

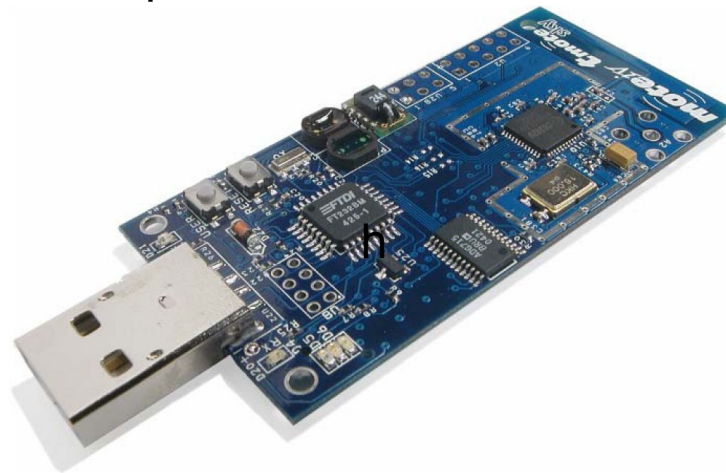
Extension and Evaluation of a Sequence Detection System in Wireless Sensor Networks

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Telecommunication

Introduction

Wireless sensor networks
Collecting any relay environmental data
Node sequence is important
Flexible node setup desired
We assume one dimensional sequences



Motivation

Create measurement data for sequence detection in big sensor networks

- Multi-Hop support
- Measurement management
- Measurement collection and transmission
- Automated sensor discovery

Working base

Tmote/TinyOS

Paper of Onur

- System/Algorithm for Sequence detection
- Frequency usage evaluation

Exp. No:	Single Channel		Multiple Channel	
1	0 2 1 4 3	F	0 2 3 4 1	F
2	0 2 1 3 4	F	0 1 2 3 4	T
3	0 2 1 3 4	F	0 1 2 3 4	T
4	0 2 1 3 4	F	0 1 2 3 4	T
5	0 2 1 3 4	F	0 1 2 3 4	T
6	0 2 3 4 1	F	0 1 2 3 4	T
7	0 2 1 3 4	F	0 1 2 3 4	T
8	0 2 1 3 4	F	0 1 2 3 4	T
9	0 2 1 4 3	F	0 1 2 3 4	T
10	0 2 1 3 4	F	0 1 2 3 4	T
Result:	0/10 Success		9/10 Success	

TABLE I
VERIFICATION: SINGLE CHANNEL VS MULTIPLE CHANNEL

Source: Node Position Discovery in Wireless Sensor Networks
M. Onur Ergin and Adam Wolisz

Design

- Sync node(Management)
 - Node Detection
 - Sender Selection
 - Channel Selection
 - Data Collection
- Measurement node
 - React on sync node

