# Internet of Things
# Unit - III

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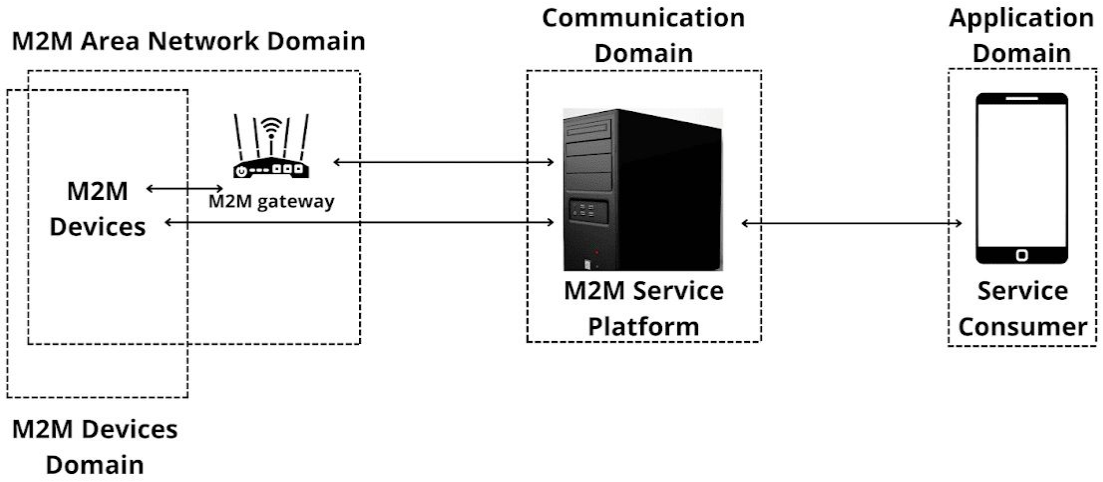
# Machine To Machine Communication

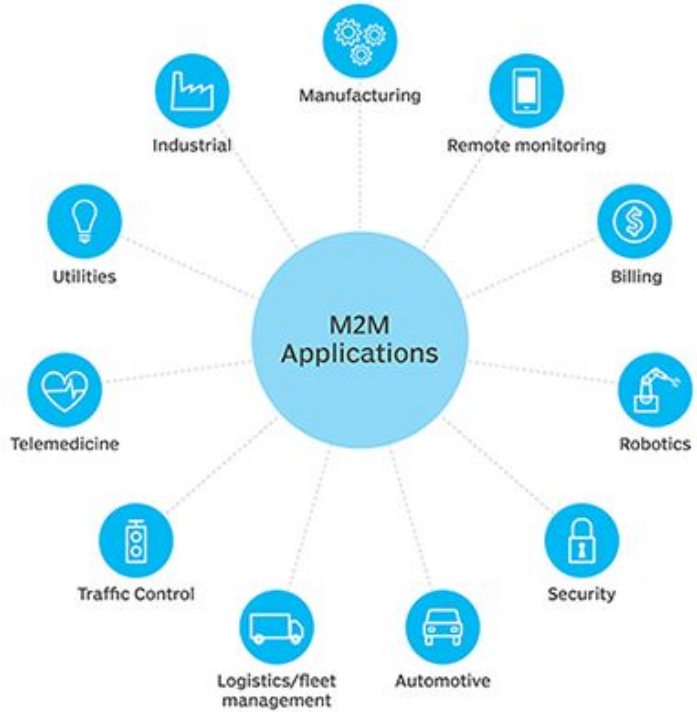
1. Machine-to-Machine (M2M) communication, also called M2M/IoT, is a more advanced form of the Internet where many devices connect with each other. Imagine a world where devices communicate without human intervention – it's like they're sharing secrets. Moreover, M2M makes our gadgets work together smoothly, like an unseen director backstage at a play. These devices share info effortlessly, helping things run better in industries and cities
2. Machine-to-machine is a term for technology that lets machines talk to each other and do things without people helping them. This works with AI and machine learning, which help the machines communicate and make their own choices.
3. At first, M2M was used in factories and industries to control machines from far away using things like SCADA and remote monitoring. Now, M2M is used in healthcare, business, insurance, and more. It's also the basis for the Internet of Things (IoT), where lots of devices connect and share information.

# Importance of Machine To Machine Communication

1. Saves money by keeping gadgets in good shape and not having to fix them often.
2. Helps businesses make more money by finding new ways to take care of their assets.
3. Makes customer service better by checking and fixing things before they break or when needed.



