Mobile robots in wireless sensor networks

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Rationale

01 Significant growth of Wireless communications.

02 Increased opportunities, new challenges. How to efficiently collect the distributed sensory data.

03 Robots can provide flexibility with respect to the installation of the network sensors and allow active information gathering.

Purpose

☐ To study current developments in the field of mobile robots and wireless sensor networks and choose the most reliable methods for implementing in real life tasks.

Research questions

01 To find possibilities for reducing energy consumption for robots.

02 To research how to improve the wireless communication performance.

03 To consider a way to solve the max flow problem.

Message Queue Telemetry Transport protocol

- Using TCP or UDP as upper layer protocols is not very good choice.

- MQTT is simple application layer protocol and not demanding for memory and computing resources.

- The ability to manage the quality of service by implementing QoS. It allows you to manage the way to deliver a message and confirmation of its receipt.

Scheme for prioritizing flows

- TCP connections presents several issues in terms of limited-bandwidth, delays and jitter, when used in wireless networks.

- Priority scheme allows favoring more important flows over less important ones, reducing delay and jitter.

- Messages enter the queue which is sorted according to the priority in the topic. Then they are pushed in the OS queue and later sent in the same order.
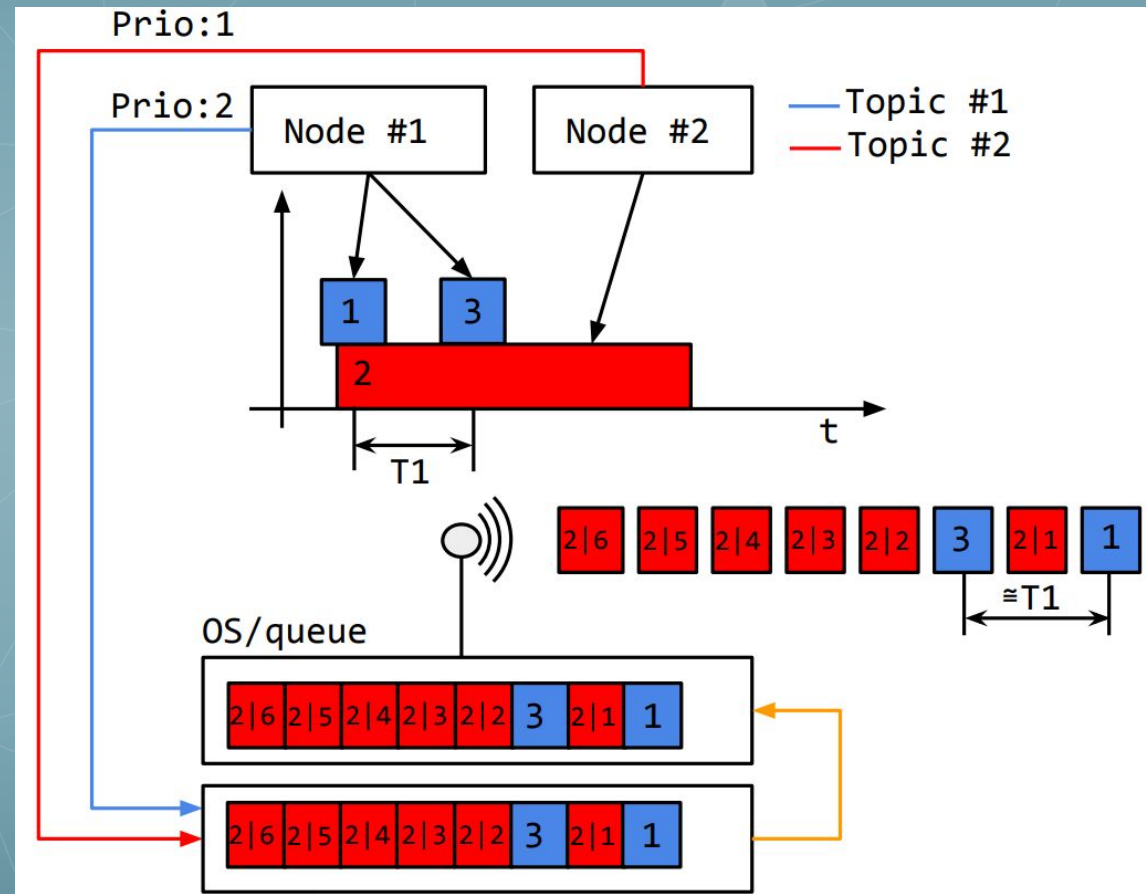
Algorithm for solving max flow problem

