

## MQTT-HOME BASED TECHNOLOGIES

**Dr V. Krishnapriya,**

Director and Head of the Department,  
Sri Ramakrishna college of Arts and Science for women,  
Coimbatore, Tamilnadu, India.

**C.N. Indhu Mathi,**

MCA Scholar,  
Sri Ramakrishna college of Arts and Science for women,  
Coimbatore, Tamilnadu, India.

**Abstract:** By the virtue of enhancing technologies, all the devices in the home can be connected. Owing to the ubiquitous availability of WiFi, all the appliances in the home-based environment can be connected through a common gateway. WiFi is chosen as the mode of communication. This effectively improves the comfort, indoor security, and cost saving at the home. Remotely monitoring and controlling the home appliances in a case of power consumption and network bandwidth which becomes a major role and concern. We need a low power device that transmits messages through a less verbose protocol. This paper presents an overview of Message Queuing Telemetry Transport (MQTT) Protocol which is used for home based technologies.

**Keywords:** *Message Queuing Telemetry Transport (MQTT), Home automation*

### I. INTRODUCTION

Day by day so many technologies are developing. In that the smart home systems are having a tremendous growth of normal network to home automation. Though the smart home technologies are being used currently but they are limited to individual houses. With the era of IoT, the traditional controlling systems are transforming to smart home systems. The smart home technologies are integrating with the IoT.

For best performance, to provide more services, effective management the cloud based services are coordinating with the smart home technology. The energy management systems in the home environments are equipped both inside and outside environments of the home. There may be issues regarding management. In real world approach the facilities like data and service sharing schemes among several entities is only possible by the community broker system. The community broker is a significant feature in this research.

The facility like managing devices in the home environment is possible with the aid of community broker. The community broker provides many services like electronic services, labor requirement is eliminated. The location based services are implemented with the combination of community services and cloud services operating together. The MQTT protocol is to provide control features in the smart home system.

### II. RELATED WORK

A literature review showed that studies on smart home systems have primarily emphasized three areas: smart devices, multiple displays, and cloud-based services. There are many definitions of home automation technology available in the literature. [1] Describes home automation as the technology within the home to enhance the quality of life of its occupants, through the provision of different services such as telehealth, energy conservation and multimedia entertainment.

There has been significant research into the field of home automation. Recently, research into the field of home

automation technology has continued to receive much attention in academia. [2] developed a Java technology based home automation system. An embedded board physically connected all the home automating devices and, through integration with a personal computer based web server, provided remote access to the system. The use of Java technology, which incorporates built-in network security features can produce a secure solution. However, the system requires an invasive and expensive wired installation and the use of a high end computer system. [3] Introduced a Bluetooth technology based home automation system, which consists of a primary controller and a number of Bluetooth sub-controllers. Each home device (appliance) is physically connected to a local Bluetooth sub-controller. The home devices communicate with their respective Bluetooth sub-controller using wired communications. From the sub-controller all communications are sent to the primary controller using wireless communications. However, due to the fiscal expense of Bluetooth technology, a single module is shared amongst several devices. This architecture basically reduces the amount of physical wiring required and hence the invasiveness of the installation, through the use of wireless technology. However, the architecture does not completely reduce the invasiveness of the installation due to the incorporation of some wired communications. Moreover the sharing of a single Bluetooth module between numerous devices has the disadvantage of suffering an access delay. [4] introduced a telephone based remote controller for home and office automation. The system differs in that all communications occur over a fixed telephone line and not over the Internet. The system can be accessed using any telephone that supports dual tone multiple frequency (DTMF).

The disadvantages of this system are threefold: users are not provided with a graphical user interface (GUI), users have to remember an access code for access, and they have to remember which buttons to press for the control of connected devices to it. [5] Proposed a novel control network, using hand gestures. The controller uses a hand glove to relay hand gestures to the system. The problem with the system lies in the inaccuracy of hand gestures, with

the potential for normal arm movements being inaccurately interpreted as commands. Mainly, there is the risk of user exhaustion if repetitive hand gestures are required. [6] Defined a home gateway as the point of access between a public access network and a personal area network. They developed a web server based home gateway to interconnect IEEE1394, with a power line based home automation system, and the Internet service. To make the system more attractive to home owners, a real time AV transcoding capability was also included. The system offers an insightful look into the development of a home gateway; however, the use of power lines as the communication media limits the positioning of devices within the home in close proximity to power sockets. [7] Proposed a home energy management focused home gateway, which connects the home network with the Internet. The system was installed in twenty houses in the Tokyo area. [8] Implements the initial provisioning function for home gateway based on open service gateway initiative platform. [9] Implemented the Home Gateway and GUI for Control the Home Appliance. [10] Cloud-Based Services Regarding Household Living: To achieve high-level home automation, third-party servers and configured smart home systems are recommended to address data privacy and authentication concerns in inter-home, multiple-device smart environments. Smart home systems have been extended to intelligent building systems, with both indoor and outdoor scenarios being involved. In addition, regional environment information is used in the dynamic intermediate layers of the architecture.

