

NDN Sensor Network Emulator

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Motivation

Explore NDN-based Sensor Networks:

- ❑ Naming scheme & discovery
- ❑ Communication paradigm
- ❑ Routing & forwarding

Need a testbed to experiment with

How to build a “testbed”

❑ Real devices

- ❑ Approach: **Real** application + **Real** network
- ❑ Challenge: building a real network is hard

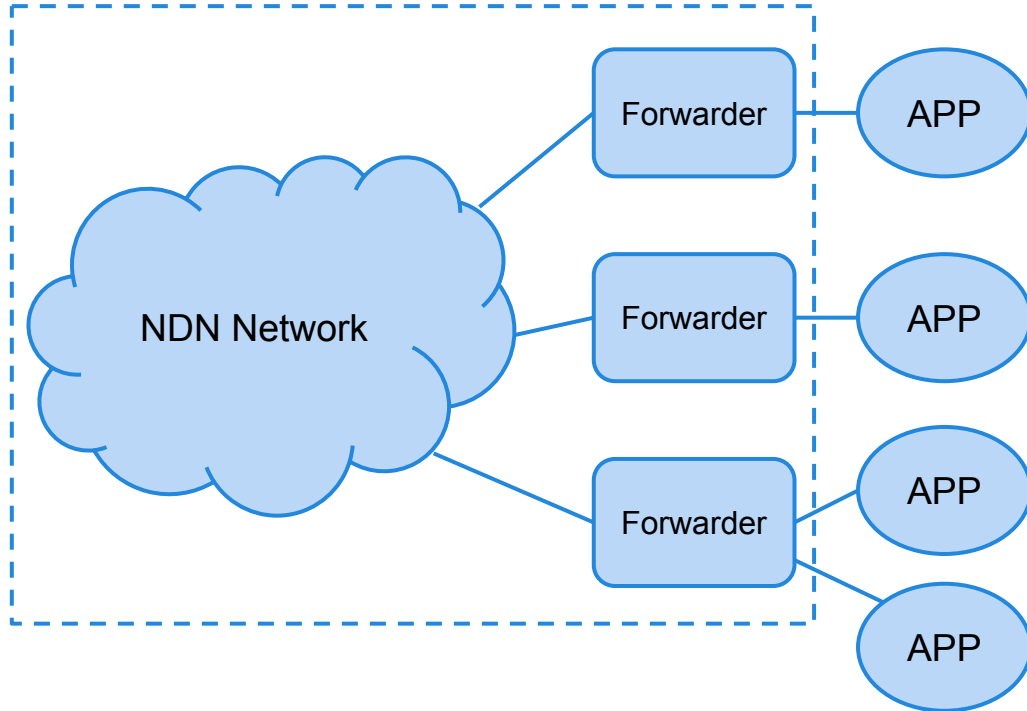
❑ Simulation

- ❑ Approach: **Virtual** application + **Virtual** network
- ❑ Challenge: application code cannot be deployed