- Nodes with poor energy have bad effect on the data rate or max flow. These nodes are called bottleneck nodes.

- Solution is to charge the bottlenode on each path to increase the data rate.

- Algorithm deploys mobile chargers to paths, then searches for bottlenodes and places it on the same set with corresponding mobile charger that charges it.
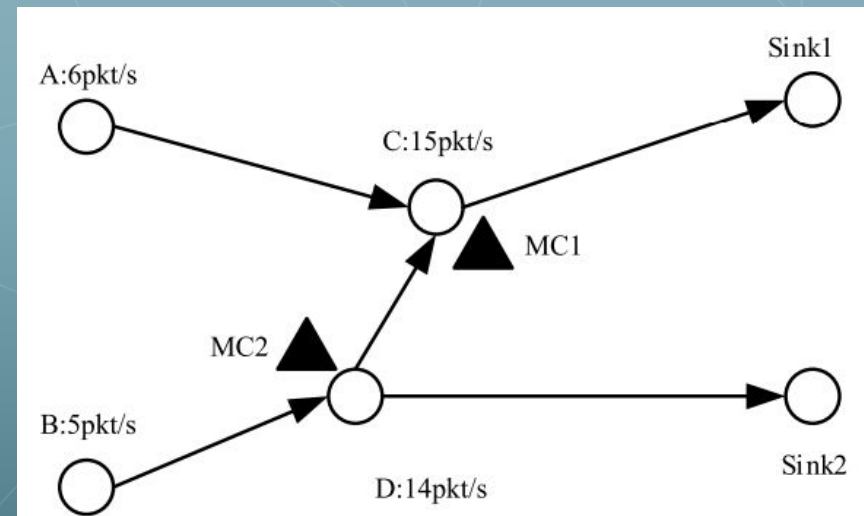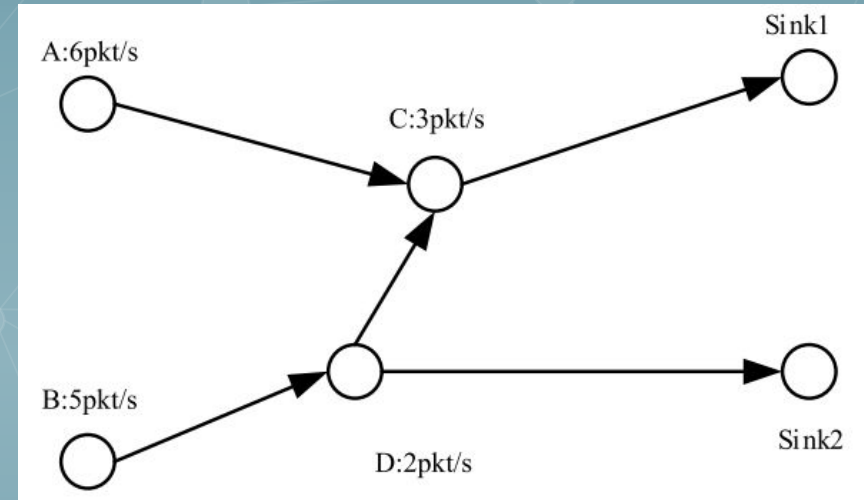
Conclusion

- The MQTT protocol simplifies software development and the maintenance process.

- BottleNeck algorithm can effectively increase the max flow at sinks and implemented to schedule mobile chargers.

- Flow prioritization is necessary for the reduction of jitter. Proposed system allows favoring more important flows over less important ones.

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THANK YOU

for your attention