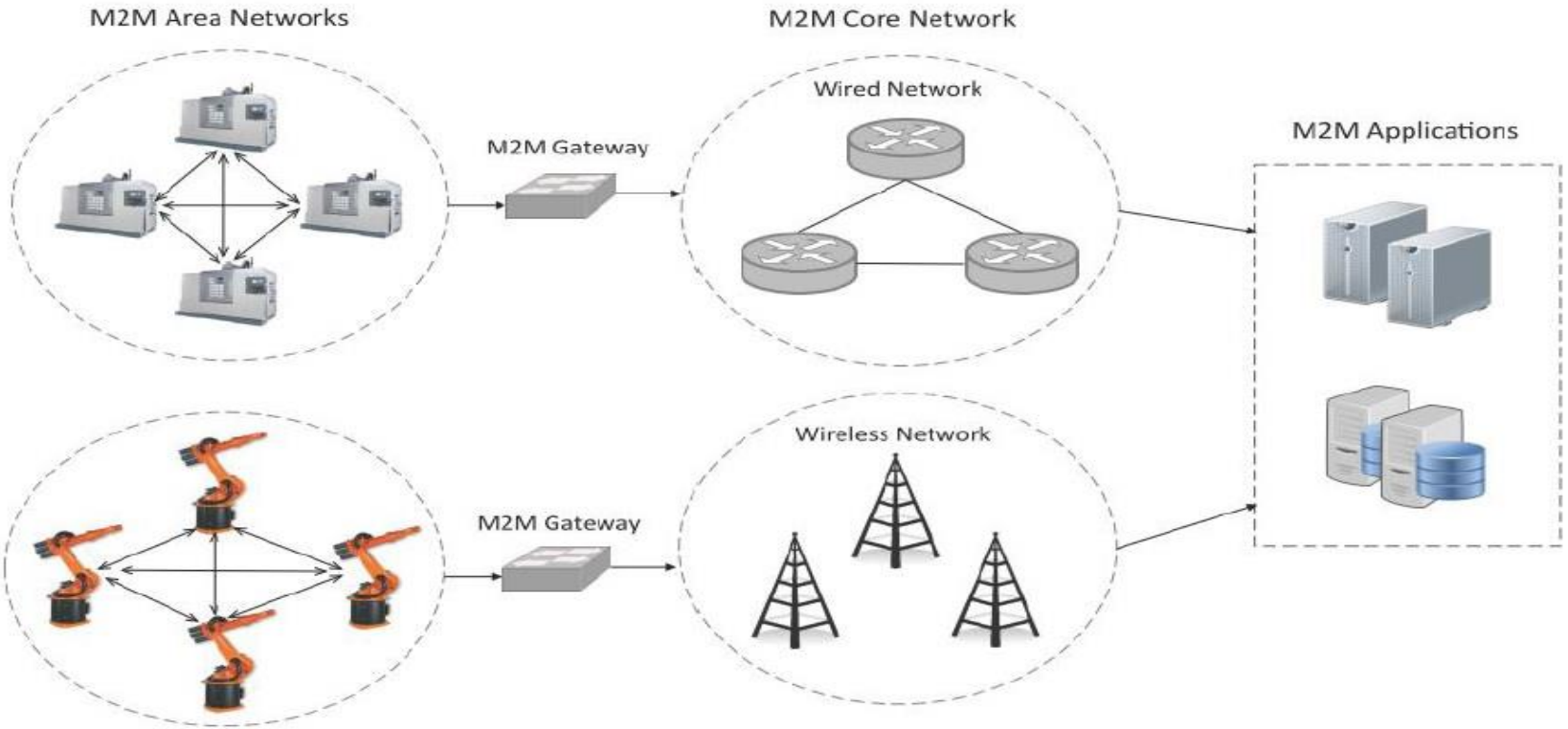
M2M and IoT Design Methodologies

M2M

- Machine-to-Machine (M2M) refers networking of **machines (devices)** for the purpose of
  - **Remote Monitoring and Control**
  - **Data Exchange**.

