

Deployment Support Network

A Toolkit for the Development of WSNs

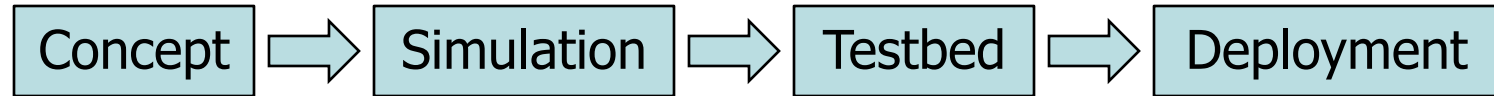
M. Dyer et al. – ETH Zurich

Ronald Steen

IN4181 - Wireless Sensor Networks

June 7, 2007

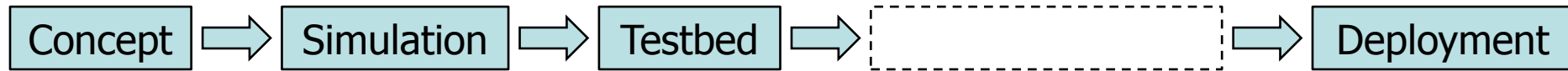
Introduction – Current approach



- Simulators
 - ns-2, Glomosim, TOSSIM
- Testbeds
 - Real sensor HW
 - (Fixed) wired network
- Services for real-world deployments
 - Watchdog timers, golden image, RPC for TinyOS

Do not allow for testing under field conditions

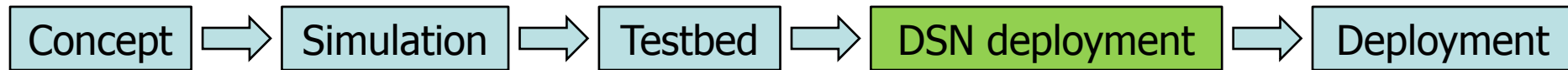
Introduction – WSN Development



Requirements

- Visibility (access to the state of the nodes)
- Control
- Realistic environment

