

# Time-Aware Routing in Wireless Sensor Networks

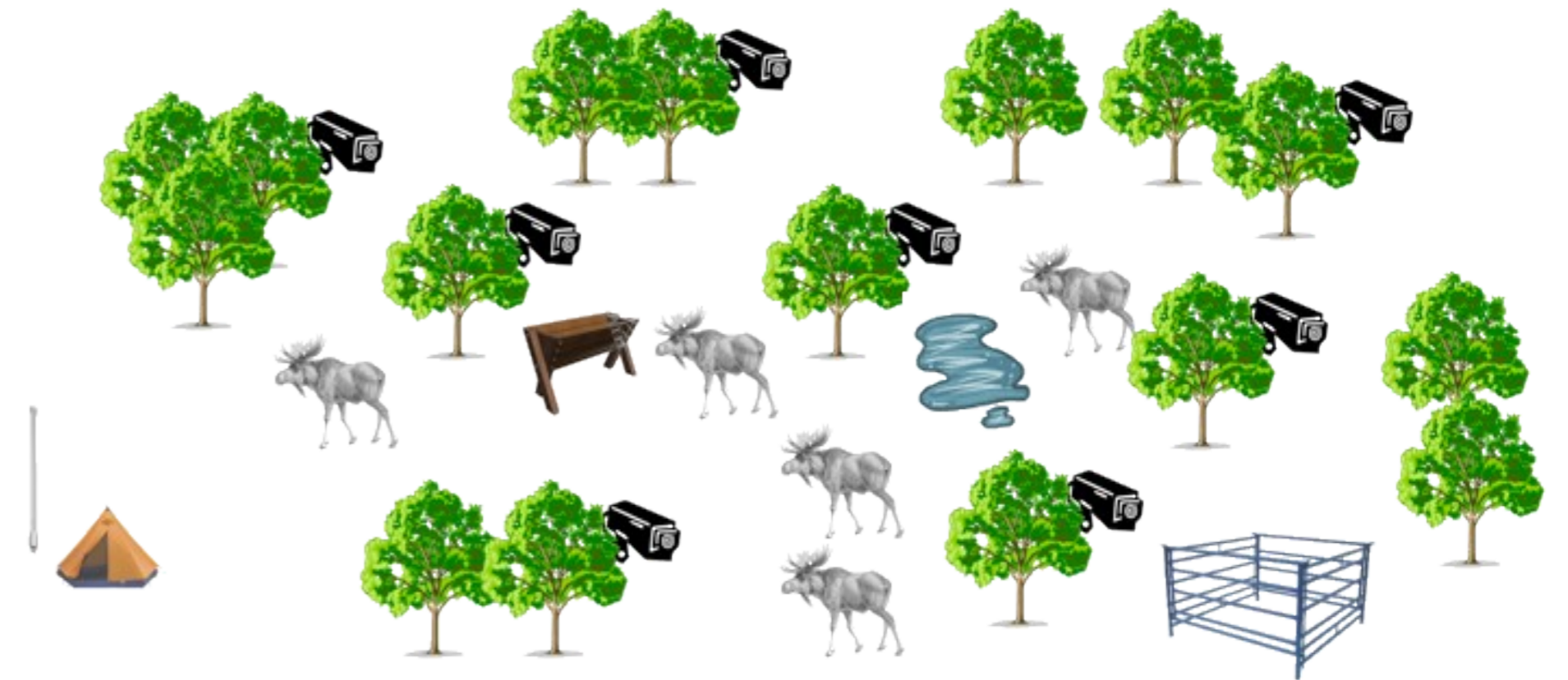


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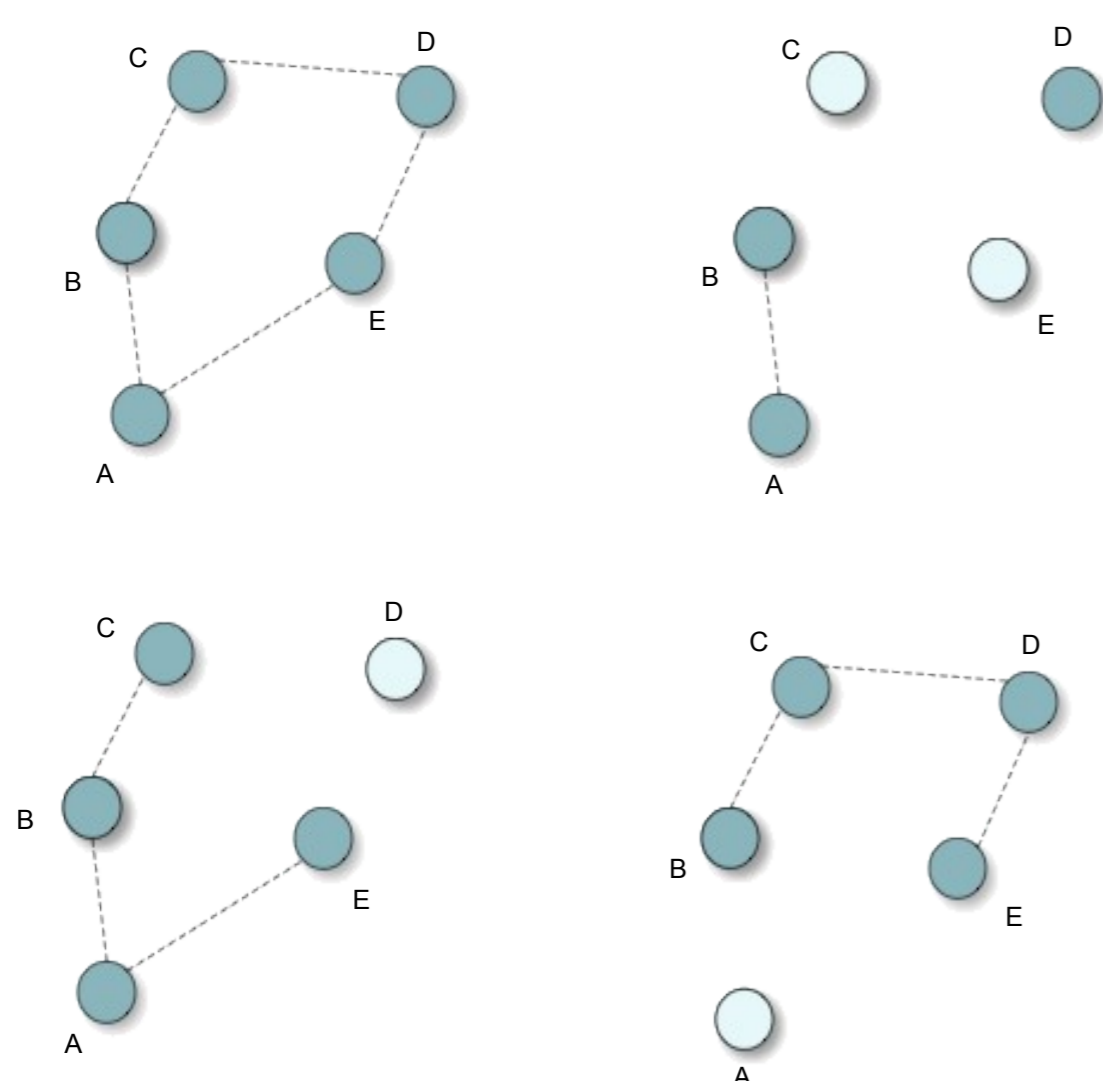
## Introduction

- The scenario is a naturalistic park in which a network of wireless nodes is deployed to perform **environmental monitoring**.
- **Fixed and mobile nodes**: they collect data, locally elaborate them, send them to sinks for centralized computation, disseminate information to data collectors or actuators.
- This is a **Wireless Sensor and Actor Network** with **dynamic topology**, nodes can be constrained on buffer size, power supply, radio range and computational power.
- The goal is to efficiently **reprogram** nodes, **collect** and **disseminate** data while coping with these issues.



	$t_0$	$t_1$	$t_2$	$t_3$
A				
B				
C				
D				
E				

## Time-Aware routing for fixed sensors



- Nodes switch the radio interface off when not needed to save battery: fixed nodes are **intermittently connected**.
- **Time** divided into **intervals**: radio switches on and off at interval changes only.
- Network administrator assigns duty-cycles to sensors at startup.
- Nodes **embed** the duty-cycle into their routing table while initializing, then start exchanging tables with neighbors.
- As tables arrive, a node updates matching local info if needed.
- Then the node checks for every path if there exist a better path that uses **store-and-forward**.
- The node broadcasts the updated table; the protocol stabilizes when no further updates occur.
- The Time-Aware Delay Tolerant Routing Protocol aims to be efficient by computing **all** the existent best paths, even **non-contemporary**, between any pair of nodes and starting in any of the time interval. The best path is the one that minimizes the end-to-end **delay**.
- Currently testing under Contiki OS on both Tmote Sky sensors and Cooja simulator.

## Future work

- Fully investigate protocol **fault-tolerance** for faulty links and nodes.
- Switch from assigned duty-cycling to **profiling** by observing traffic. Use profiles to statistically **predicting** future availability of links; profiles enhance protocol flexibility, efficiency, reliability.
- Involve **mobile nodes** in the communication scheme. Extend the profile approach to mobile nodes in order to predict their behavior and compute the related delay-tolerant paths.

