6LoWPAN for mobile wireless sensor network communication

Weiqi Zhang and Bradford G. Nickerson
University of New Brunswick, Faculty of Computer Science

Motivation:

To explore 6LoWPAN in mobile Wireless Sensor Network (WSN).

Objectives:

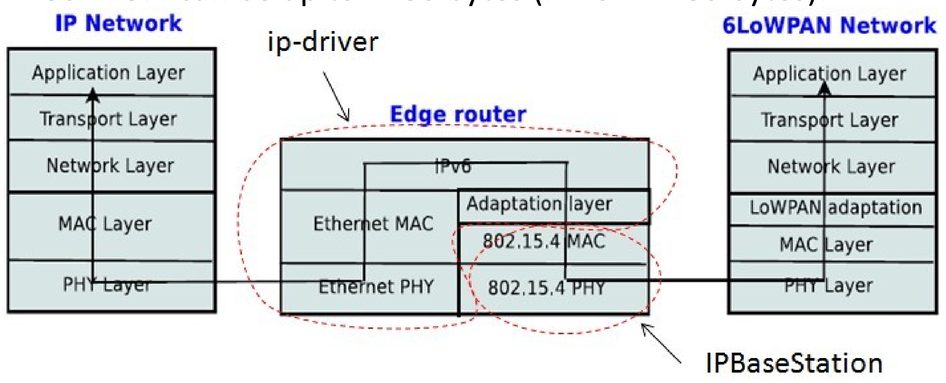
- Can an IPv6 protocol based on 6LoWPAN accommodate moving nodes?
- How well do 6LoWPAN libraries integrate with IP networks running IPv6?

Dual stack, integrating 6LoWPAN with IPv6

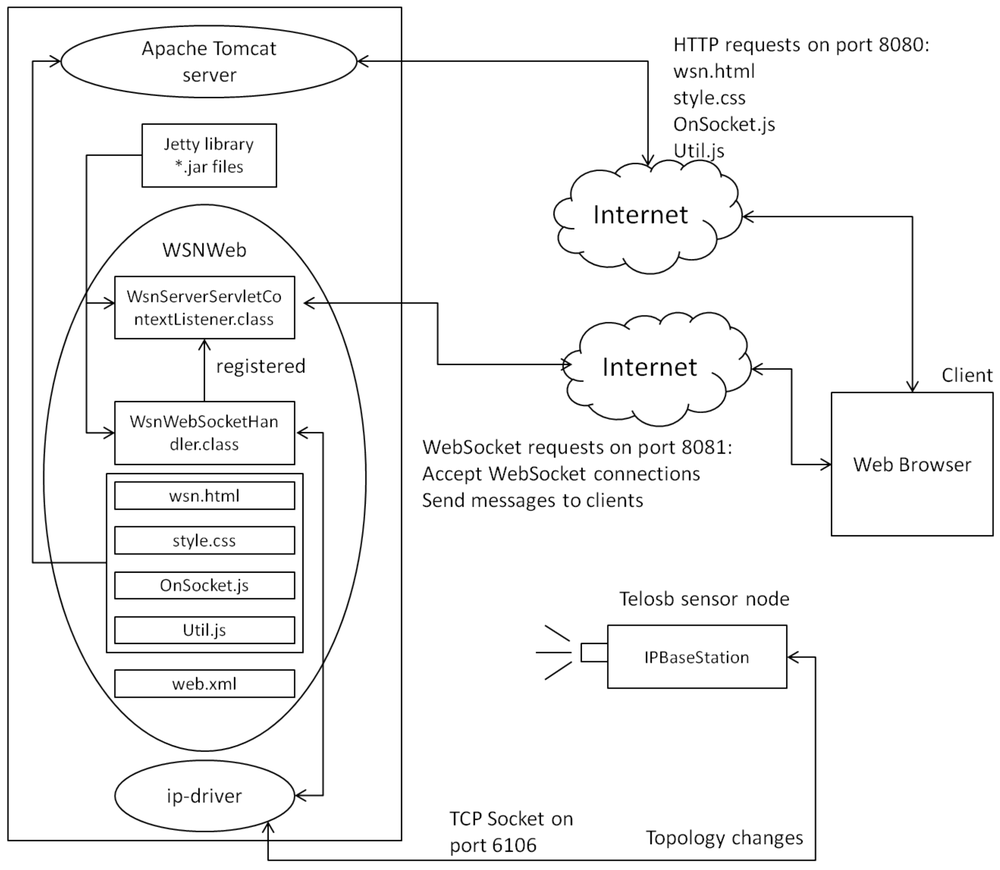
A 6LoWPAN packet is at most 127 bytes, e.g. for UDP packet:

Preamble	FCF	seq	PAN	dst	src	Frag header	data	FCS
14B	2B	1B	2B	2B	2B	5B	up to 97B	2B

An IPv6 packet header is 40 bytes, length of an IPv6 packet over IEEE 802.15.4 can be up to 1280 bytes (MTU = 1280 bytes).



WSNWeb application architecture



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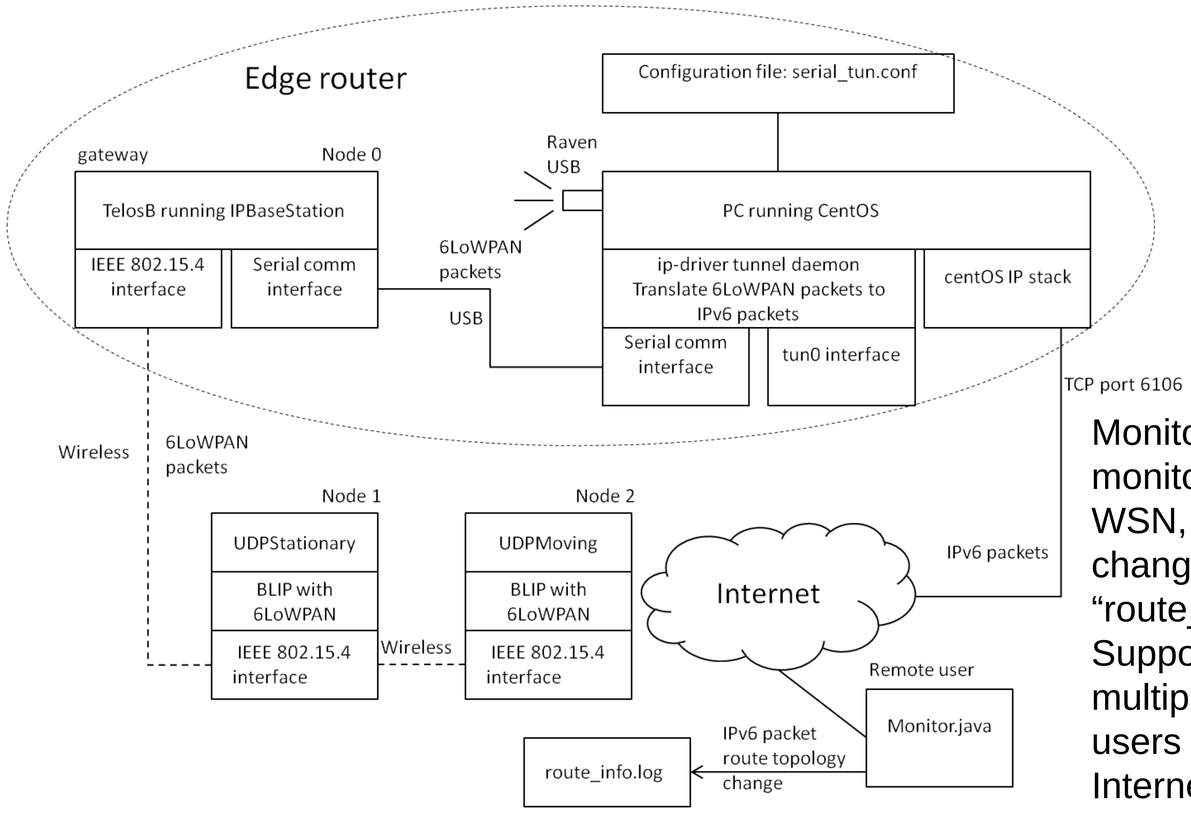
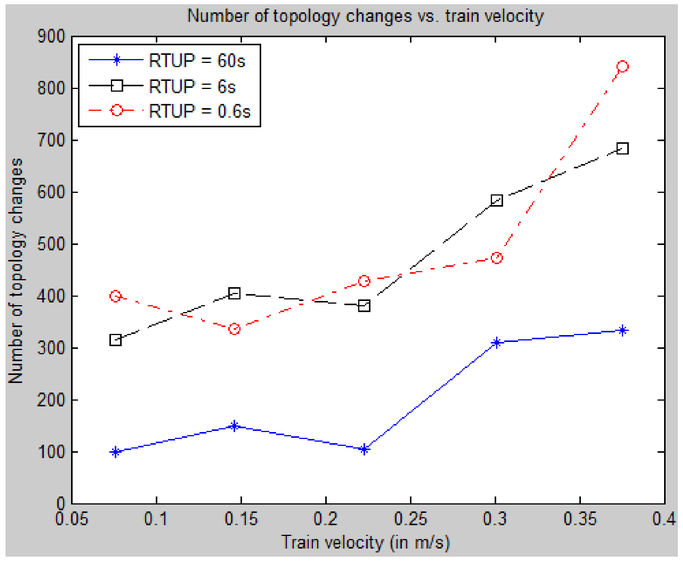
6LoWPAN based Wireless sensor network architecture

