



SNS College of Engineering

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Redesigning Common Mind & Business Towards Excellence



Build an Entrepreneurial Mindset Through Our Design Thinking FrameWork

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Internet Of Things



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MESSAGE COMMUNICATION PROTOCOLS FOR CONNECTED DEVICES



• Terminology

- ✓ Request/Response (Client/Server)
- ✓ Publish/Subscribe (pubsub)
- ✓ Resource Directory
- ✓ Pull (Subscribe/Notify) Data
- ✓ Polling or Observing
- ✓ Push (Publish/Subscribe) Data
- ✓ Message Queue
- ✓ Information/Query



MESSAGE COMMUNICATION PROTOCOLS



Following are the protocols used in message communication

- CoAP-SMS and CoAP-MQ
- MQTT Protocol (Message Queuing Telemetry Transport)
- XMPP (Extensible Messaging and Presence Protocol) XML



MESSAGE COMMUNICATION PROTOCOLS: CoAP-SMS and CoAP-MQ



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M2M or IoT device uses SMS quite frequently.

SMS is identified as the transport protocol for transmission of small data (up to 160 characters).

It is used for communicating with a GSM/GPRS mobile device.

M2M or IoT device uses message queuing quite frequently due to ROLL environment and constrained devices (awake only when initiated) or connection-breaks for long periods.

CoAP-SMS:

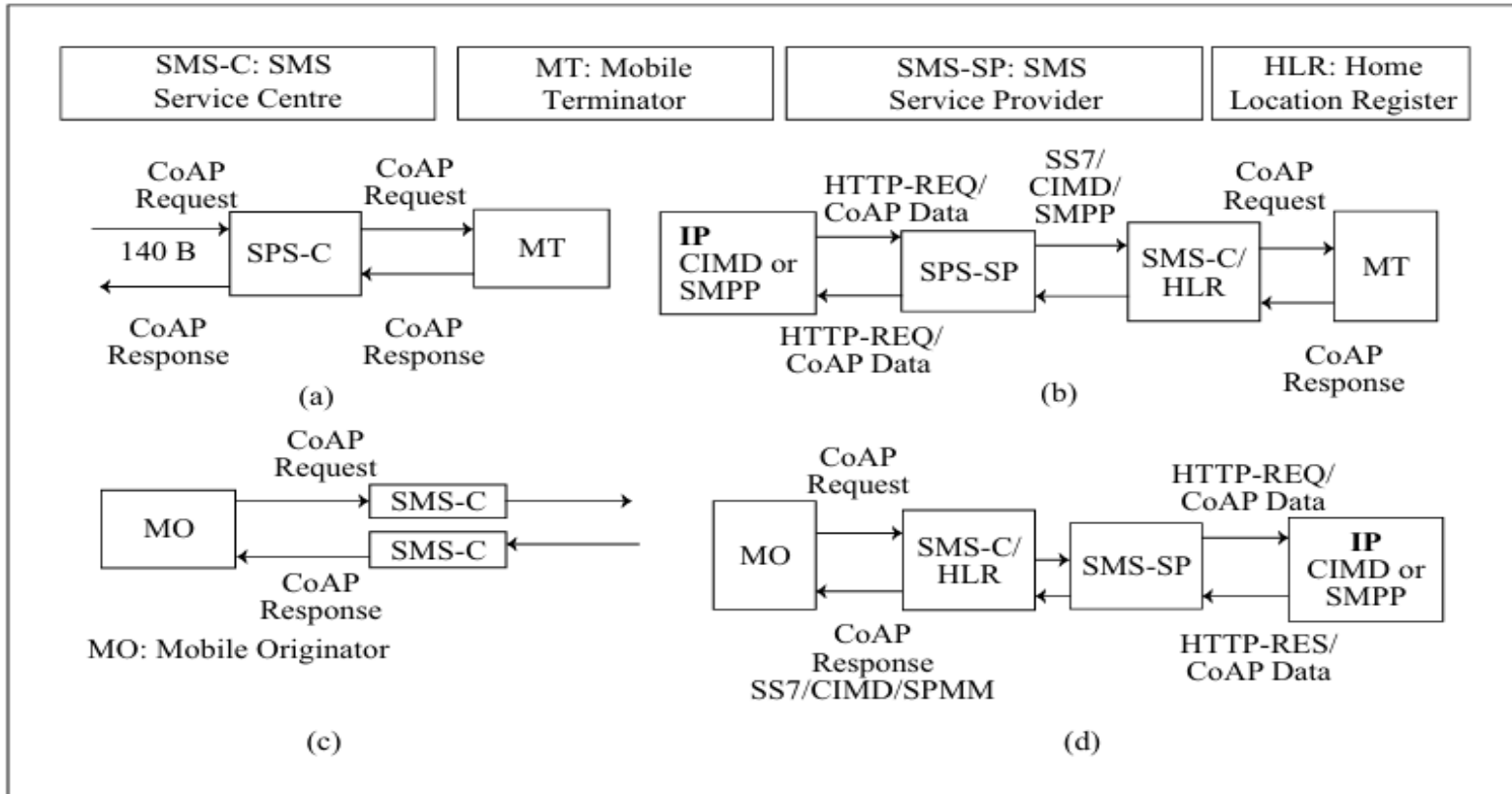
CoAP-SMS is a protocol when CoAP object uses IP as well as cellular networks and uses SMS. It is an alternative to UDP-DTLS over ROLL for CoAP object messages and when using cellular communication