M2M Architecture

- M2M Systems Comprising of **4 parts**,
  - M2M Area Network
  - M2M Core Network (Communication Network)
  - M2M Gateways
  - M2M Applications



M2M Area Network

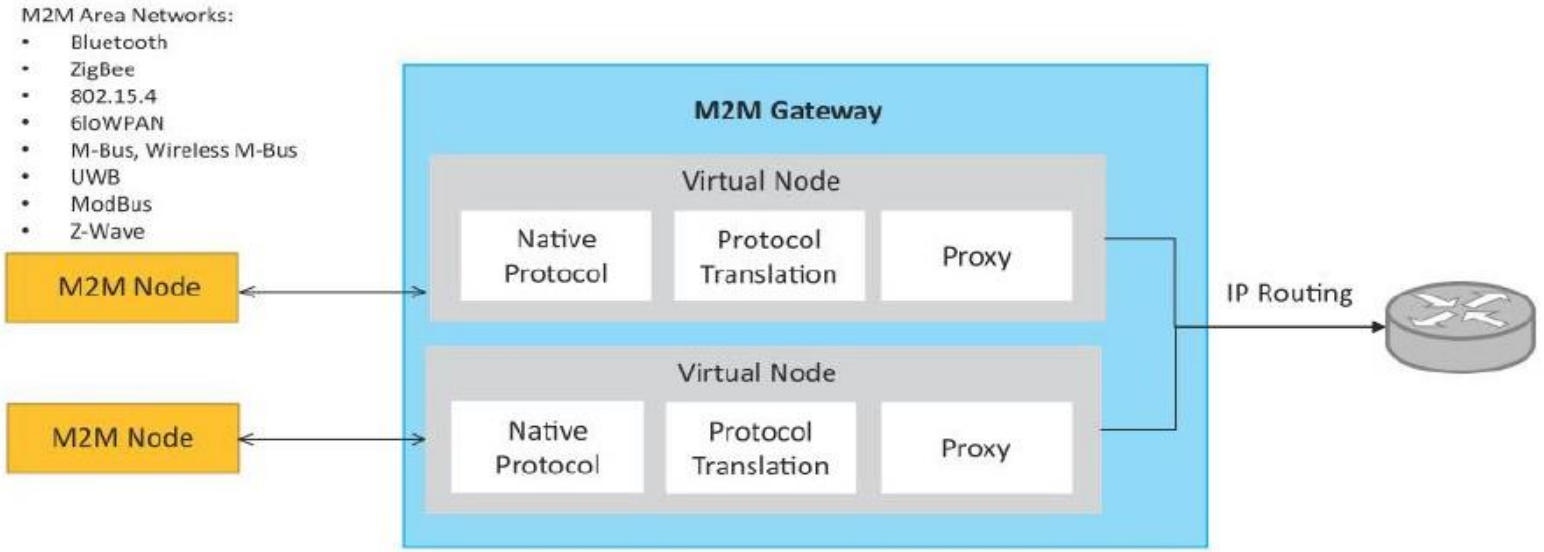
- M2M Area Network comprises of machines (or M2M Nodes) which have embedded hardware modules for
  - **Sensing**
  - **Actuation**
  - **Communication**
- Various Communication Protocols can be used for M2M LAN such as **Zigbee, Bluetooth, ModBus, M-Bus, Wireless M-Bus, Power Line Communication(PLC), 6LoWPAN, IEEE 802.15.4**, etc.
- These Communication Protocols provide **connectivity between M2M Nodes** within an M2M area network.

M2M Core Network(Communication N/w)

- The communication network provides **connectivity to remote M2M area networks**.
- The communication network can use either **wired or wireless networks** (IP-based).
- While the **M2M area networks** use either **proprietary** or **non-IP based communication protocols**, the **communication network** uses **IP-based networks**.
- Since non-IP based protocols are used within M2M area networks, the **M2M nodes within one network cannot communicate with nodes in an external network.**

