M2M and IoT

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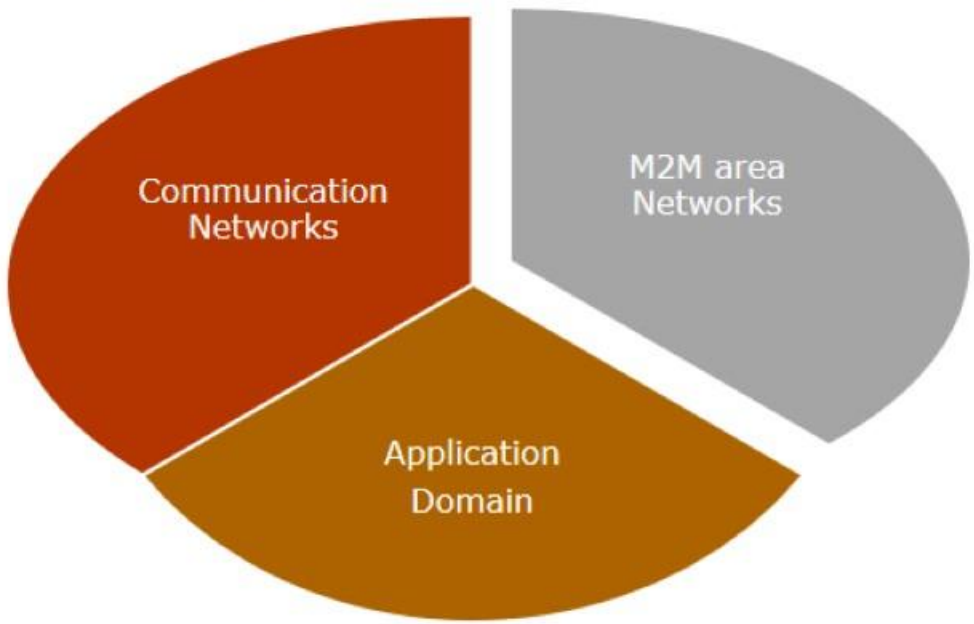
M2M

- **Machine-to-Machine (M2M)** refers to networking of machines(or devices) for the purpose of remote monitoring and control and data exchange
- ✓ Term which is often synonymous with IoT is M2M
- ✓ IoT and M2M are often used interchangeably
- End-to-end architecture of M2M systems

Main Components:



End to end architecture System of M2M

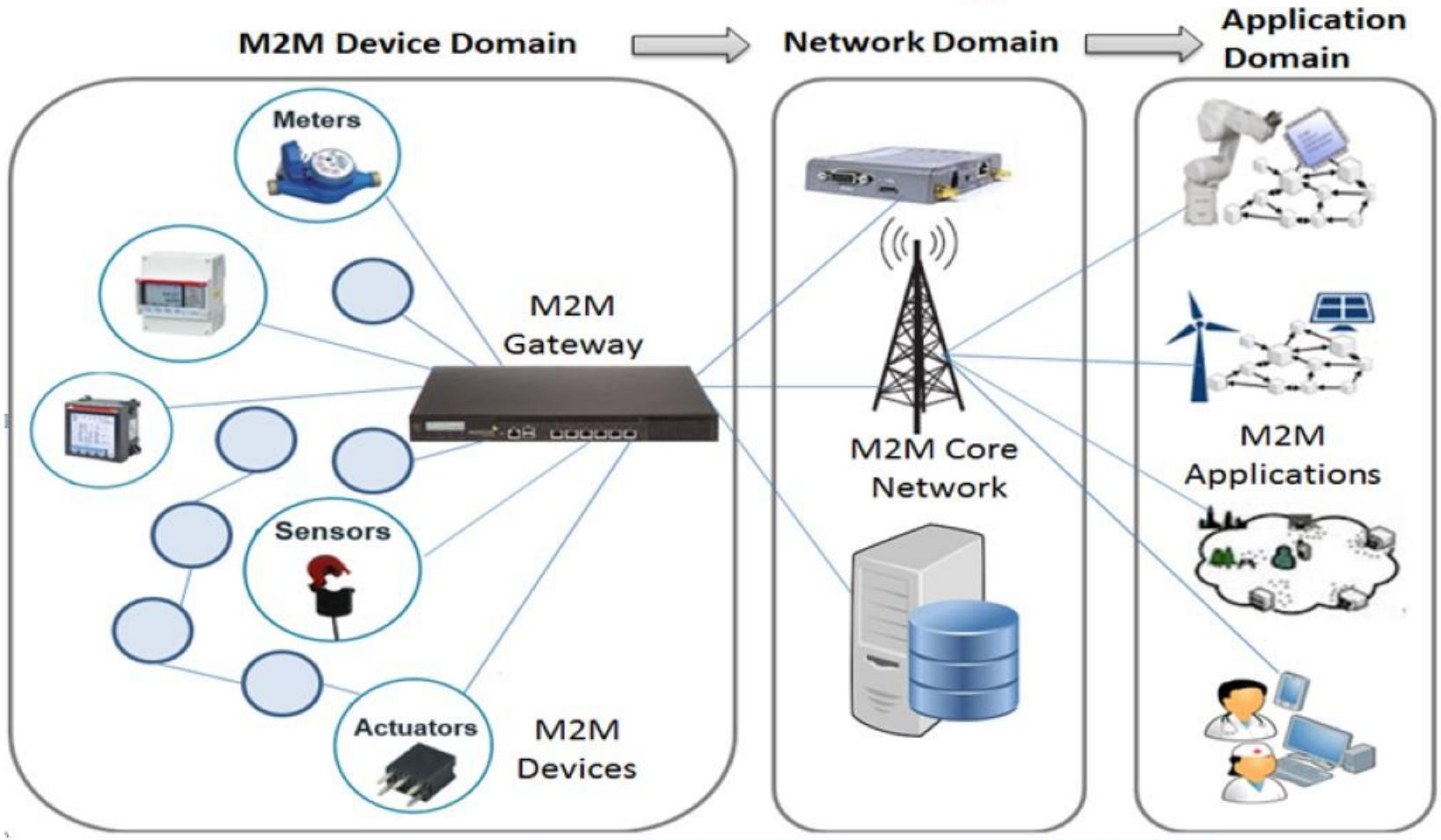


Fig 1: End to end architecture system of M2M

Difference Between M2M and IOT

Communication Protocols:

- Commonly uses M2M protocols include ZigBee, Bluetooth, ModBus, M-Bus, Wireless M-Bus tec.,
- In IoT uses HTTP, CoAP, WebSocket , MQTT ,XMPP ,DDS ,AMQP etc.,

Machines in M2M Vs Things in IoT:

- Machines in M2M will be homogenous whereas Things in IoT will be heterogeneous.

Hardware Vs Software Emphasis:

- The emphasis of M2M is more on hardware with embedded modules, the emphasis of IoT is more on software

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 orhybrid cloud).

Applications:

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

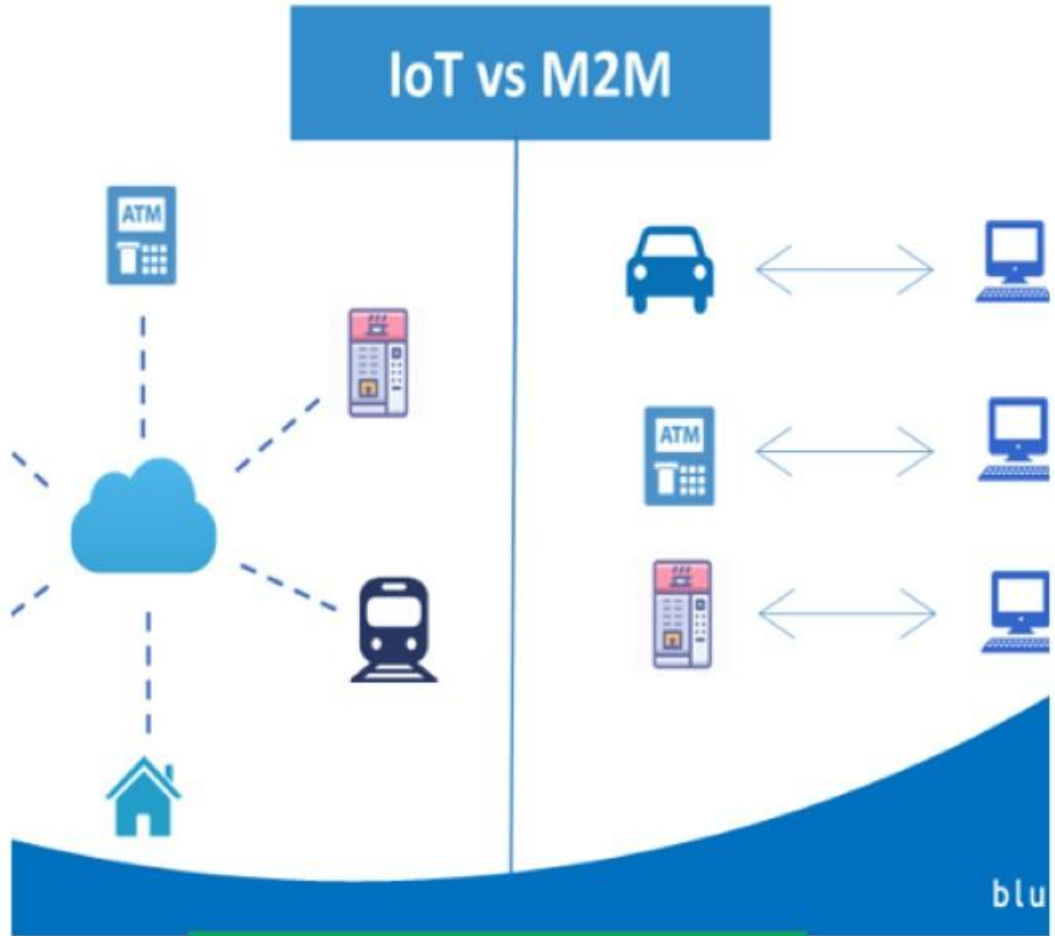


Fig 2: IoT Vs M2M

Software Defined Networking(SDN)

- Software-Defined Networking (SDN) is a networking architecture that separates the control plane from the data plane and centralizes the network controller.
- Software-based SDN controllers maintain a united view of the network
- The underlying infrastructure in SDN uses simple packet forwarding hardware as opposed to specialized hardware in conventional networks

Key Components of SDN:

1) Centralized Network Controller
2) Programmable Open APIs
3) Standard Communication Interface(OpenFlow)