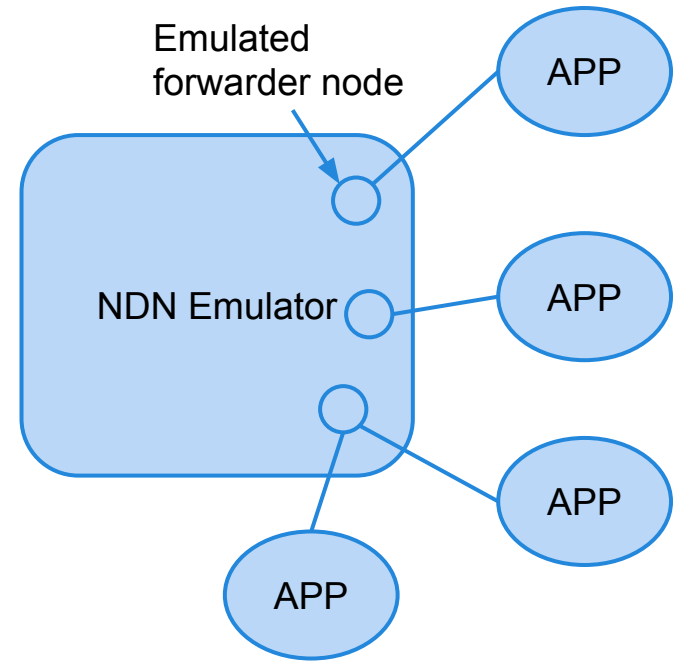
❑ Emulation

- ❑ Approach: **Real** application + **Virtual** network

Basic idea

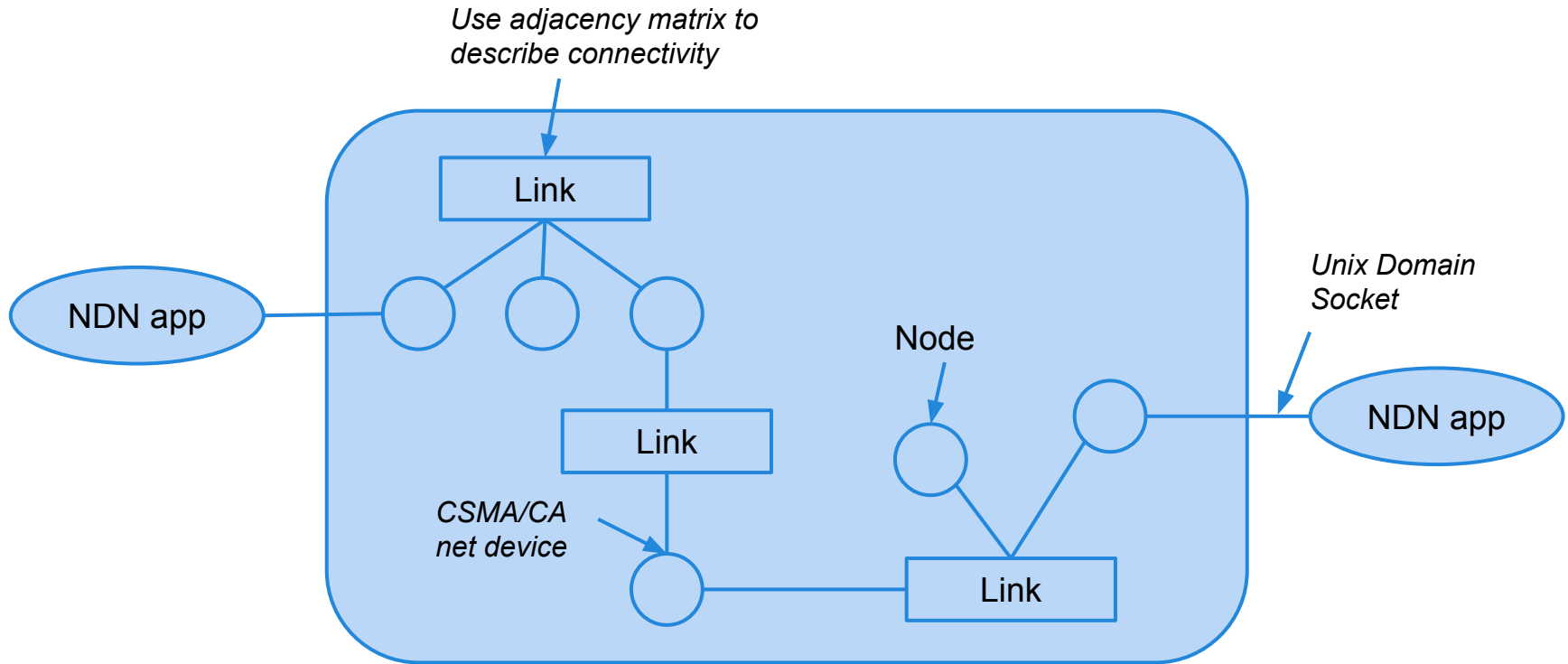


Real-world scenario



Emulated scenario

Design approach



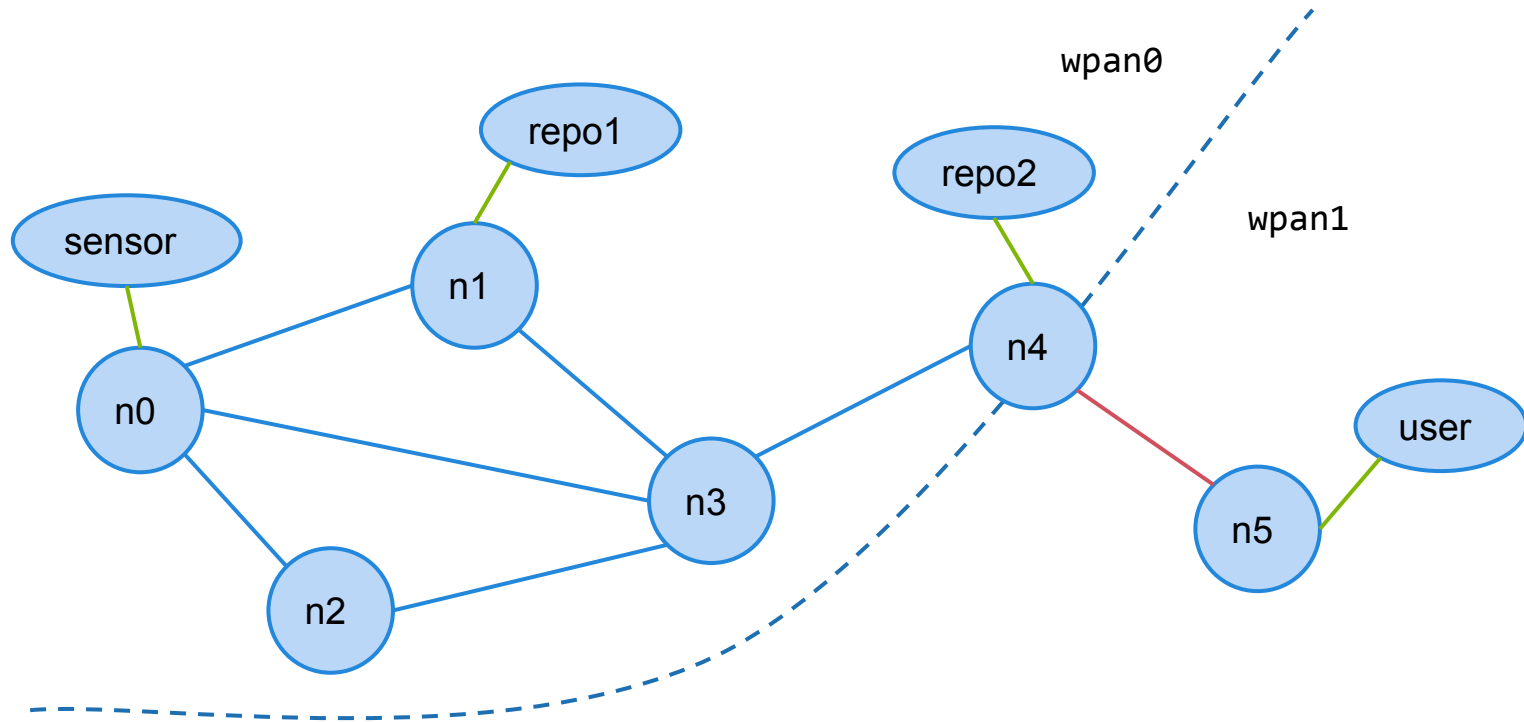
Features

- ❑ Abstract physical link behavior with tx delay and packet loss
- ❑ Emulate basic 802.15.4 protocol
- ❑ Compatible with the latest version of NFD & NDN-TLV packet format

How to use

1. Specify your testbed deployment as a configuration file
2. Run the emulator program with the configuration file
3. Connect your applications to the emulated NDN nodes and start testing

Test app: sensor data distribution



Tested communication models

❑ POLL:

- ❑ Repo sends Interest to sensor and gets Data back

❑ PUSH:

- ❑ Sensor sends Interest (encoding raw data) to repo

❑ NOTIFY:

- ❑ Sensor sends Interest as notification; repo sends Interest back and pulls data out of sensor

Future work

- ❑ Enhancing the emulator
 - ❑ Support of more wired/wireless protocols
 - ❑ Validation of correctness
- ❑ Exploring application design space
 - ❑ Additional communication models
 - ❑ Routing & forwarding for sensor mesh networks
 - ❑ Security in constrained environments