Design – Node Detection

Sync Node



Node 1



Node 4

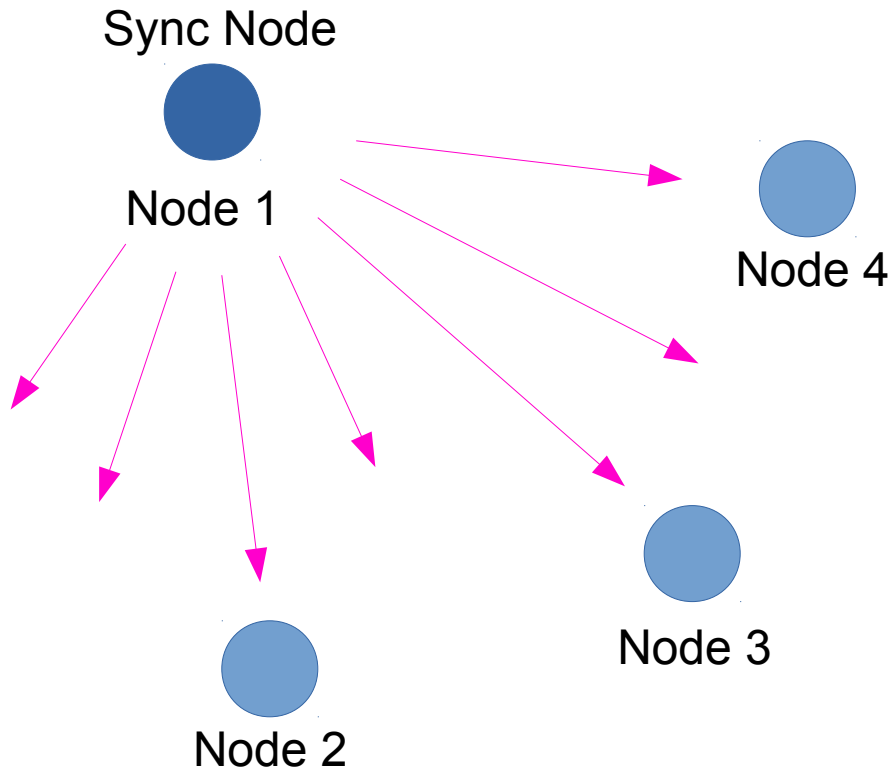


Node 3



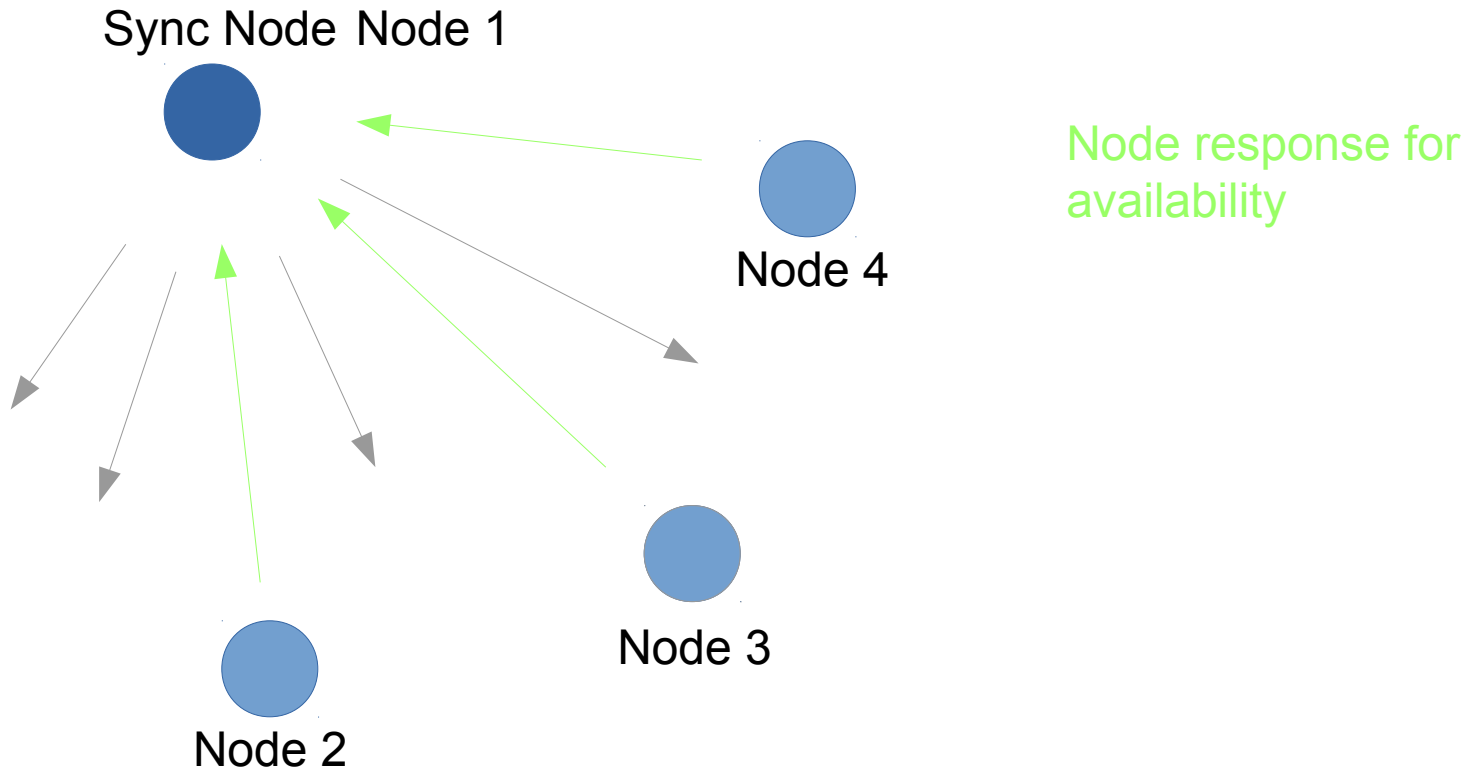
Node 2

Design – Node Detection