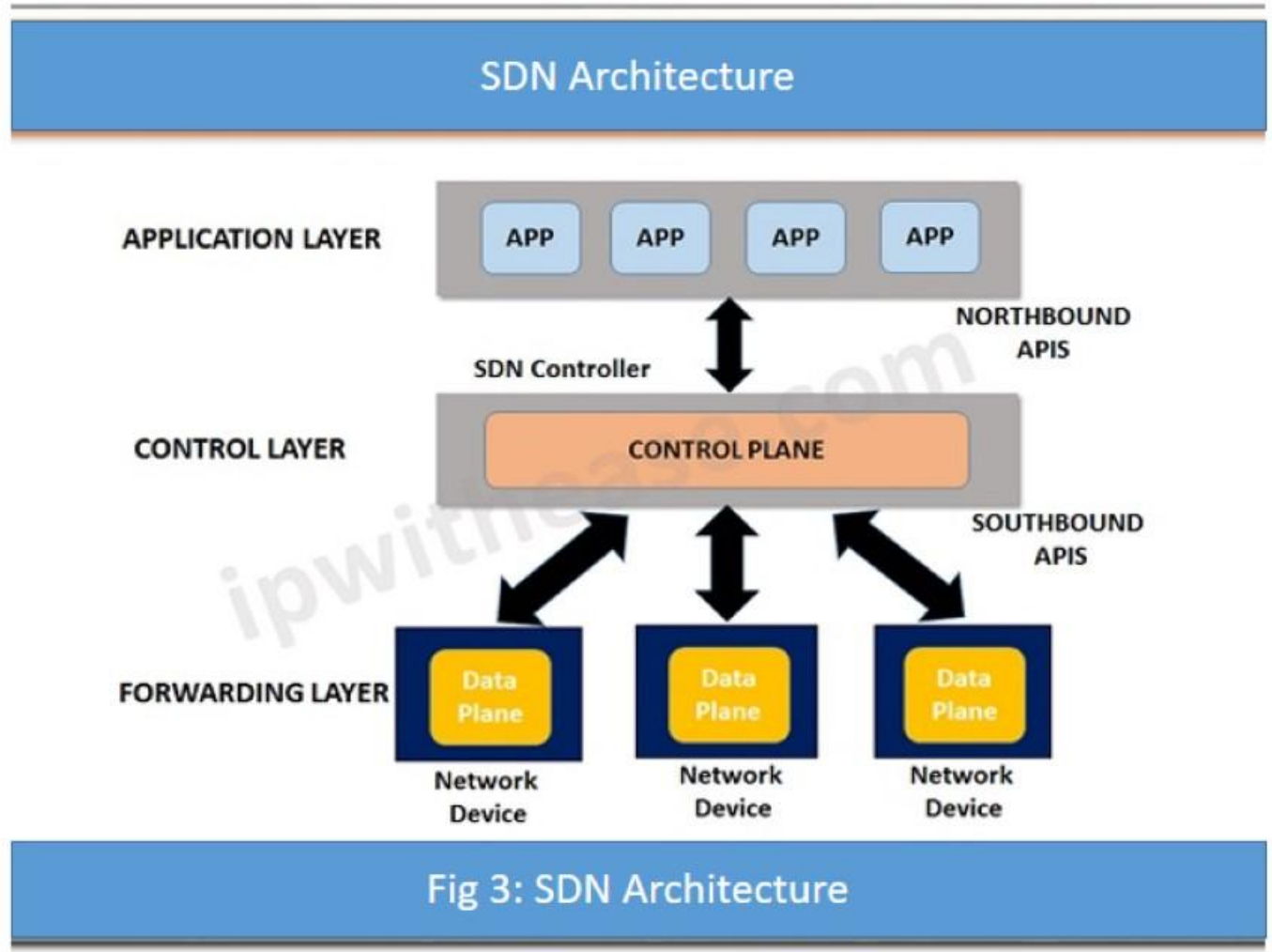


Fig 3: SDN Architecture

Network Function Virtualization(NFV)

- Network Function Virtualization (NFV) is a technology that leverages virtualization to consolidate the heterogeneous network devices onto industry standard high volume servers, switches and storage.
- NFV is complementary to SDN as NFV can provide the infrastructure on which SDN can run
- Key Components of NVF:

  1) Virtualized Network Function(VNF)
  2) NFV Infrastructure(NFVI)
  3) NFV Management and Orchestration

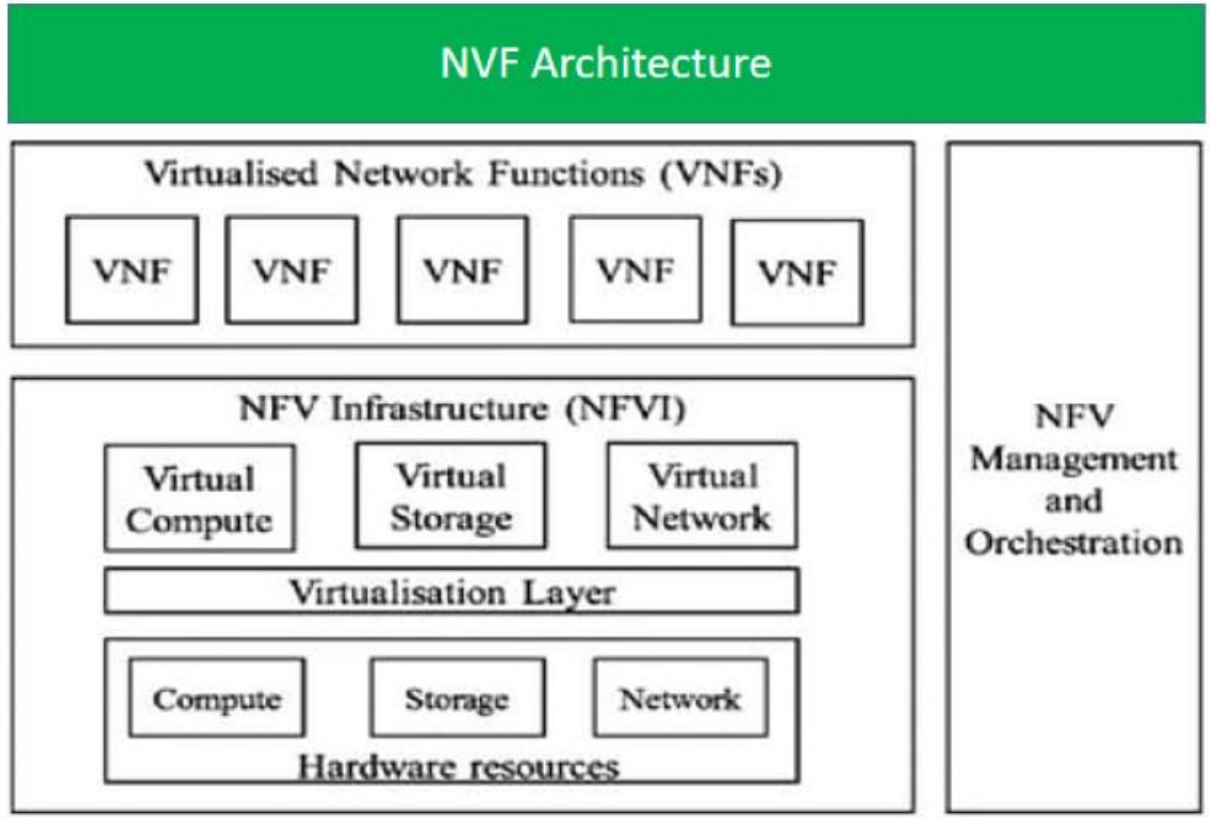


Fig 4: NVF Architecture

Need for IoT Systems Management

- ✓ Automating Configuration
- ✓ Monitoring Operational & Statistical Data
- ✓ Improved Reliability
- ✓ System Wide Configurations
- ✓ Multiple System Configurations
- ✓ Retrieving & Reusing Configurations