# Applications of M2M



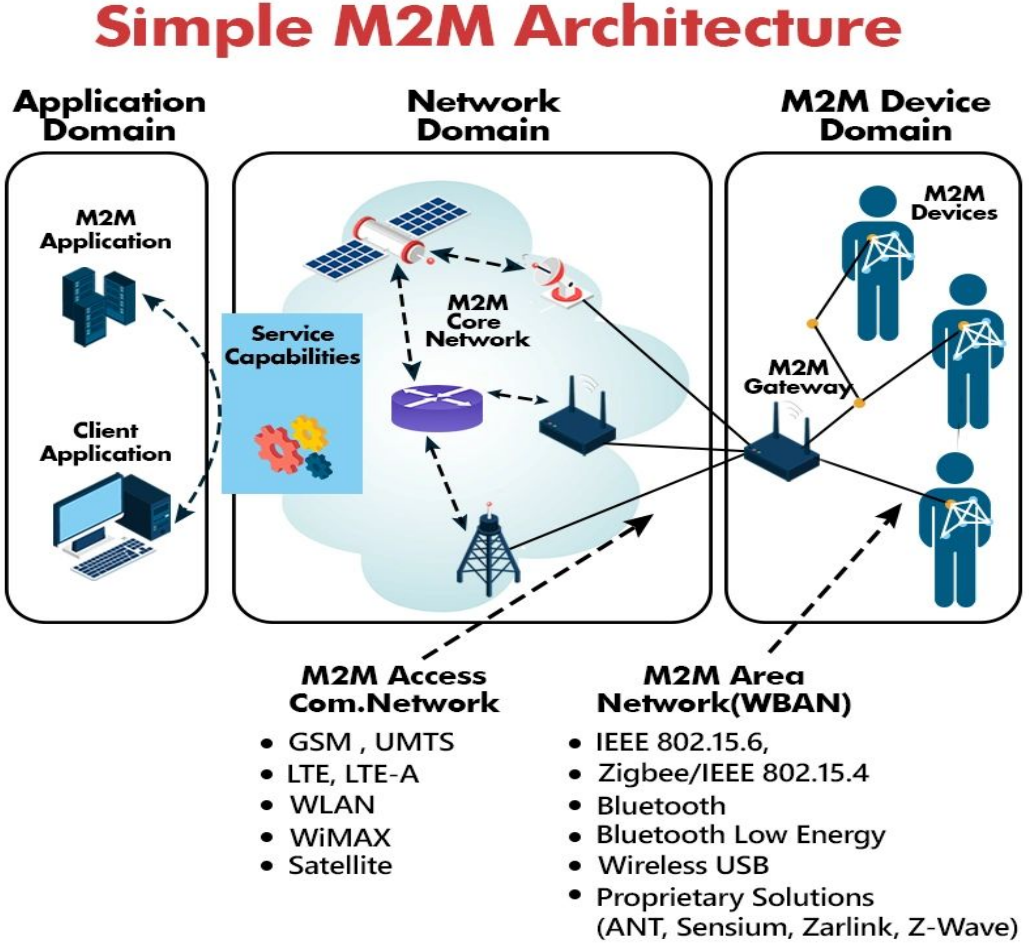
# Few Key Features of M2M

1. **Efficient Energy Use for Enhanced M2M:** The M2M system conserves energy, leading to improved performance in M2M applications.
2. **Seamless Data Exchange in M2M:** Network operators utilize organized data packets to ensure smooth information sharing among machines in M2M communication.
3. **Rapid Event Detection: T**hrough monitoring, the system swiftly identifies events.
4. **Flexible Data Timing:** Data transfers can tolerate minor delays.
5. **Scheduled Information Sharing:** Data is transmitted or received at specific, predefined times.
6. **Location-Based Device Notifications:** Devices receive alerts when entering specific areas.
7. **Steady and Small-Scale Data Transfer:** The system maintains a consistent flow of small data packets.

# Difference between M2M and IoT

| M2M | IOT |
| --- | --- |
| • Point-to-point connectivity frequently includes customer-site gear. | • A network consists of both remote and local devices that transmit information via IP. |
| • Many devices connect to networks via cellular or cable connections. | • The data delivered is through a cloud-based intermediary layer. |
| • Designed for small scale projects | • Can usually be scaled for large projects |
| • M2M devices do not always need to be connected to the internet | • In most circumstances, devices need continuous internet access. |
| • Because devices must adhere to the same communication protocols, integration choices are limited. | • There are endless integration possibilities, but you'll need a platform that can handle all of your communications. |