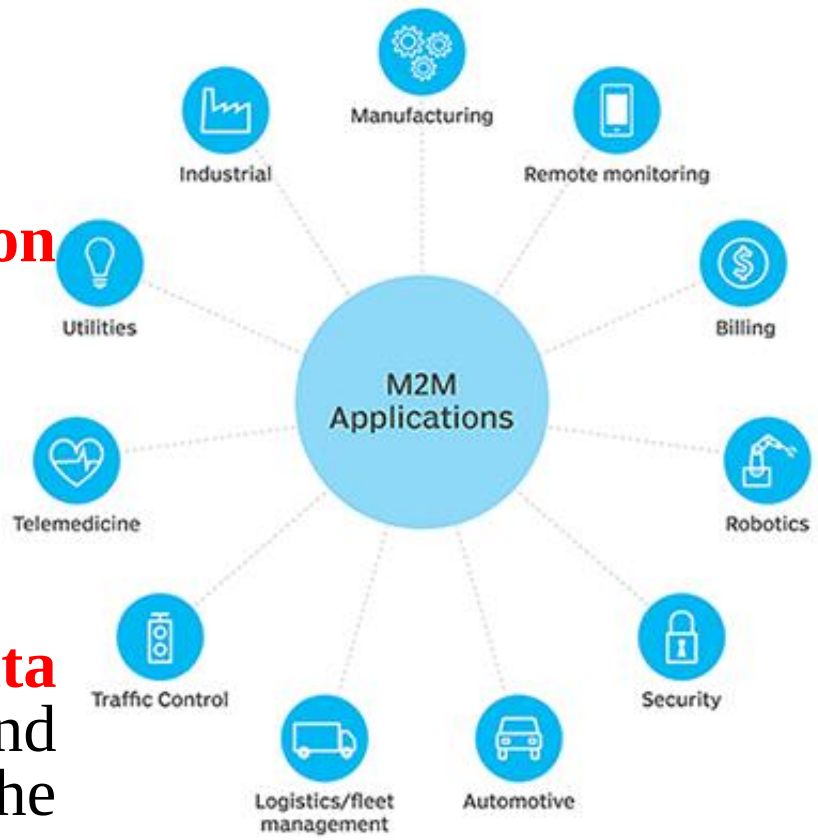
M2M Gateways

- To enable the communication between remote M2M area networks, **M2M gateways** are used.
- The communication between the M2M nodes and the M2M Gateway is based on the **communication protocols** which are native to the M2M area networks.
- M2M gateways performs **protocol translations** to enable IP-connectivity for M2M Area Networks.
- M2M gateway act as a **proxy** performing translations from/to native protocols to/from Internet Protocol(IP).
- With M2M gateway, each node in an M2M area network appears as **virtualized node** for external M2M area networks.



M2M Application

- M2M data is gathered into **point solutions** such as
  - Enterprise Applications
  - Service Management Applications
  - Remote Monitoring Applications
- M2M has various **application domains** such as
  - Smart Metering
  - Home Automation
  - Industrial Automation
  - Smart Grids, etc.
- M2M solution designs (such as **data collection, storage architecture** and **applications**) are **specific** to the M2M application domain.