### III. MESSAGE QUEUING TELEMETRY TRANSPORT PROTOCOL

MQTT is a Client Server publish/subscribe messaging transport protocol. It is light weight, open, simple, and designed so as to be easy to implement. These characteristics make it ideal for use in many situations, including constrained environments such as for communication in Machine to Machine (M2M) and Internet of Things (IoT) contexts where a small code footprint is required and/or network bandwidth is at a premium.

MQTT uses the pub/sub pattern to connect interested parties with each other. It does it by decoupling the sender (publisher) with the receiver (subscriber). The publisher sends a message to a central topic which has multiple subscribers waiting to receive the message. The publishers and subscribers are autonomous, which means that they do not need to know the presence of each other.

#### Terminology of MQTT

- **Client** – Any publisher or subscriber that connects to the centralized broker over a network is considered to be the client. It's important to note that there are servers and clients in MQTT. Both publishers and subscribers are called as clients since they connect to the centralized service. Clients can be persistent or transient. Persistent clients maintain a session with the broker while transient clients are not tracked by the broker. Clients often connect to the broker through libraries and SDKs. There are over a dozen libraries available for C, C++, Go, Java, C#, PHP, Python, Node.js, and Arduino.
- **Broker** – The broker is the software that receives all the messages from the publishing clients and sends them to

the subscribing clients. It holds the connection to persistent clients. Since the broker can become the bottleneck or result in a single point of failure, it is often clustered for scalability and reliability. It is up to the implementors to decide how to create a scalable broker layer. Some of the commercial implementations of MQTT brokers include HiveMQ, Xively, AWS IoT, and Loop.

- **Topic** – A topic in MQTT is an endpoint to that the clients connect. It acts as the central distribution hub for publishing and subscribing messages. In typical MOM, a topic is created before the publisher and subscriber connect to the endpoint. In MQTT, a topic is a well-known location for the publisher and subscriber. It's created on the fly when either of the clients establish the connection with the broker. Topics are simple, hierarchical strings, encoded in UTF-8, delimited by a forward slash. For example, building1/room1/temperature and building1/room1/humidity are valid topic names. Subscribers can choose to subscribe to a specific topic or all the subtopics through wildcards. A subscription to building1/+ /temperature will automatically subscribe to the temperature topic of all the rooms in the building. Similarly, building1/# will match all the topics available under building1. Refer to the MQTT specification for more details on the wildcards.
- **Connection** – MQTT can be utilized by clients based on TCP/IP. The standard port exposed by brokers is 1883, which is not a secure port. Those brokers who support TLS/SSL typically use port 8883. For secure communication, the clients and the broker rely on digital certificates. AWS IoT is one of the secure implementations of MQTT, which requires the clients to use the X.509 certificates.

### IV. CONCLUSION

In this given research we have try to connect the simply human life to smarter technical world. We have design the secure and fast access and responsive home automation system which is access by global position as well as we design web GUI for maintaining platform independence and run on low configuration. MQTT protocol is better and secure than the other protocol like COAP, HTTP etc. This proposed system we use and deploying in number of other areas which is covered in IOT.

### V. REFERENCES

- [1] K. Bromley, M. Perry, and G. Webb. "Trends in Smart Home Systems, Connectivity and Services", [www.nextwave.org.uk](http://www.nextwave.org.uk), 2003.
- [2] A. R. Al-Ali and M. Al-Rousan, "Java-based home automation system", IEEE Transactions on Consumer Electronics, vol. 50, no. 2, pp. 498504, 2004.
- [3] N. Srisanthan, F. Tan and A. Karande, "Bluetooth based home automation system", Microprocessors and Microsystems, Vol. 26, no. 6, pp. 281-289, 2002.
- [4] H. Ardam and I. Coskun, "A remote controller for home and office appliances by telephone", IEEE

- Transactions on Consumer Electronics, vol. 44, no. 4, pp. 1291-1297, 1998.
- [5] T. Baudel and M. Beaudouin-Lafon, "Charade: remote control of objects using free-hand gestures", Communications of the ACM, vol. 36, no. 7, pp. 28-35, 1993.
- [6] T. Saito, I. Tomoda, Y. Takabatake, J. Ami and K. Teramoto, "Home Gateway Architecture and Its Implementation", IEEE International Conference on Consumer Electronics, pp. 194-195, 2000.
- [7] N. Kushiro, S. Suzuki, M. Nakata, H. Takahara and M. Inoue, "Integrated home gateway controller for home energy management system", IEEE International Conference on Consumer Electronics, pp. 386-387, 2003.
- [8] S. Ok and H. Park, "Implementation of initial provisioning function for home gateway based on open service gateway initiative platform", The 8<sup>th</sup> International Conference on Advanced Communication Technology, pp. 1517- 1520, 2006.
- [9] D. Yoon, D. Bae, H. Ko and H. Kim, "Implementation of Home Gateway and GUI for Control the Home Appliance", The 9th International Conference on Advanced Communication Technology, pp. 1583-1586, 2007.
- [10] Khusvinder Gill, Shuang-Hua Yang, Fang Yao, and Xin Lu, "A ZigBee- Based Home Automation System", IEEE Transactions on Consumer Electronics, Vol. 55, No. 2, MAY 2009.

