be a bright future for machine-to-machine communication. This is a

flexible technology that uses common devices in new ways. Every day, businesses, engineers, scientists, doctors and many others are finding new ways to use this new communication tool.

VII. CONCULUSION

Connections are the big difference between the Internet of Things (IoT) and Machine to Machine (M2M). While the IoT is usually a device that connects to the Internet to improve performance, M2M usually connects two or more devices to the Internet for data exchange and analysis.

By definition, the IoT includes almost any electronic device that communicates wirelessly with other devices to achieve goals such as managing schedules and heating, turning off lights when someone leaves the room, and so on. .. M2M, on the other hand, is created by connecting two or more devices over the Internet and installing software for data storage and analysis. Machine-to-machine communication uses low-power, short-range wireless communication technologies such as device-to-device (D2D) and object-to-object (O2O).

The M2M Application is: Intelligent networks; retail; remote patient monitoring; agriculture; smart cities; industrial automation; supply chain management and more.

Retail provides consumers with accurate, real-time supply chain information to improve customer service. This technique is also used to validate health insurance claims. Remote Patient Monitoring (RPM) includes the connection of patient monitoring devices and patient care information management systems for remote monitoring and improved patient care.

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