Channel Assignment for Wireless Mesh Network

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Advised by

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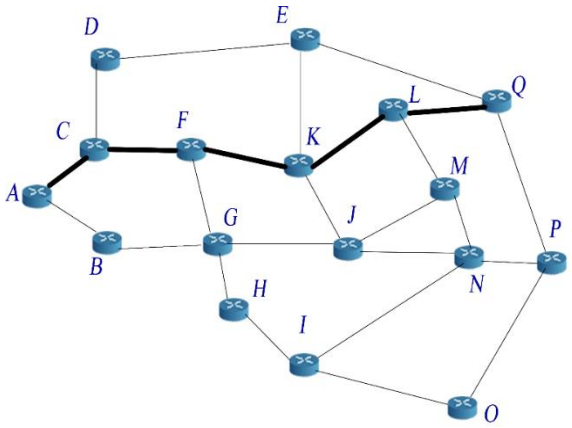
INTRODUCTION



Wireless Mesh Network (WMN) is formed by multiple radio-connected Wi-Fi routers. Routers forward data wirelessly through multiple routers until a gateway with Internet access is reached. Under the wireless radio signal emitted by multiple routers on different channels, channel interference and collision may occur and degrade network performance.

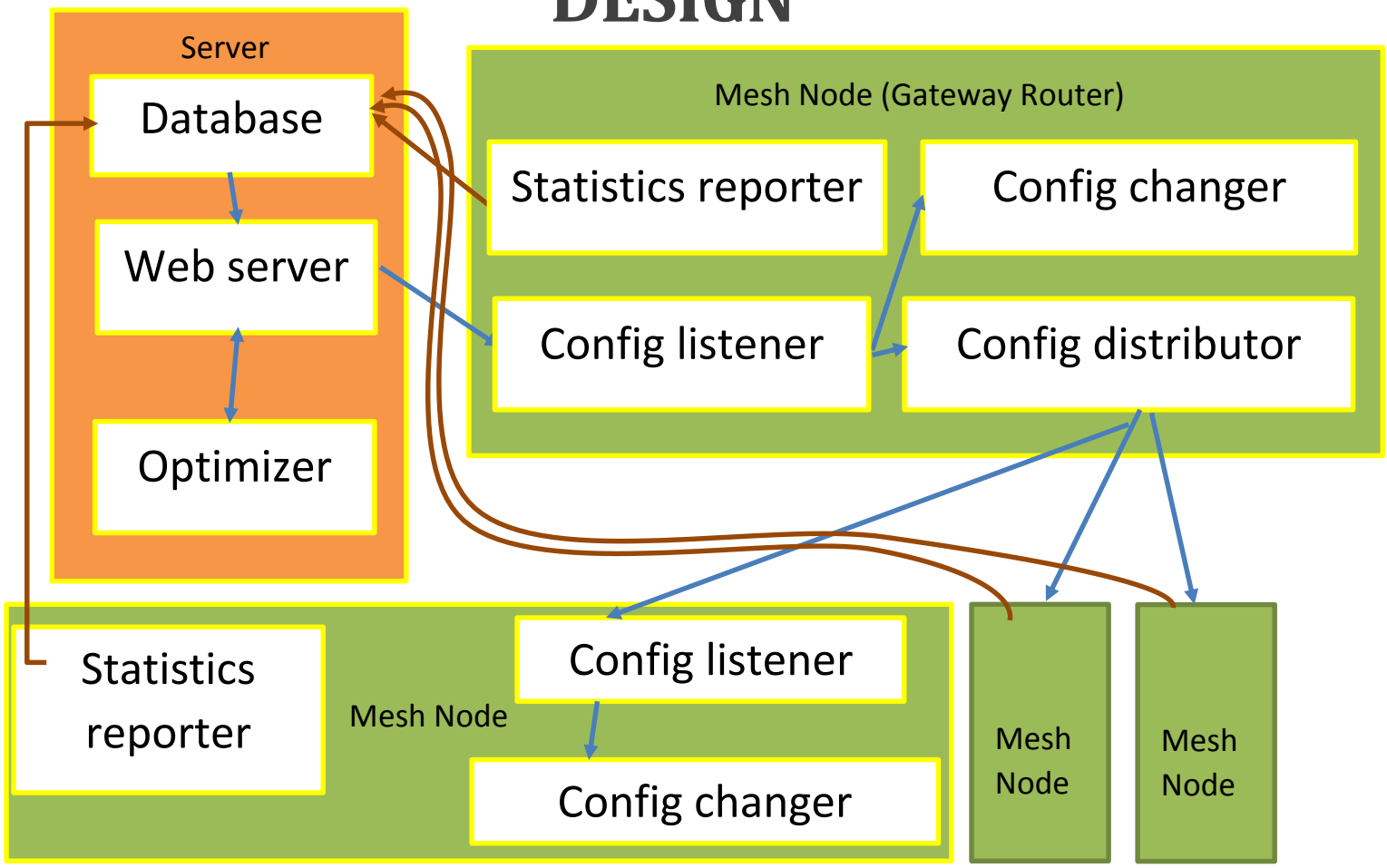
PRACA has previously been developed to solve for a joint optimization problem on channel assignment (CA) and routing in a WMN.