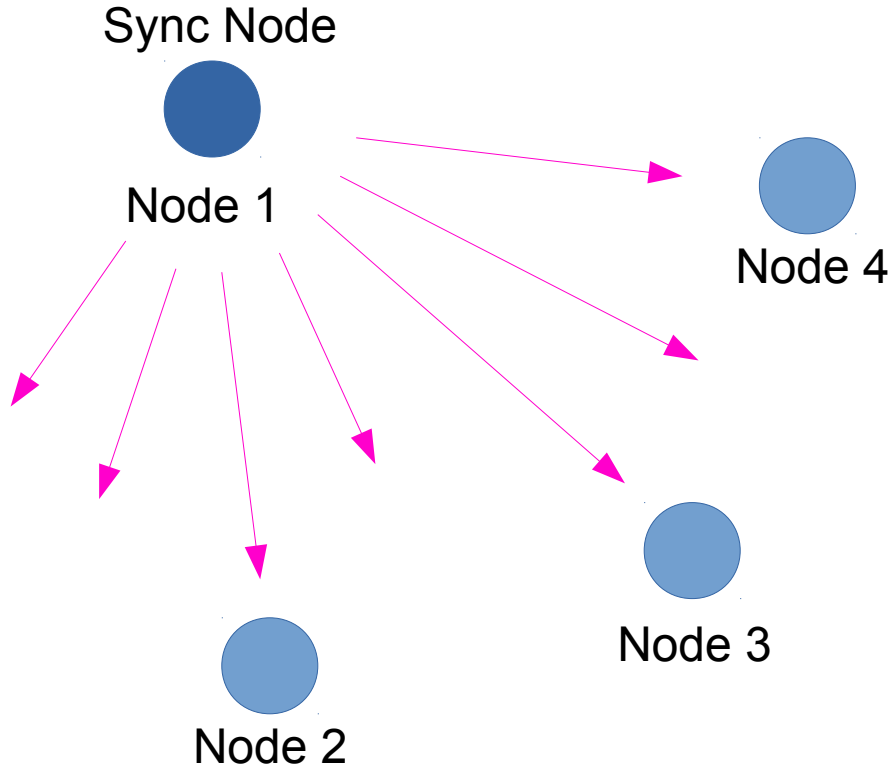


Request for discovery

Design – Node Detection

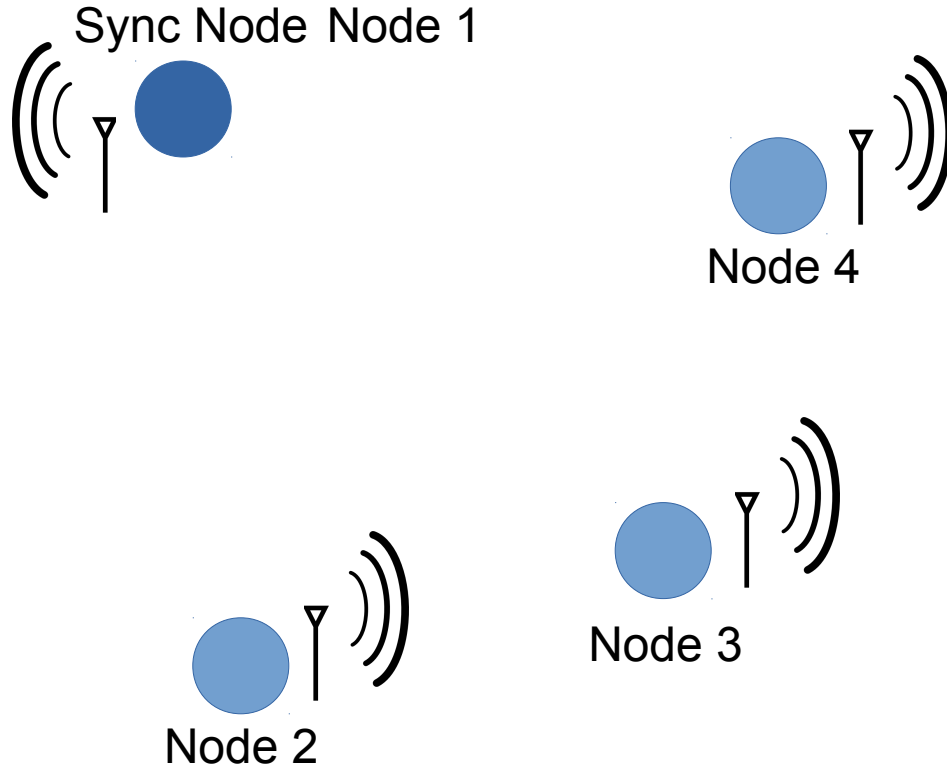


Design – Sender Selection