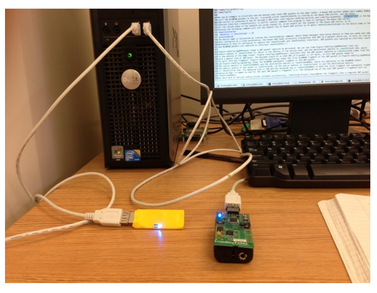


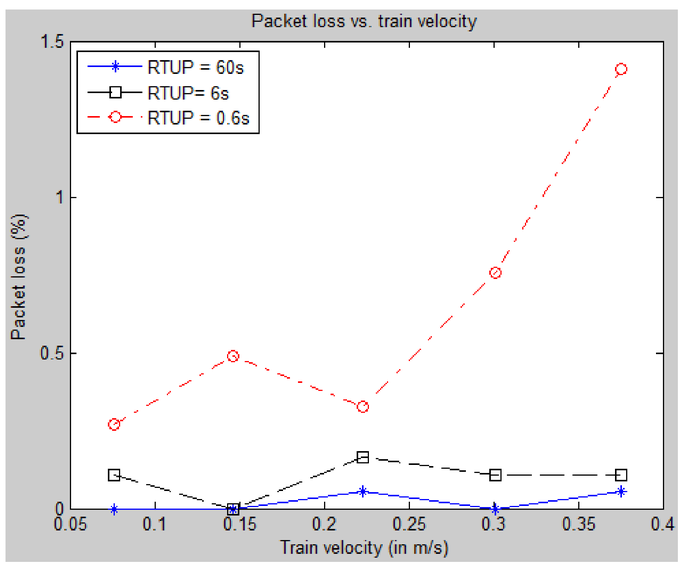
Monitor.java monitors WSN, topology changes to file "route_info.log". Supports multiple remote users over the Internet.

Testing platform and preliminary results



The moving nodes are carried on model trains running in ITB214 lab.
There are six stationary nodes in the lab, the power level of the nodes are -25dBm (minimum level).





Conclusions:

1. Increased train speed => higher route topology change.
2. Routing table update period (RTUP) of 60s and 6s has same packet loss for high and low train speed. Routing table update rate of 0.6s has increasing packet loss with increasing speed.

Future work:

1. Test the performance of the WSN with two moving nodes.
2. Create a database to store routes and sensor readings.