GOAL

This project aims at developing:

- A database which keeps track of channel condition statistics based on received radio signal strength between different Wi-Fi routers on the WMN
- A web interface which visualize the channel assignment and routing suggested by the matrix output from PRACA, allowing user to modify before applying changes to the network, and this web interface send these changes to
- A small program which runs on every mesh router each, which listens to the required channel and routing. Each of them configures itself switching to new channel and routing.

DESIGN



IMPLEMENTATION

Central Server:

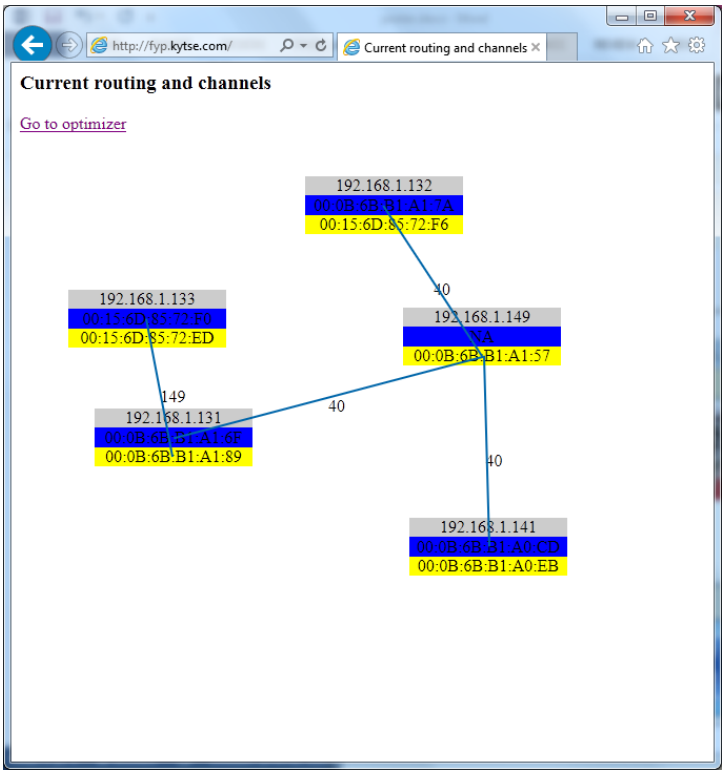
The server hosts

- A MySQL database which stores the channel statistics sent from the routers.
- PRACA mesh optimizer which queries channel statistics from the database and output CA and routing matrix, when being invoked by the web interface.
- A web server running PHP to provide an interface for system administrator to preview the suggested CA and routing provided by the output of mesh optimizer. The system administrator can send the CA and routing configuration to the routers through web interface to the socket listener at gateway mesh router.