Introduction — Deployment Support Network

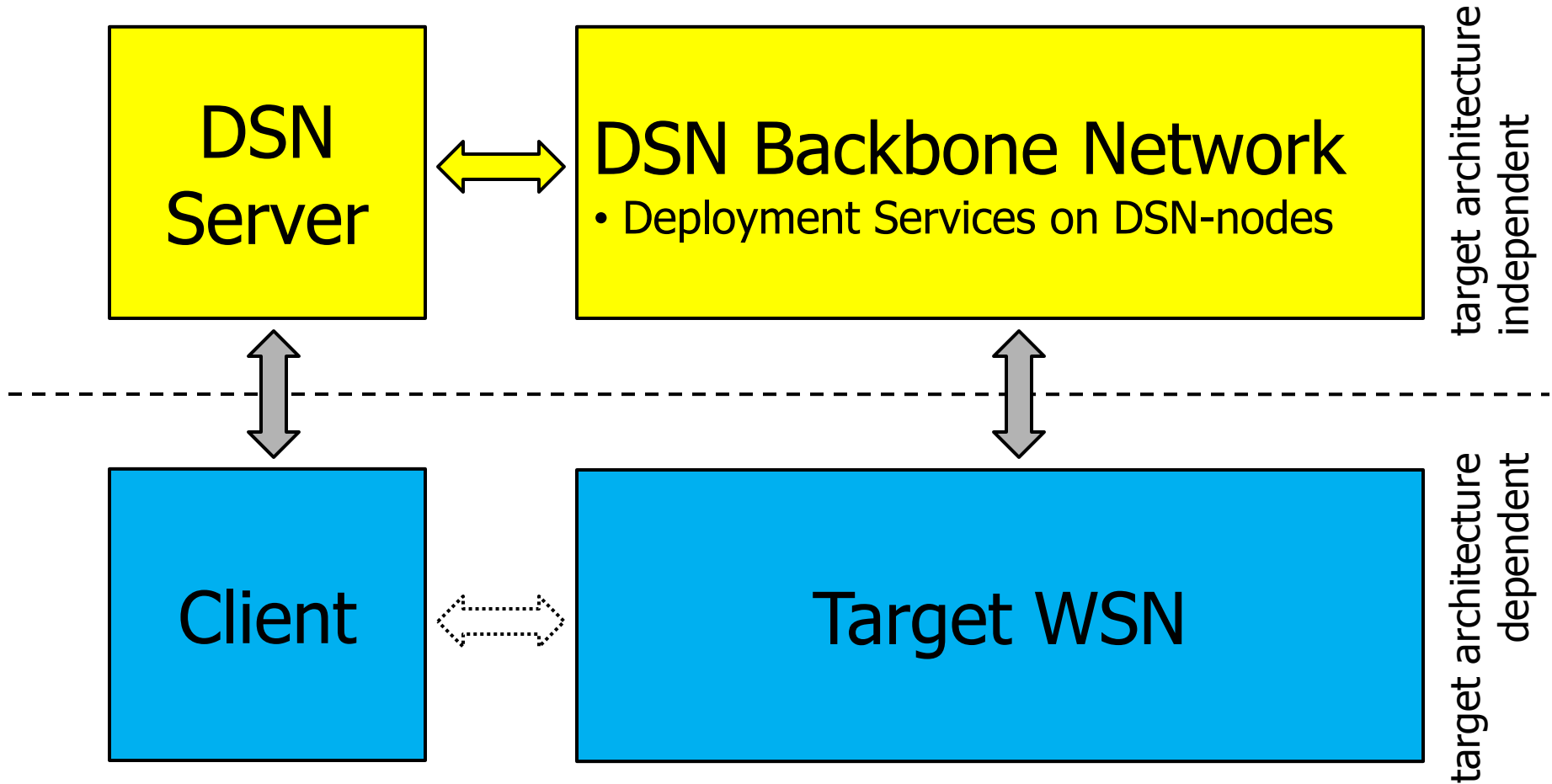


- Wireless backbone network
- Separating debugging and testing services from the application

Overview

- Introduction
- Deployment Support Network
- Realization
- Performance
- Case Study: Link Characterization in Buildings
- Conclusion