Fig 5

IoT Systems Management with NETCONF-YANG

- YANG is a data modeling language used to model configuration and state data manupulated by the NETCONF protocol.
- The generic approach of IoT device management weith NETCONF-YANG. Roles of various componentsare:

  1) Management System
  2) Management API
  3) Transaction Manager
  4) Rollback Manager
  5) Data Model Manager
  6) Configuration Validator
  7) Configuration Database
  8) Configuration API
  9) Data Provider API

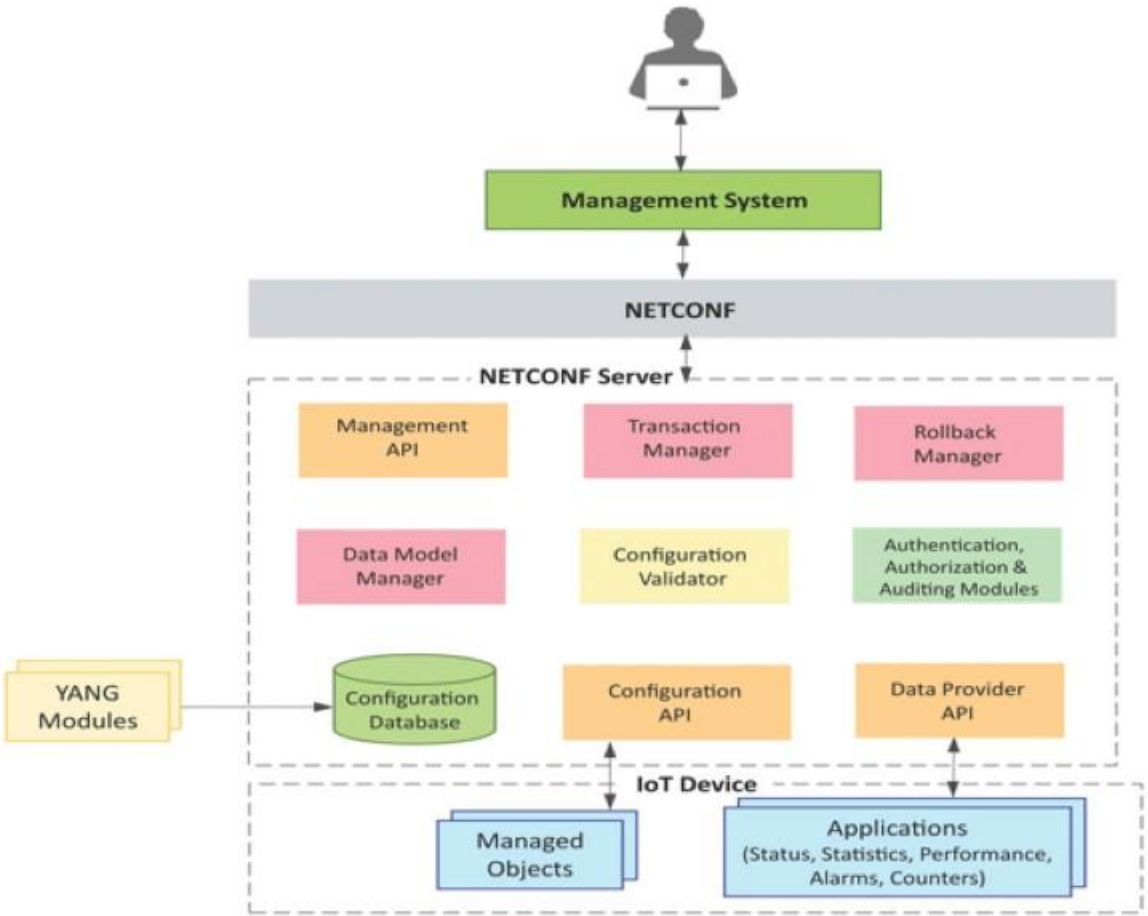


Fig 6: NETCONF-YANG

Steps for IoT device Management with NETCONF-YANG

1) Create a YANG model of the system that defines the configuration and state data of the system.