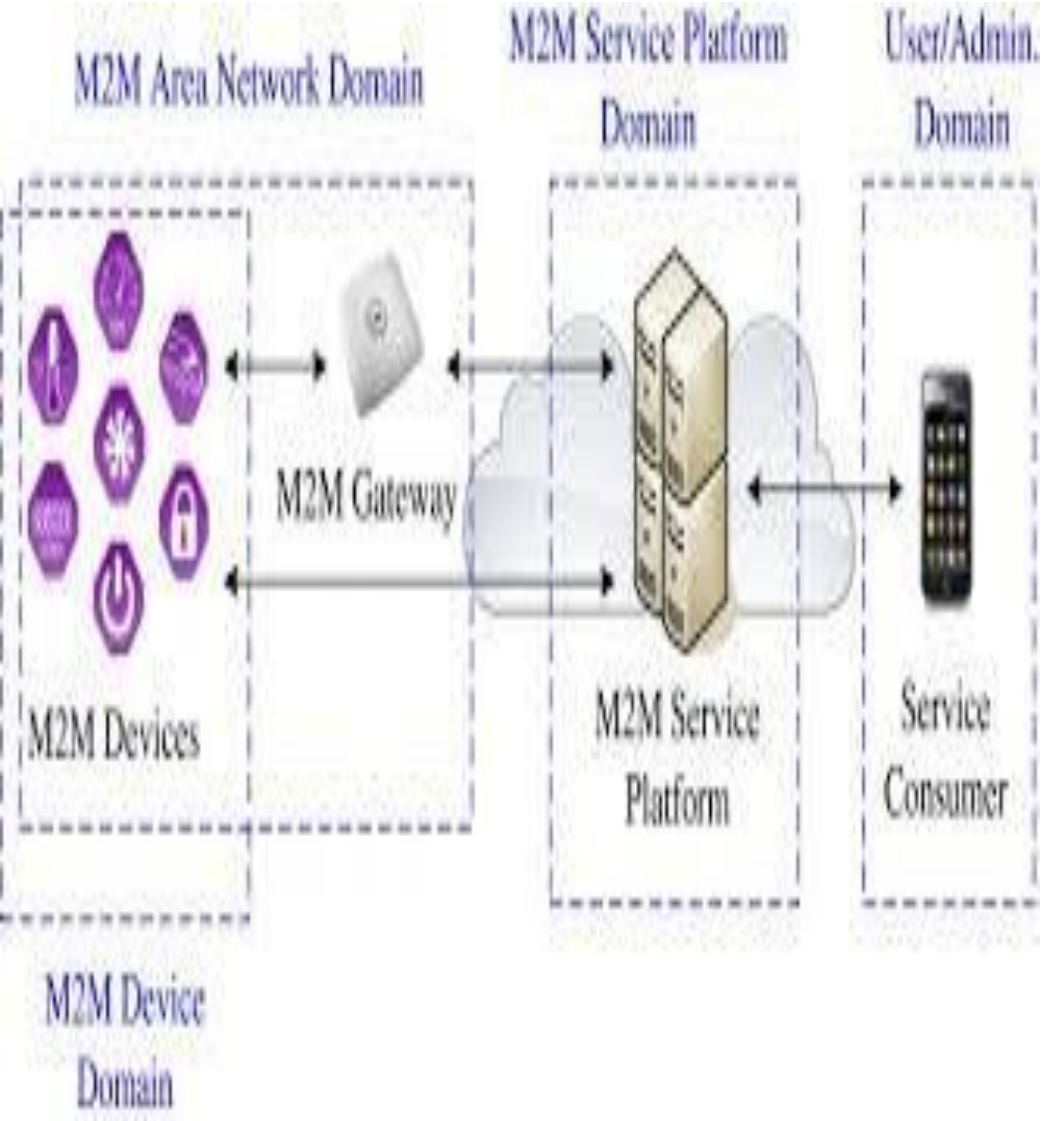


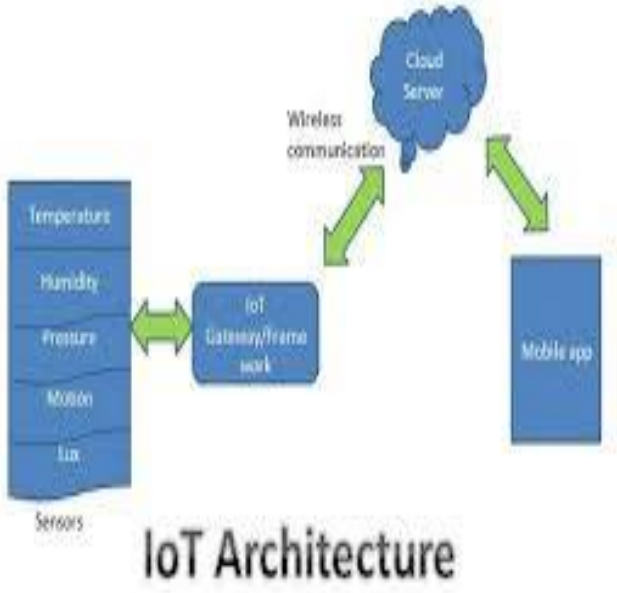
M2M and IoT

Difference

- Both M2M and IoT involve networking of machines or devices, but differ in
  - Technology
  - System Architecture
  - Types of Applications

M2M vs IoT


M2M Area Network Domain
M2M Service Platform Domain
User/Admin. Domain
M2M Gateway
M2M Devices
M2M Service Platform
Service Consumer
M2M Device Domain


Cloud Server
Wireless communication
Temperature
Humidity
Pressure
Motion
Lux
Sensors
IoT Gateway/Framework
Mobile app
IoT Architecture