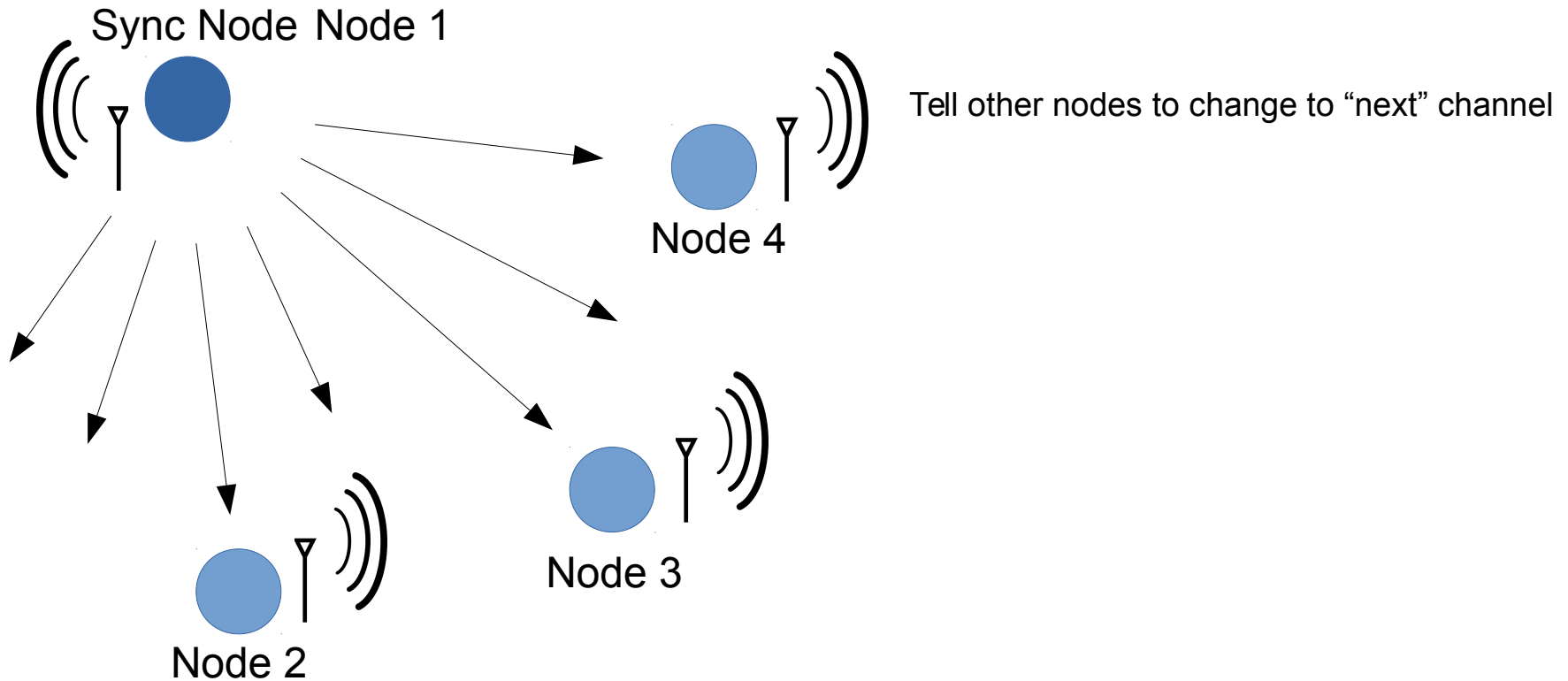
Tell which node will
send next

Design – Channel Switching

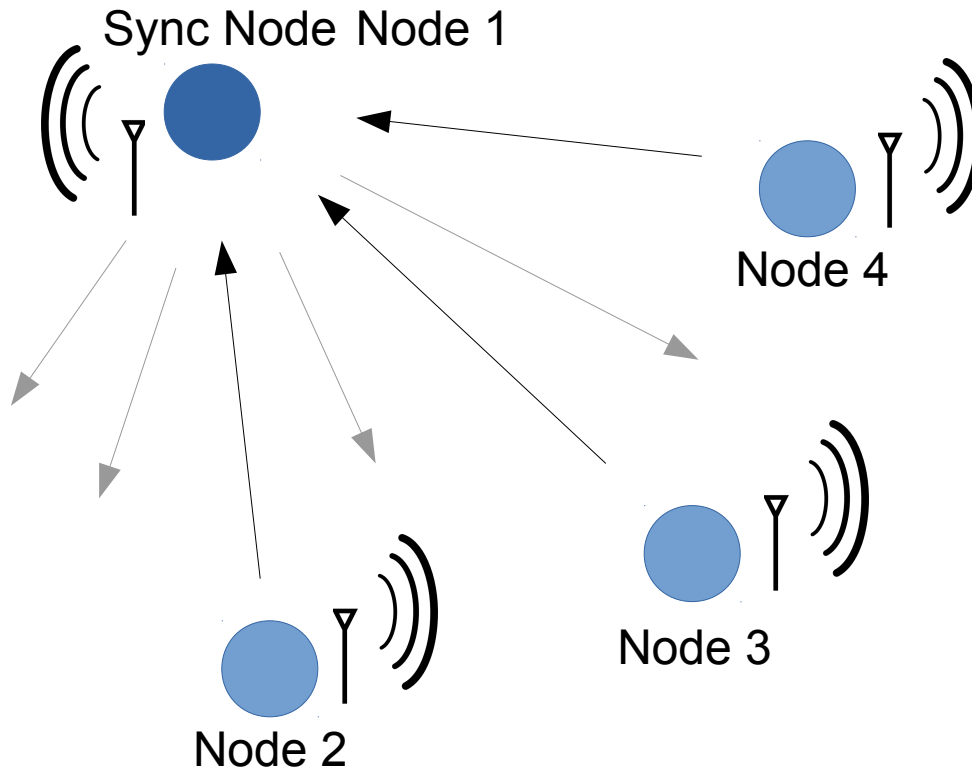


- Every Node has several frequencies