DSN – Architecture Overview



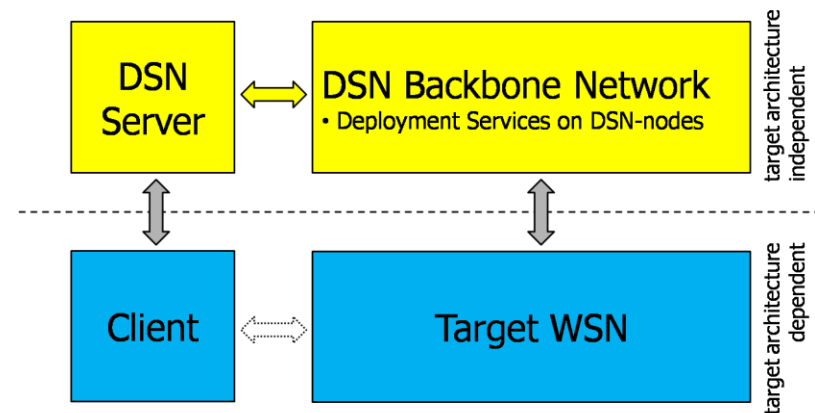
DSN – Architecture Overview

DSN Server

- XML-RPC interface for DSN services
- Data storage

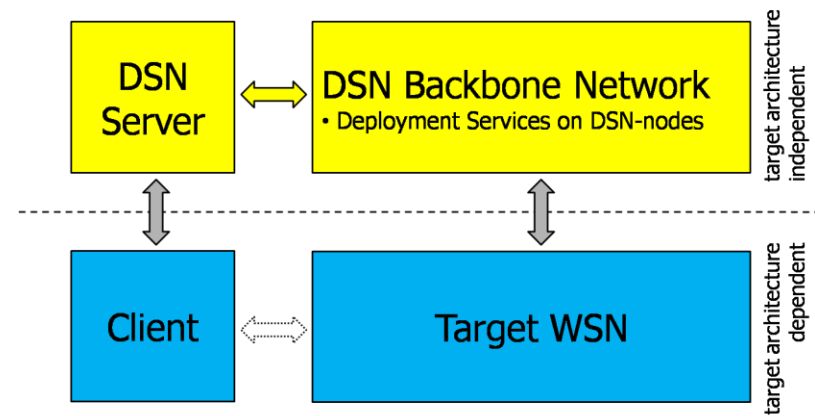
DSN nodes

- Regular sensor nodes
- Battery powered
- Microcontroller
- Radio



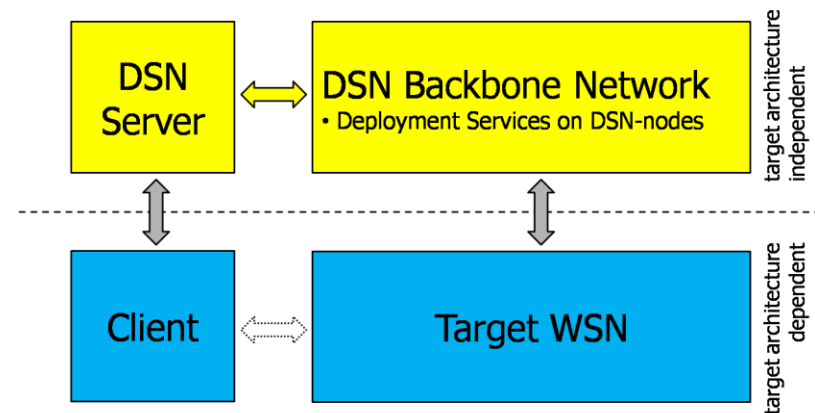
DSN – Services

- Data- and Event-Logging
 - Push-messages
 - Pull-messages
- Commands
 - Instant
 - Timed
- Remote Reprogramming



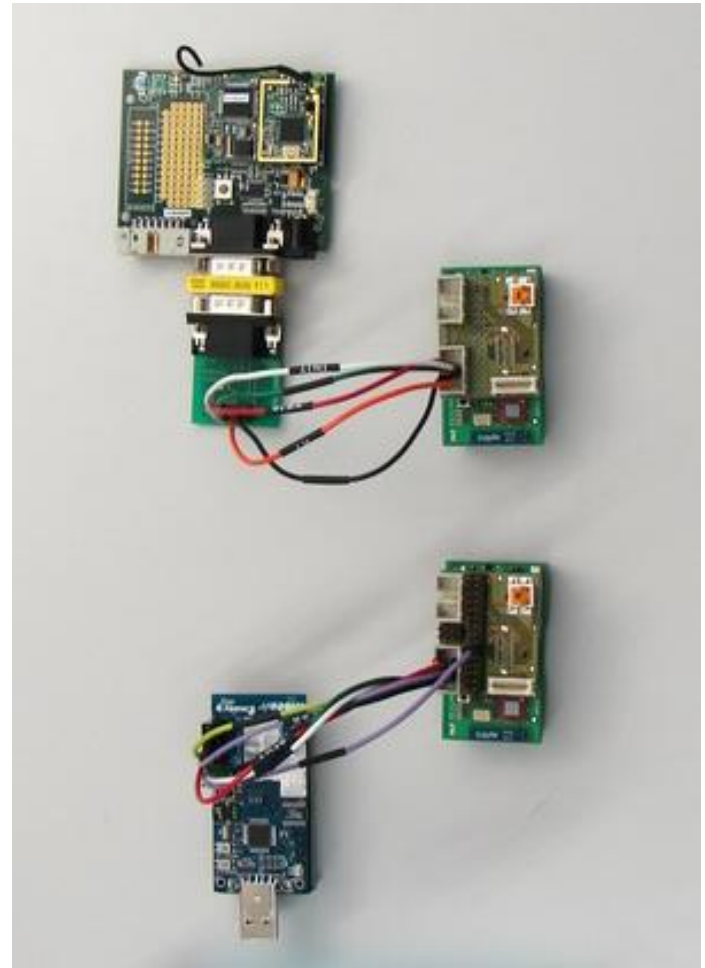
DSN – Test Automation

- Automation and scripting support
 - Repeated experiments
 - Delayed execution
 - Long experiments