CoAP-SMS and CoAP-MQ



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(a) A CoAP request or response communication to a machine, IoT device or mobile terminal (MT), (b) A computer or machine interface using IP communication to a mobile service provider for data interchange with terminal, (c) A machine or IoT device or mobile origin (MO) communication of CoAP request or response communication, and (d) An origin communication using SS7/CIMD/SMPP with a computer or machine interface using IP communication

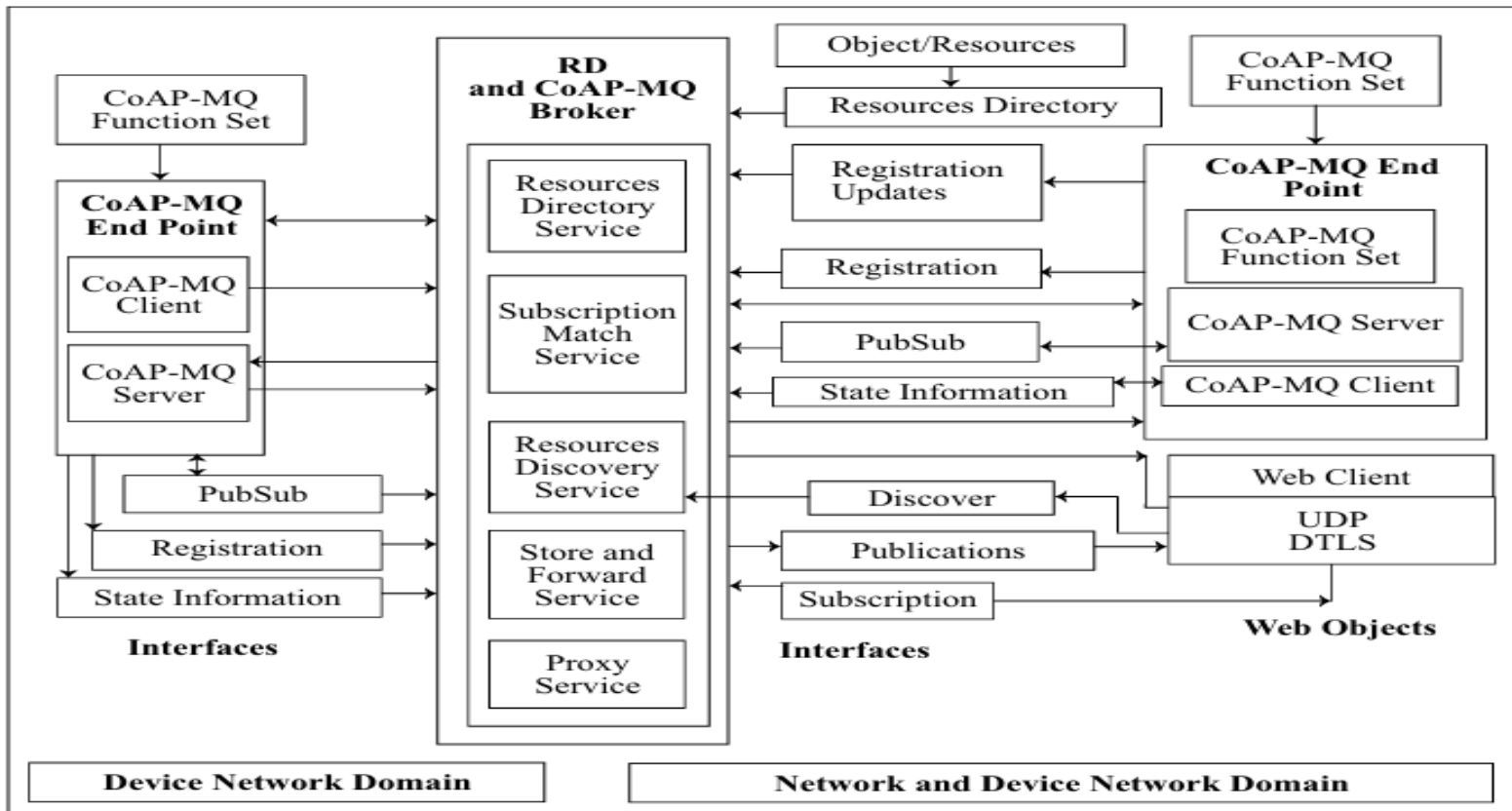


CoAP-MQ



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- CoAP-MQ is a message queue protocol using a broker and RD. Roles of CoAP endpoints have roles as a client and server.



Data interchanges between CoAP-MQ endpoints, CoAP-MQ clients, CoAP-MQ servers through CoAP-MQ broker and its services [PubSub means publication to RD and subscription to MQ]



