Development of Multihop Adhoc network using street lights infrastructure.

Main goal:

Building a support system of smart city management, the system will support electricity consumers in the city while interfacing with different systems operating in the city.
The system will manage and operate the various energy consumers in the city, including street lighting, lighting structures and acclimatization of buildings, traffic lights and security cameras.

Introduction:

- Mobile Multi-hop Ad Hoc Networks are collections of mobile nodes connected together over a wireless medium.
- These nodes can freely and dynamically self-organize into arbitrary and temporary, "ad-hoc" network topologies, allowing people and devices to seamlessly internetwork in areas with no pre-existing communication infrastructure, (e.g., disaster recovery environments).

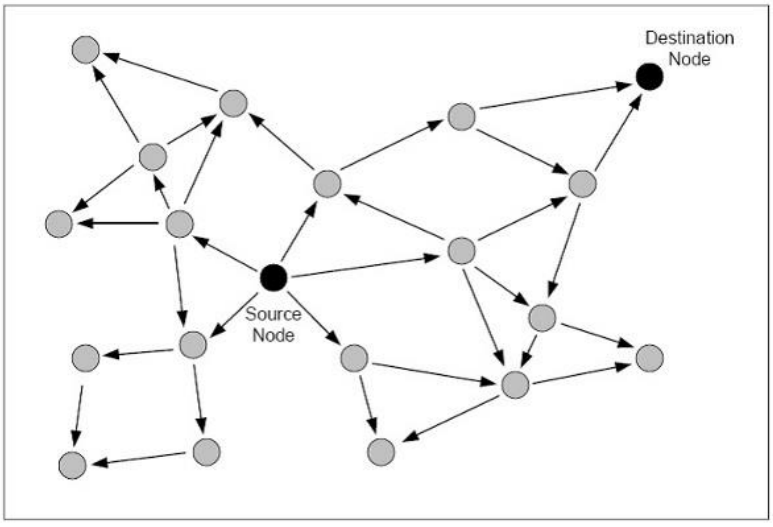
Nature of Project:

- Design and implement 802.11 wireless adhoc network based on raspberry pi devices.
- Plan and Design of secure wireless communications system
- General technical data of the components which connect the element, the element will know to connect streetlights, air conditioners, Traffic lights, and the general electrical circuits, the element will know how to connect to a tiny video camera.

Goal:

- Our main goal in this project is to use the street lights infrastructure to create a decentralized wireless network using a designated device that will be install on the streetlight, exploiting their space topology.
- Each cluster of streetlight will have a 3G gateway, enabling communication with the World Wide Web.
- Use a raspberry pi (https://www.raspberrypi.org/products/) as our development platform.

Diagram



The focus of the project:

- Explore and research the adhoc mode in the 802.11 IEEE standard
- Secure communications system equivalent to 802.11.
- With sufficient bandwidth to send information videos, filmed with cameras that connect to the element, distance from point to point will be between 40 and 500 meters.

- Research the various type of multihop routing protocols exist today.

- Choose the winning protocol with respect to match our demands from the project.

- Implement the protocol on the raspberry pi device.

- The element will know to connect streetlights from 70 watts to 400 watts, 1.5 horsepower air conditioners up to 4 horsepower. Traffic lights from 70 watts to 150 watts, general electric circuit from 20 Amp to 400 Amp. The element will know how to connect to tiny video camera.

- The inherent functions of the device. Receiving and execution of turn on and turn off command. Receiving and execution of command dimming. Operating hours programmability and remote alarm. The ability to remotely definition of structured troubleshooting. Measurement capability of the power and the electric current. Alert to drop a certain electric current (remote setting).Storage and sending aggregated data (kilowatt hour, amps, power) according to the time defined (remote setting).The ability to Receiving and execute a command to replace the lit timing of the traffic light.
  The ability to Receiving and send visual video information.

What will we learn from the project?

- IEEE 802.11 standard.

- Decentralized networking.

- Multihop routing protocols.

- Protocol and standard implementation.

- Planning and programing of the rasberry pi device

- Assimilation of embedded systems to the external system.