# Architecture of M2M



# Components for M2M Communication

| | |
|---|---|
| Service | • Machines work for people frictionlessly & robustly<br>• Standard interface to foster innovation in the ecosystem |
| Computation | • Answers are computed ahead of the questions<br>• Optimum distribution of device & cloud intelligence |
| Communication | • Zero effort to connect large, dense populations of stationary and moving devices with high energy efficiency<br>• Complete data security and privacy |
| Sensors | • Low-power so that no need to change battery<br>• "Zero-touch" to deploy and manage devices |

# Standard Effort for M2M Communication

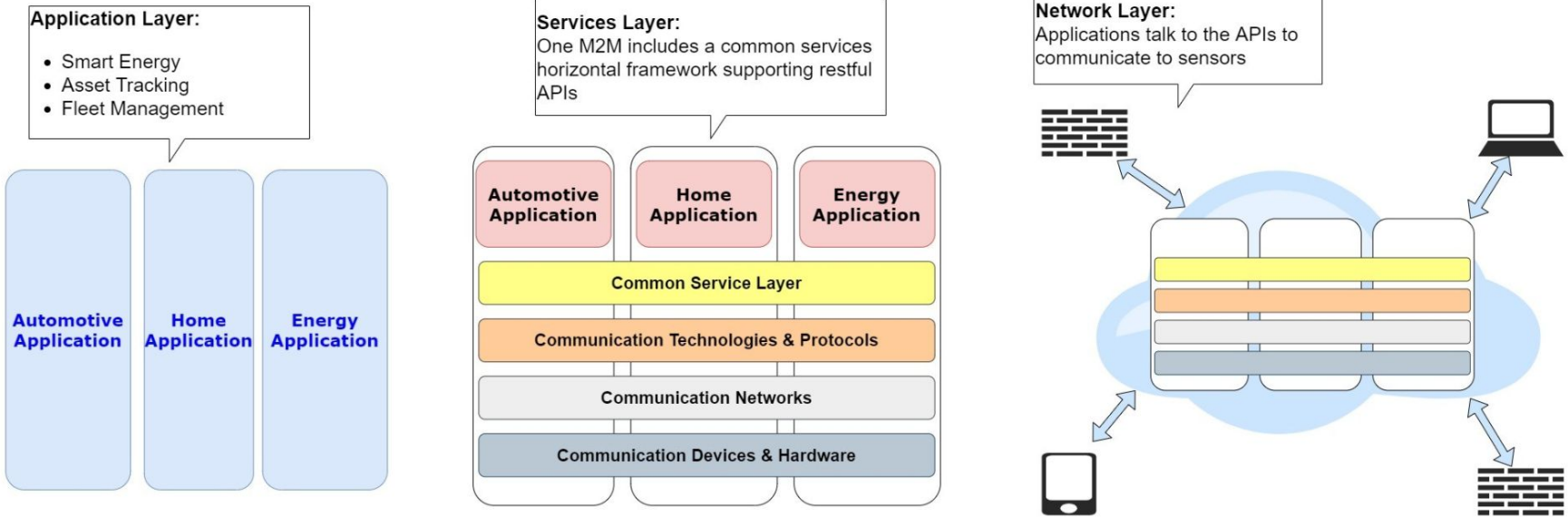



Fig: The Main Elements of the one M2M IoT Architecture

# Standard Effort for M2M Communication

**The one M2M architecture divides IoT functions into three major domains:**

1. **Application layer**
2. **Services layer**
3. **Network layer**

**While this architecture may seem simple and somewhat generic at first glance, it is very rich and promotes interoperability through IT-friendly APIs and supports a wide range of IoT technologies.**

**Let's examine each of these domains in turn**

# Standard Effort for M2M Communication

1. **Applications Layer:** The one M2M architecture gives major attention to connectivity between devices and their applications. This domain includes the application layer protocols and attempts to standardize northbound API definitions for interaction with Business Intelligence (BI) Systems. Applications tend to be industry specific and have their own sets of data models and thus they are shown as vertical entities.
2. **Services Layer:** This layer is shown as a horizontal framework across the vertical industry applications. At this layer, horizontal modules include the physical network that the IoT applications run on, the underlying management protocols, and the hardware. Examples include backhaul communications via cellular, MPLS (Multiprotocol label switching) networks, VPNs and so on. Riding on top is the common services layer. This conceptual layer adds APIs and middleware supporting third party services and applications.
3. **Network Layer:** This is the communication domain for the IoT devices and endpoints. It includes the devices themselves and the communication network that links them. Embodiments of this communication infrastructure includes wireless mesh technologies and wireless point to multipoint systems.