MQTT Protocol



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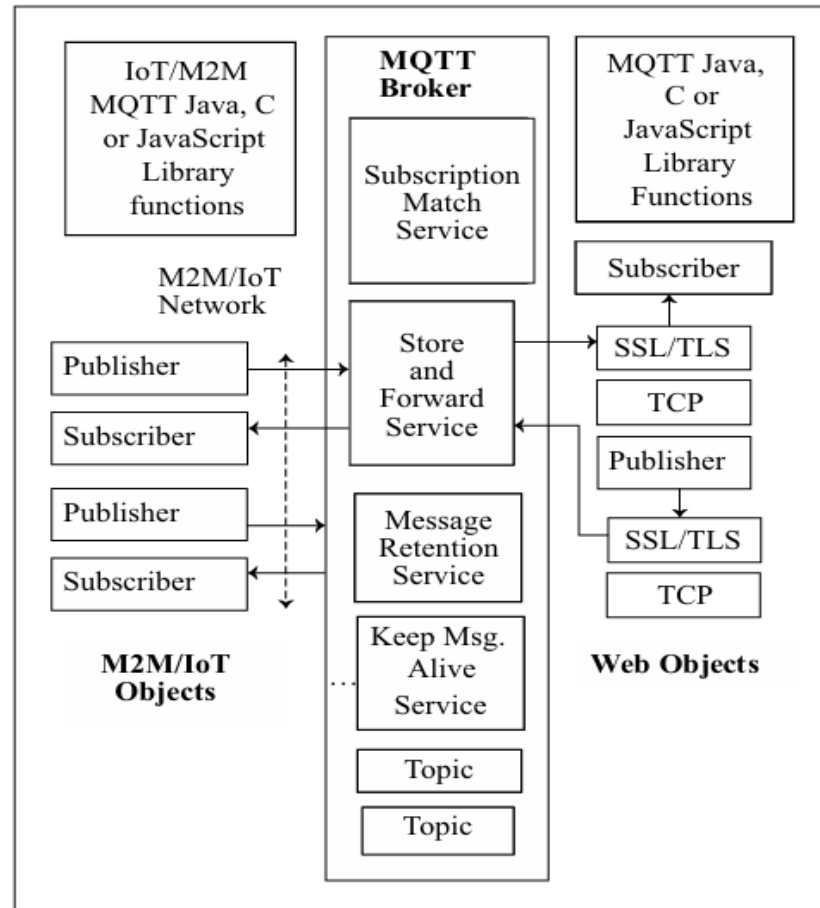
- Message Queuing Telemetry Transport (MQTT) is an open-source protocol for machine-to machine (M2M)/IoT connectivity.
- Word ‘telemetry’, in English dictionary, means measuring and sending values or messages to far off places by radio or other mechanism.
- IBM first created it and then donated it to M2M ‘Paho’ project of Eclipse.
- A version is MQTT v3.1.1. MQTT has been accepted (2014) as OASIS (Organization for the Advancement of Structured Information Standards) standard 6 MQTT protocol is used for connectivity in M2M/IoT communication.
- A version is MQTT-SN v1.2. Sensor networks and non-TCP/IP networks, such as ZigBee can use the MQTT-SN.
- MQTT-SN is also a publish/subscribe messaging protocol.
- It enables extension of the MQTT protocol for WSNs, the sensor and actuator devices and their networks.



MQTT Protocol



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Messages interchange between M2M/IoT device objects (publisher and subscriber) and web objects (publisher and subscriber) using an MQTT Broker



XMPP (Extensible Messaging and Presence Protocol)