2) Complete the YANG model with the Inctool which comes with Libnetconf.

3) Fill in the IoT device management code in the TransAPImodule.

4) Build the callbacks C file to generate the library file.

5) Load the YANG module and the TransAPImodule into the Netopeer server using Netopeer manager tool.

6) The operator can now connect from the management system to the Netopeer server using the NetopeerCLI.

7) Operator can issue NETCONF commands from the Netopeer CLI. Command can be issued to change the configuration data, get operational data or execute an RPC on the IoTdevice.

Use case diagram of IoT-based monitoring system

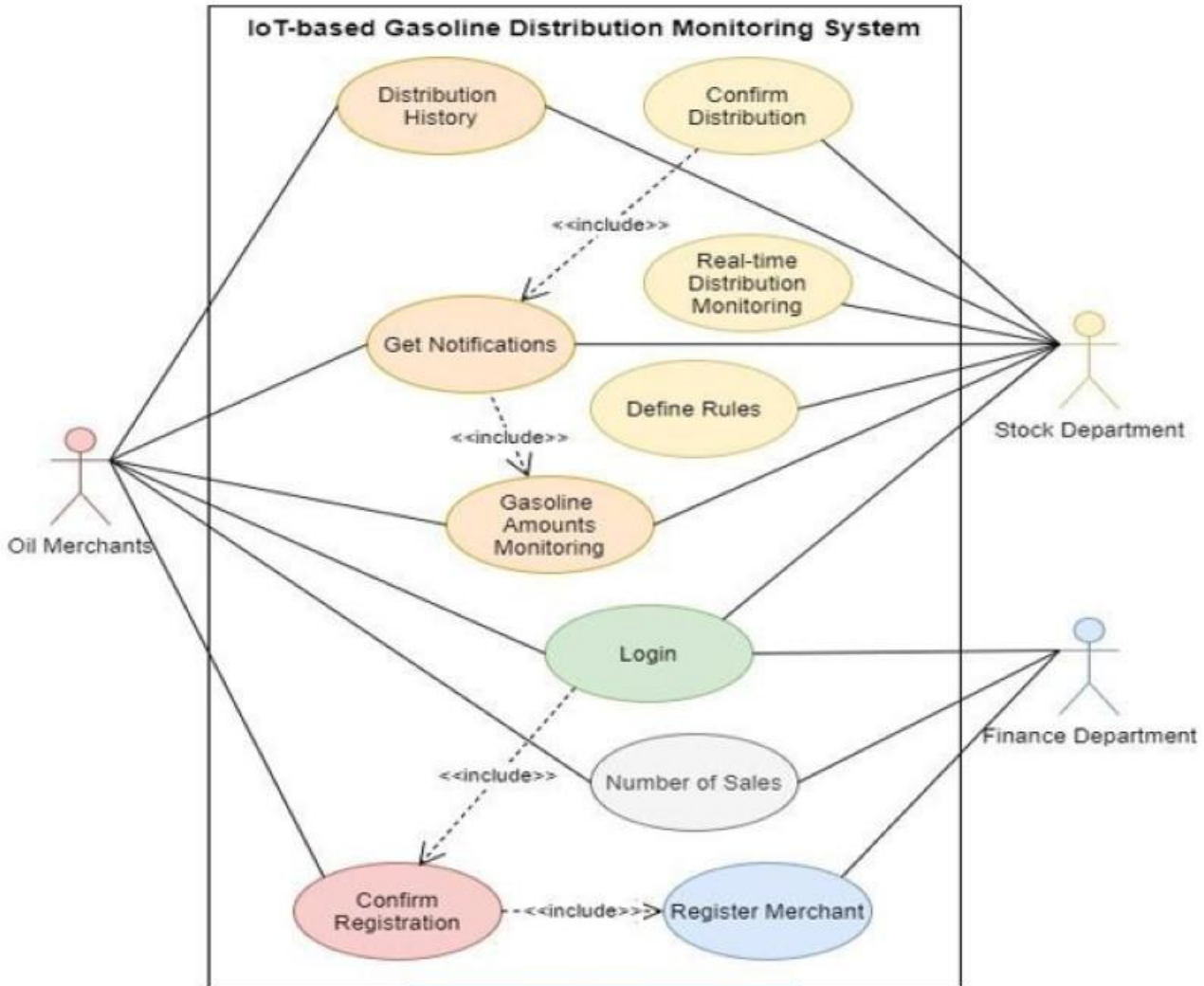


Fig 7

M2M Value Chain

M2M value chains are internal to one company and cover one solution

Fig 8: M2M value chain

IOT Value Chain

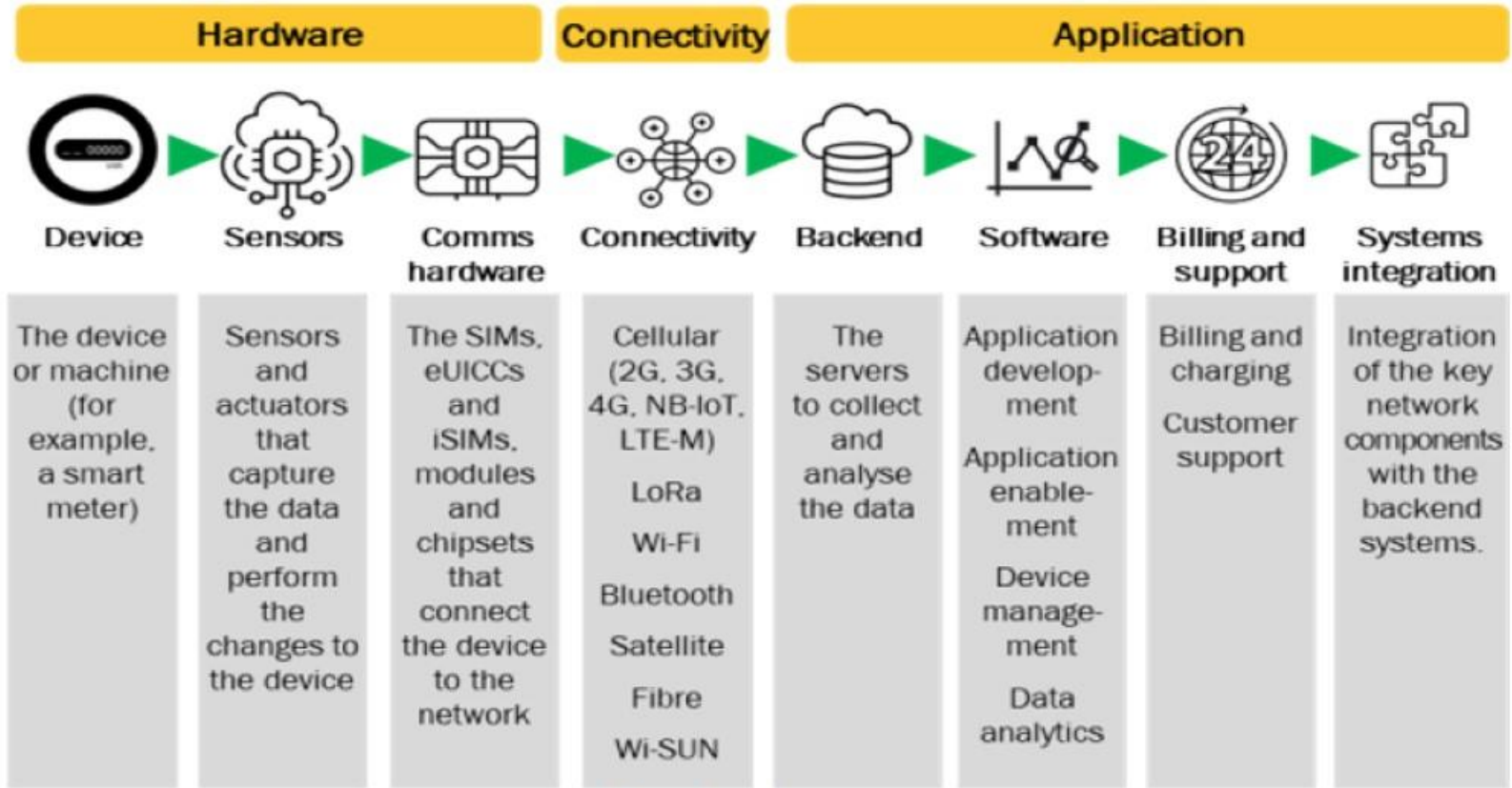


Fig 9: IOT value chain

Source: Analysys Mason

IoT Value Chains, meanwhile, are about the use and reuse of data across value chains and across solutions

Industrial Structure for IOT

So, What is the INDUSTRIAL IoT?