Design – Channel Switching

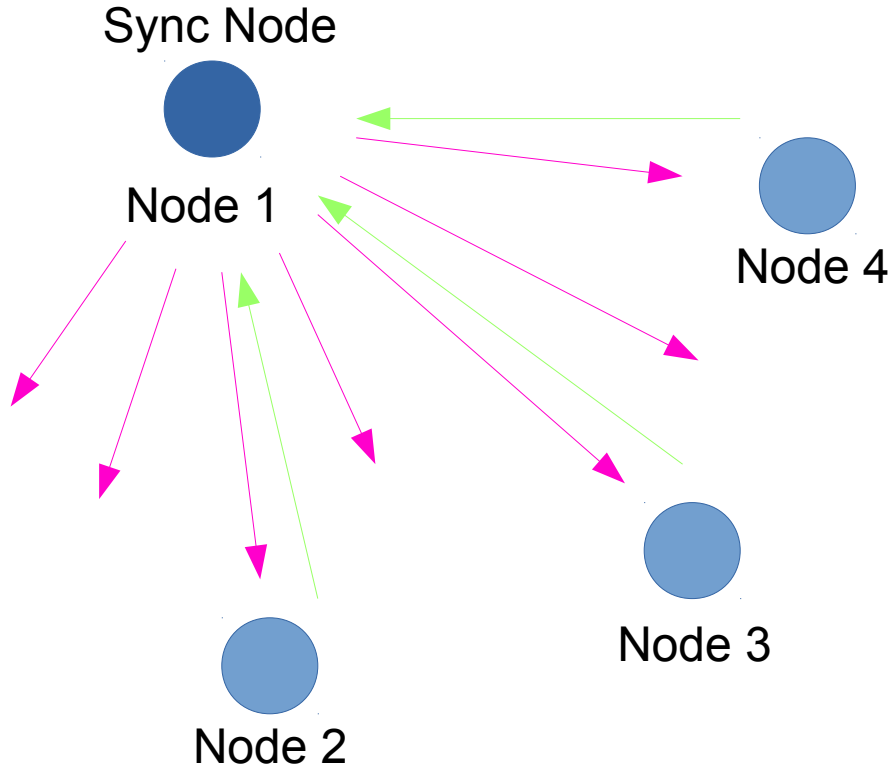


Design – Channel Switching



Nodes acknowledge
on the “next”
channel, that they
changed

Design – Data Collection