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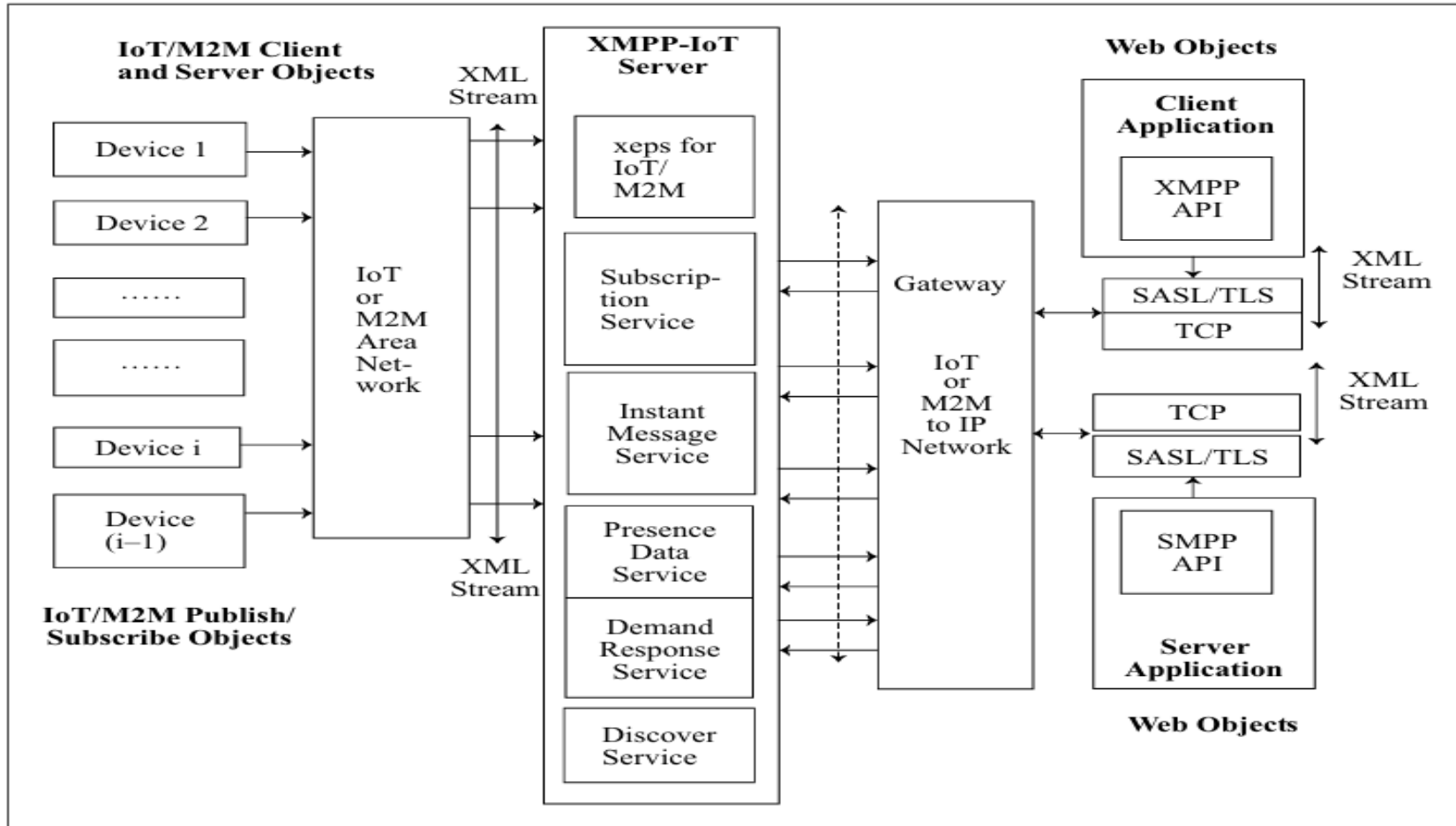
- XMPP is an XML-based specification for messaging and presence protocols. XMPP is also an open-source protocol recommended specification which is accepted by IETF.
- RFC is an international organisation and stands for 'Recommended for Comments'. RFC 6120 document specifies the XMPP for CoRE.
- Another recommendation, RFC 6121 XMPP specifies the instant messaging (IM) and presence, and RFC 6122 XMPP specifies the (message) address format.
- XMPP is extensible—XSF (XMPP standards foundation) develops and publishes the xeps (XMPP extension protocols).
- The xeps enable the addition of features and new applications. List of XMPP xeps for web objects is quite long.
- Examples of xeps are: xep-DataForms Format xep-XHTML-IM xep-Service Discovery xep-MUC xep-Publish-Subscribe and Personal Eventing Protocol xep- File Transfer xep-Jingle for Voice and video



XMPP (Extensible Messaging and Presence Protocol)



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Use of XMPP and XMPP extension protocols for connected devices and web objects for the messaging, presence notifications, responses on demand and service discoveries using XML streams



XMPP (Extensible Messaging and Presence Protocol)



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- XMPP server set by anyone on the following standards recommended and using XSF xeps;
- for example, XMPP-IoT server, XMPP M2M server for messaging between the machines.
- Authentication by SASL/TLS, and support from intelligent and business analyst applications, and processing through XMPP server and gateway for connecting device network with IP network.
- XMPP does the following: Binary data is first encoded using base 64 and then transmitted in-band.
- Therefore, the file first transmits out-of-band between nodes on messages from XMPP server but not directly like IMs.
- No end-to-end encryption Higher overhead being text based in place of binary implementations No support for QoS like MQTT does



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Thank
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