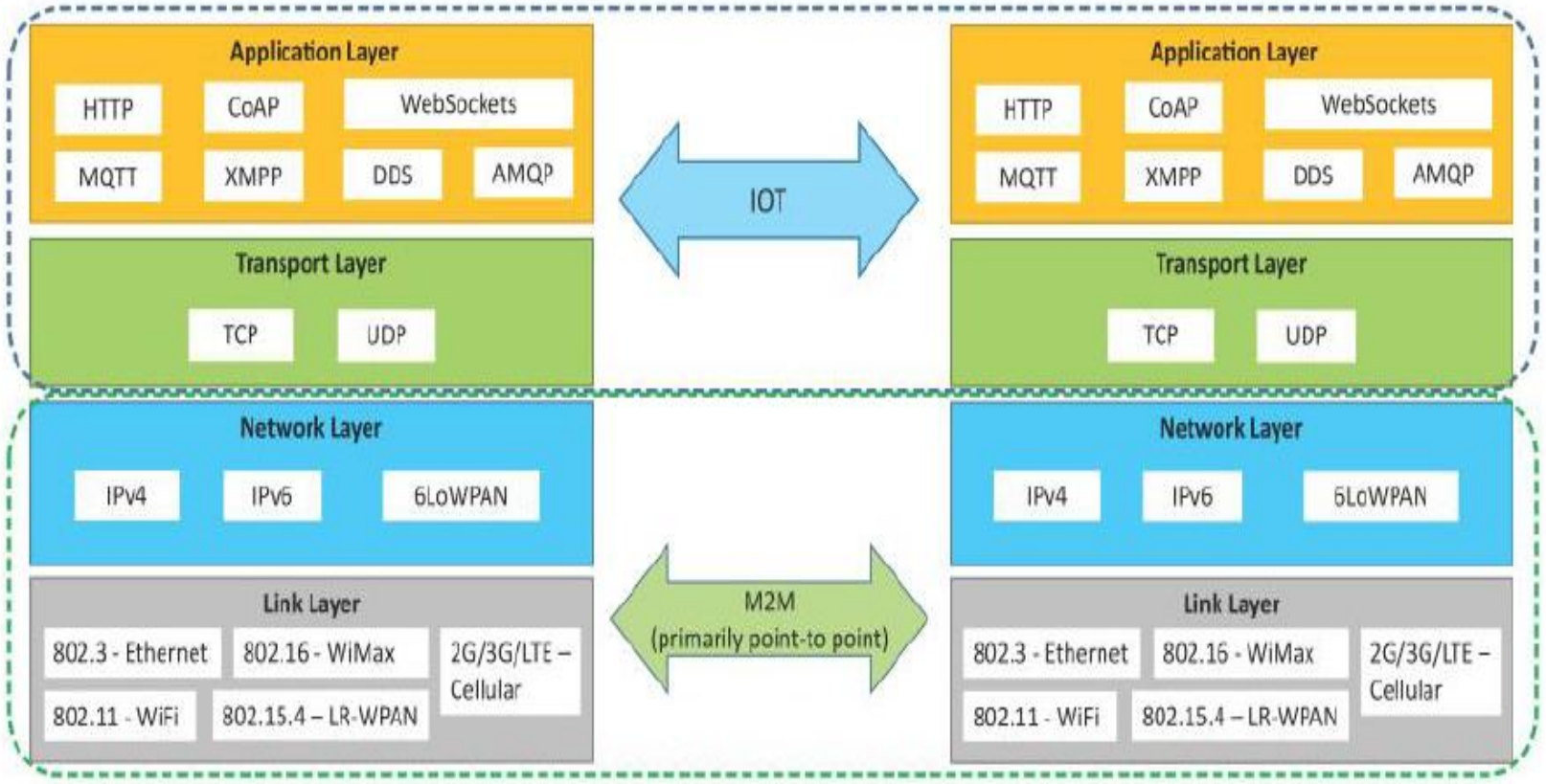
Difference in M2M and IoT

- Communication Protocols
- Machines vs Things
- Hardware vs Software
- Data Collection & Analysis
- Applications

Communication in IoT vs M2M

- M2M uses either use either **proprietary** or **non-IP based communication protocols within M2M area networks** and M2M **communication network** uses **IP-based networks**.
- M2M commonly uses **Zigbee, Bluetooth, ModBus, M-Bus, Wireless M-Bus, Power Line communication (PLC), 6LoWPAN, IEEE 802.15.4**, etc
- Focus of Communication in M2M – below network layer
- Focus of Communication in IoT - above network layer

Communication in IoT vs M2M



Machines in M2M

- M2M uses homogeneous machine types within a M2M area network .
- IoT systems can have heterogeneous things.
- IoT refers to physical objects that have unique identifiers(IP and MAC address)

Hardware vs Software Emphasis

- The emphasis of M2M is more on hardware with embedded modules
- The emphasis of IoT is more on software.
- IoT devices run specialized software for sensor data collection, data analysis and interfacing with cloud.
- Data collected in IoT is massive, cloud based analysis is used.

Data Collection & Analysis

- M2M data is collected in point solutions and often in on-premises storage infrastructure.
- The data in IoT is collected in the cloud (can be public, private or hybrid cloud).

Applications

- M2M data is collected in point solutions and can be accessed by on-premises
- M2M applications such as diagnosis applications, service management applications, and on premises enterprise applications.
- IoT data is collected in the cloud and can be accessed by cloud applications such as

  IoT analytics applications

  Enterprise applications

  Remote diagnosis and

  Management applications, etc.

CRITERIA	M2M	IoT
Communication	Focus below network layer	Focus above network layer
Machines	homogeneous machine types	heterogeneous machine types
H/W Vs S/W	emphasis of M2M is more on hardware	IoT is more on software
Storage	point solutions and often in on-premises storage	data in IoT is collected in the cloud