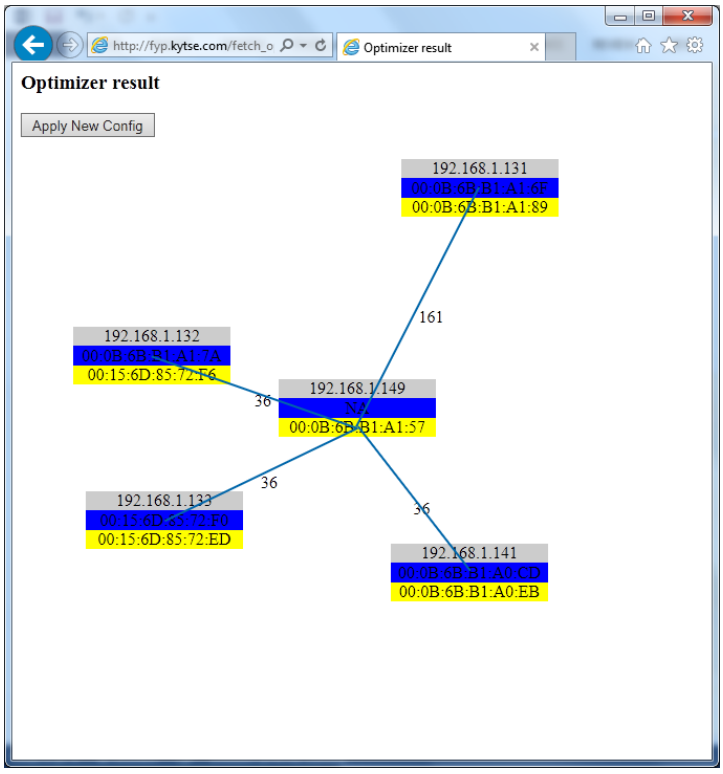
Mesh Node Routers:

The mesh routers initially establish arbitrarily to a neighboring node which is reachable by the mesh network. The routers scan the channel statistics regularly and send it to the central server through the established mesh network. When their socket listeners receive configuration changes from the central server, they will change the channel assignment of themselves and associate with their assigned new parent routers.

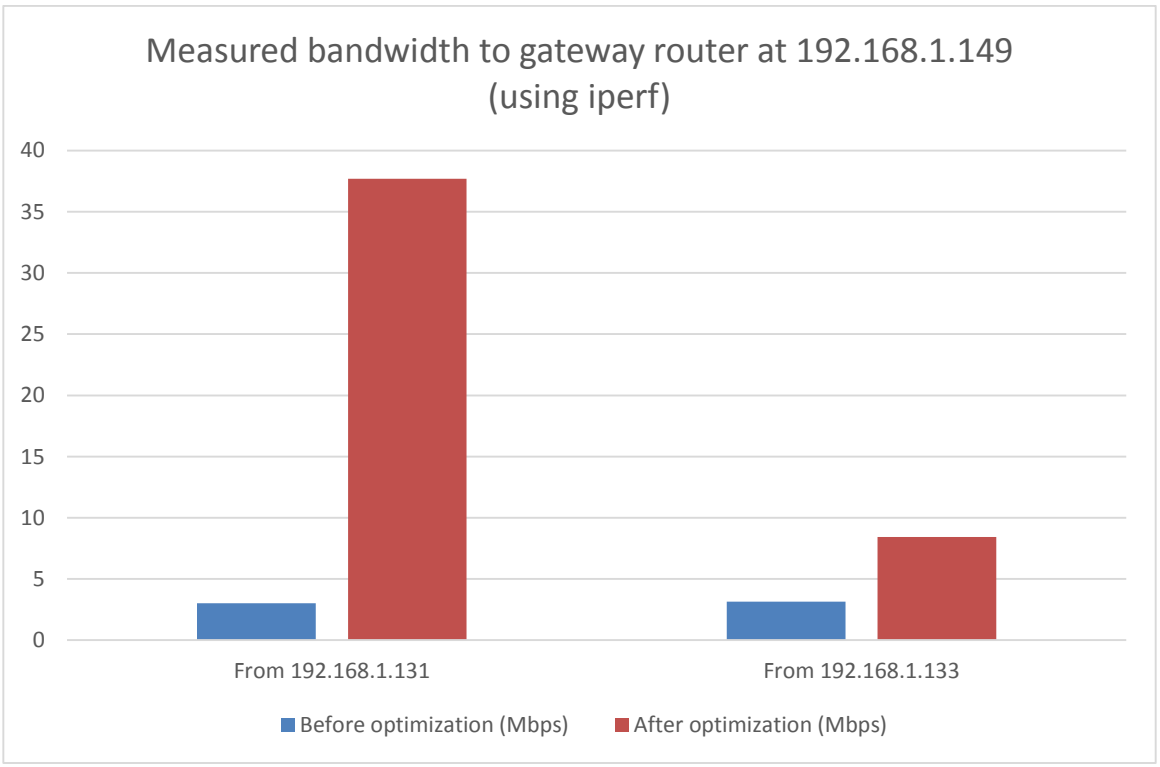
RESULT



An example WMN visualization, before optimization



An example WMN visualization, after optimization



Network performance is significantly improved after applying optimization according to PRACA's output.