Send me your
collected data
Collected data

Architecture

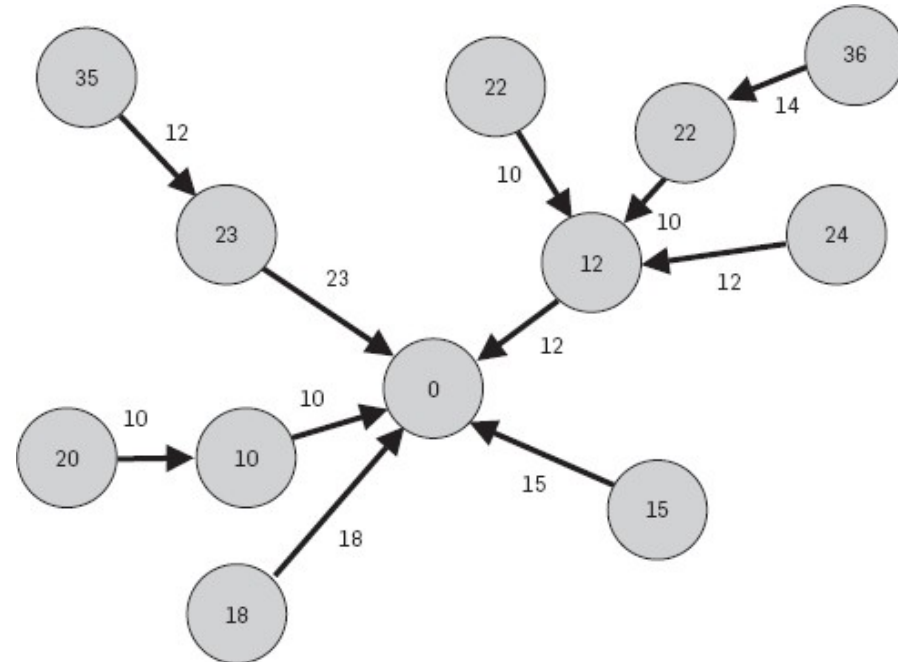
- Protocols
 - Dissemination
 - CTP
- Message Acknowledgement
- PC-Node communication