- The IoT is now being thought of as two types of network, coined the Human IoT and the Industrial IoT
- The “Human IoT” is characterized as having human interaction and low failure impact.
- The “Industrial IoT” is characterized as operating without direct human interaction and oversight, sometimes with potential catastrophic failure impact.

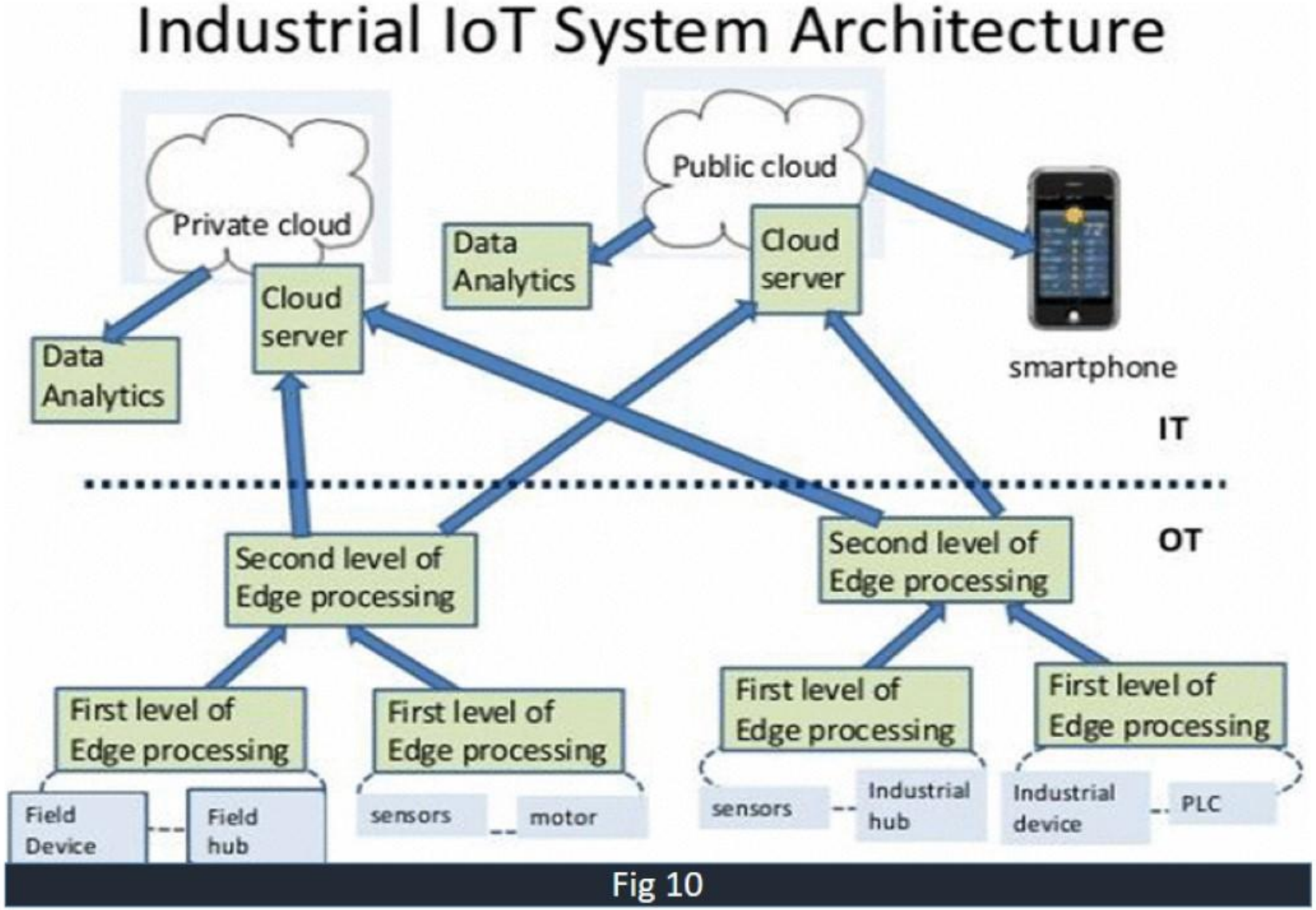

Industrial IoT System Architecture
Private cloud
Public cloud
Data Analytics
Cloud server
Cloud server
Data Analytics
smartphone
IT
OT
Second level of Edge processing
Second level of Edge processing
First level of Edge processing
First level of Edge processing
First level of Edge processing
First level of Edge processing
Field Device
Field hub
sensors
motor
sensors
Industrial hub
Industrial device
PLC

Fig 10

Any QUESTIONS???


THANK
YOU