Realization

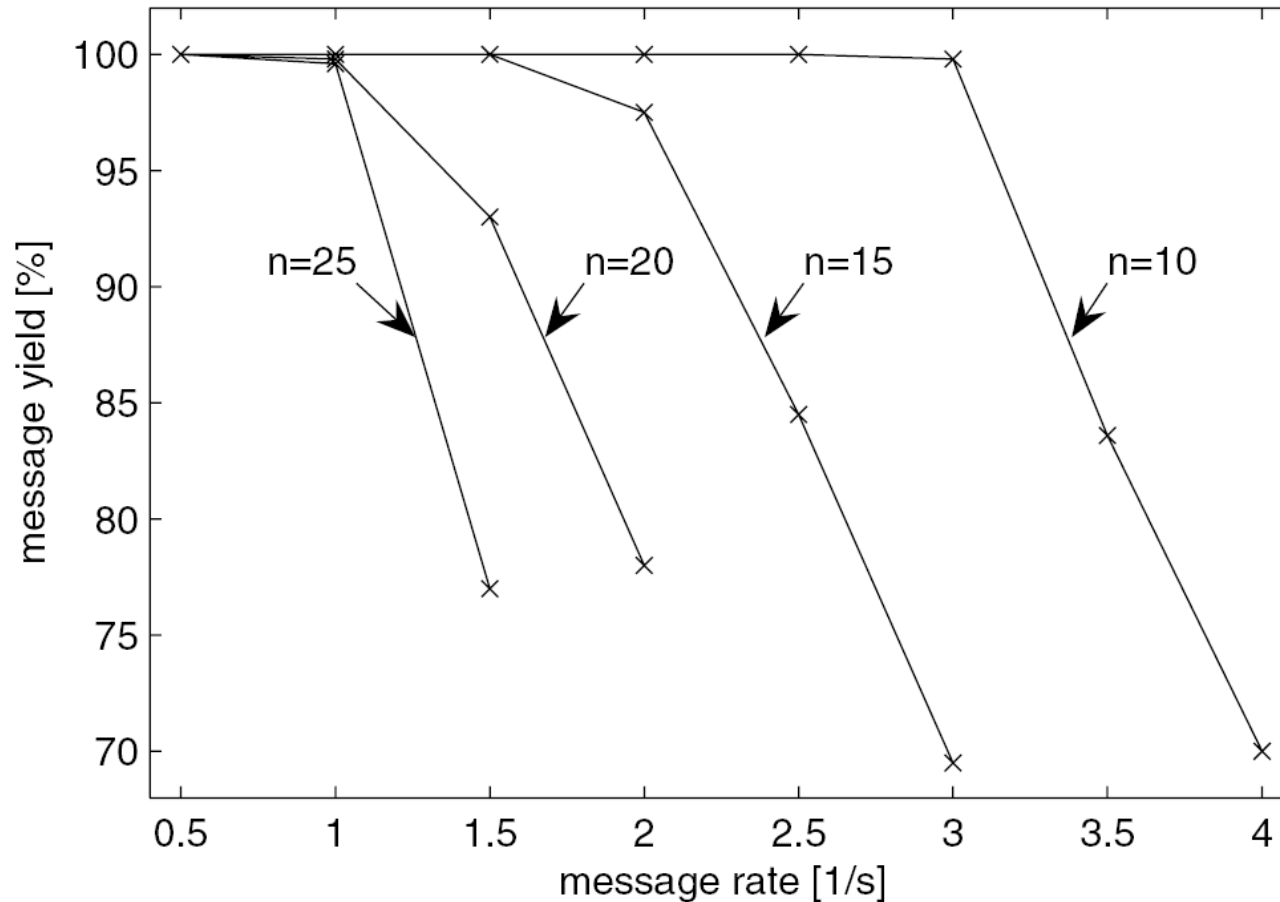
- Btnodes
 - ATmega128L 8 MHz
 - 64+180 Kbyte SRAM
 - 128 Kbyte Flash ROM
 - 4 Kbyte EEPROM
- Bluetooth scatternets
- Wired Target Interface
- Client Interface



Performance (1)

- Limited by processing hardware
- Dropped messages
 - a. Pushed log-messages
 - b. Pulled log-messages
 - c. Commands
 - d. Data-dissemination packets

Performance (2) – Max. Message Rate



Case Study

Link Characterization in Buildings

Siemens Building Technologies



Goal: proof the concept of the DSN system

- Test automation: different transmit power levels
- Timed commands: observe influence of human interference

Advantages relevant to development team

- DSN works with existing target platforms
- DSN-node/target-node pairs are wireless
 - Quick deployment
 - Inaccessible locations

Conclusion

- Services
 - Data- and event-logging
 - Commands
 - Remote programming
- Limitations
 - Limited range
 - Lower throughput compared to wired solutions
- Advantages
 - Large and dense deployments
 - Deployment services – target application separation
 - No need for over-engineering target nodes

Questions and Discussion