Architecture - Dissemination

- Provides reliable broadcasting to every node in network
- Detects when a node is missing a packet
- For small data sizes

Architecture – CTP

- Improves delivery reliability
 - Acknowledgements for unicast packages
- Sending data over closest nodes (parents) to the root (sync)
 - Using ETX for routing



Architecture - Acknowledgments

Still in discussion

Strategies

- Sending Acknowledgments for all control packets
 - Using CTP
 - Using direct transmission
 - Using Disseminate
- Waiting after each control packets
 - May be reliable, dependent on nodes
 - May be slow

Testing

Can we collect all measurements?

Tests with

- Distance between node
- Obstacles
- Lower Transmission power

What we've done

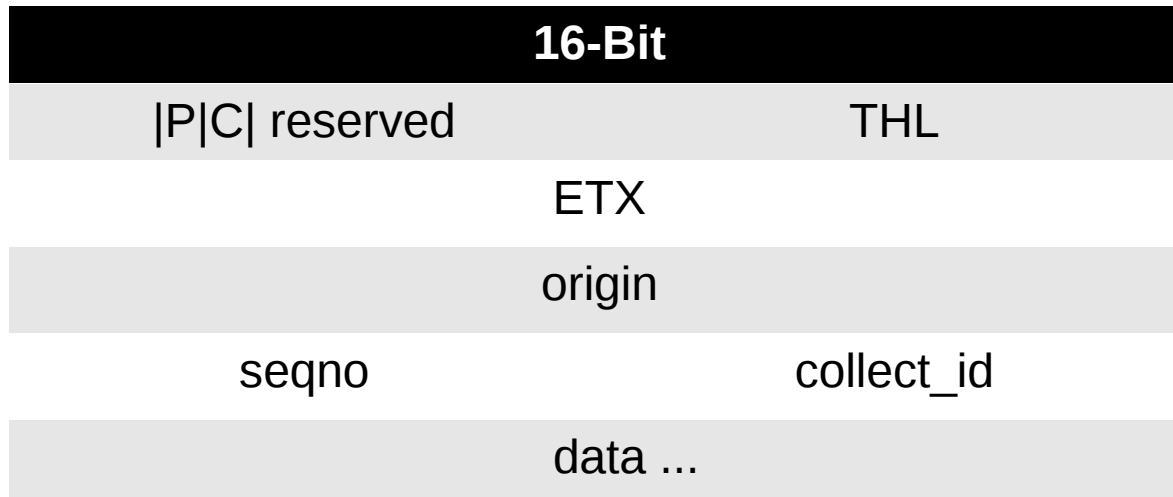
Will be filled in with code and examples here...

Timetable

Milestone	Week	Goals	Success
Initial	43-45	Getting comfortable with environment: TinyOS, tmote, Communication Protocol, PC-Connectivity	Done
Milestone 1	46-49	Node detection PC communication/GUI Sender Selection Data Collection	
Milestone 2	50-2	Channel Switching Implement Sequence Algorithm	
Final	3-6	Testing Improvements Evaluation	

Thank You

Extra Stuff CTP – Details



P: Routing pull.

C: Congestion notification.

THL: Time Has Lived.

ETX: The ETX routing metric of the single-hop sender.

origin: The originating address of the packet.

seqno: Origin sequence number.

collect_id: Higher-level protocol identifier.

data: the data payload, of zero or more bytes.