

2018 Research Interest/Project Ideas

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IOTA: An Investigation Of IoT Protocols.

The IETF has developed a set of protocols for wireless Internet of Things (IoT) devices. Instead of relying on a centralized base station, the protocols follow a mesh approach in which each node agrees to forward packets on behalf of other nodes.

Vendor consortia have adopted the protocols, and are starting to use them in products.

For example, both Zigbee IP and Wi-SUN use the IETF protocols. However, the protocols are relatively new, and their behavior has not been investigated thoroughly. In particular, the Routing Protocol for Low-power and Lossy Networks (RPL), which provides mesh forwarding information, must converge after a node joins or leaves the network, or whenever a node moves. Because many IoT devices are small and portable, rapid changes in the network are expected.

We are currently building a wireless protocol testbed. The proposed project will use the testbed to measure IETF protocols when topologies change as nodes enter, leave, and move. Our intuition suggests that we will be able to find periodic topology changes that drive RPL (and most mesh routing protocols) into an oscillating state in which the routing never converges. The results of the research will be especially important to corporations that are deploying wireless IoT sensors in their offices and production lines as well as corporations that are selling IoT devices and services.