# Development of Client-Server System of Remote Access Control to the Premises on the Basis of Mesh-Network

https://doi.org/10.31713/MCIT.2019.68

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*Abstract*— **This article about the system of remote access control to the premises on the basis of Mesh-network. The operating principle of the system and the MESH network are described here. It will also talk about the MESH network and compare it with other network topologies.**

**Keywords— MESH, MQTT, MySQL, PHP, ReactJs**

## I. Introduction

Today most everyday tasks are simplified or automated, and this trend is increasing every year. In modern life the technology of remote control is tightly integrated. These technologies not only save time but also allow you to be independent of location.

One of the tasks of remote control is access to the premises (areas for training, work responsibilities, etc.), so the purpose of this work was to develop a cross-platform client-server system for remote access to premises based on MESH network, because this technology allows to cover large areas of the radio signal without additional equipment (Fig. 1).

To implement the system, the following tasks were solved:

- ability to remotely control system nodes;
- development of control interface;
- the ability to work the system offline;
- implementation of the network topology so that each node can be both a receiver and a transmitter to increase distance from the base station to the end node;
- minimization of the cost of maintenance and modernization of building systems which should be ensured by the application common standards in the construction of the subsystems, automatic configuration and detection of new devices which add to the system;
- modeling and analysis developed system based on MESH network.

## I. System structure

Client-server architecture was chosen to design the remote access control system. The developed system consists of two blocks: hardware (Fig. 2) and WEB interface (Fig. 3).

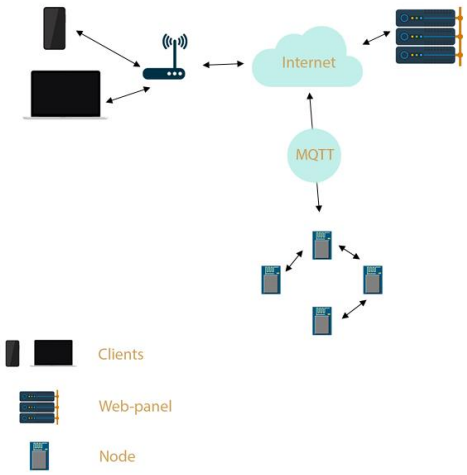


Figure 1. Scheme of the system

Figure 2. Hardware part of the system

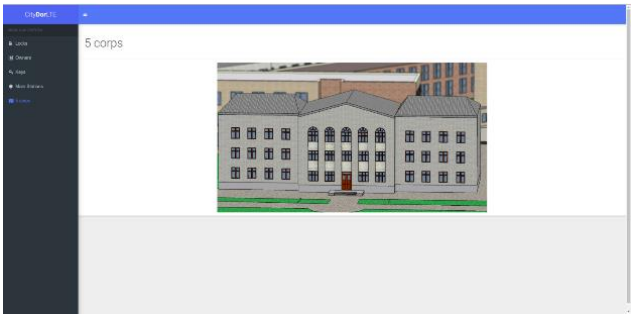


Figure 3. Web interface

The second part consists of a microcontroller equipped with a Wi-Fi 802.11 b / g / n wireless interface and this a separate node.

A number of nodes and a master node make up a MESH network topology, each node is connected to each other and can transmit data over the network [1] - [2].

The second part consists of a web interface developed using ReactJS library, MySQL database, and logic developed using PHP that combines the data of the part that are hosted on a remote server and is responsible for managing access that is the link between humans and system.

## II. MESH NETWORK

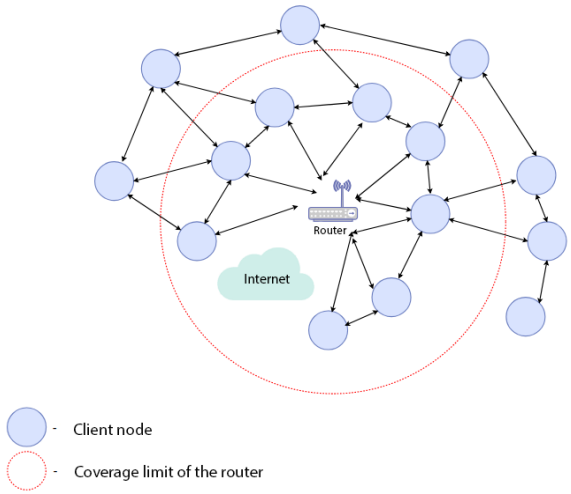


Figure 4. MESH network scheme

Since MESH networks (see Fig. 4) have a number of advantages it is this topology that was chosen to implement the developed system, namely:

- the network is automatically transformed one of the nodes is lost and the data goes the specified network node [3];
- the network is independent of the main node, so the load goes not to the main station, but is distributed between all nodes which facilitates the connection of more nodes;
- all system nodes are equal this allowing the network to quickly rebuild its structure;
- in the case of failure of any the nodes, the signal falls within the range of another node, the system rebuilds routes in the network and continues to work;
- this system allows to cover large areas of the network.

## III. RESEARCH OF THE DEVELOPED SYSTEM

The study was conducted on the basis of the second floor of educational building №5 of the National University of Water and Environmental Engineering. TamoGraph was used to design and analyze the network.

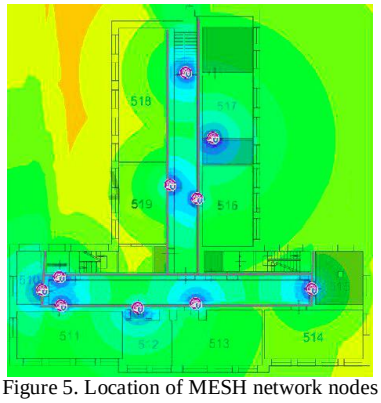


Figure 5. Location of MESH network nodes

Virtual WiFi hotspots were set up (see Fig. 5) and settings for hotspots and obstacles were set.

After analyzing the results, we see that the signal strength of the first control node is -37 dBm, the second -20 dBm, the third -46 dBm and the fourth -55 dBm, which is optimal for placement of MESH network modules.

To test the validity of this simulation, the measurements were taken at the same network node and the results at the first control node were equal to -39 dBm, at the second -27 dBm, at the third -50 dBm and at the fourth -60 dBm.

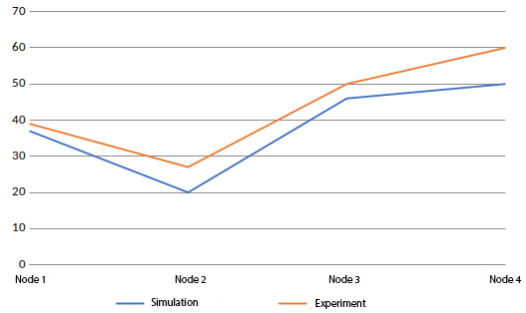


Figure 6. Comparative diagram of simulation and experiment data

Comparing the data (see Fig. 6), we can conclude that the developed system based on MESH network optimally provides communication between network nodes.

## CONCLUSIONS

A server architecture for remote access to premises based on the server architecture client has been developed. A self-organized MESH network has been considered and integrated into the system. MESH network research was conducted.

## REFERENCES

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