First Workshop on Global Sensor Networks (GSN '09)

March 6th, 2009

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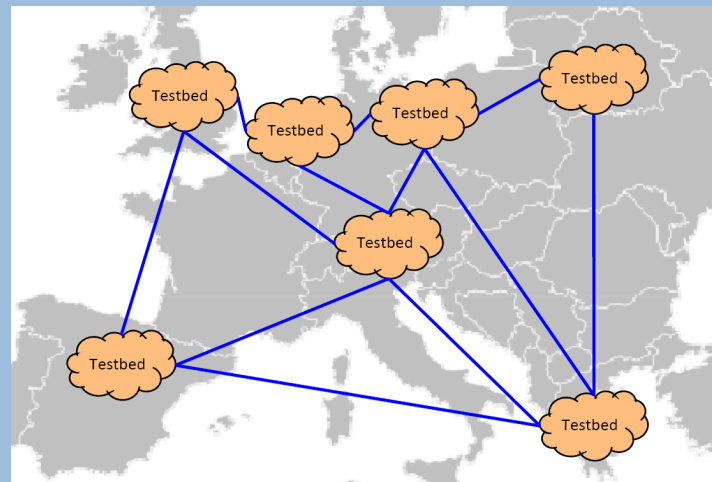
A Secure Remote Authentication, Operation and Management Infrastructure for
Distributed Wireless Sensor Network Testbeds

EU FP7 Project WISEBED (Wireless Sensor Network Testbeds)

WISEBED

- form a pan-european federation of wireless sensor network testbeds

- remotely conduct experiments

- share resources among federation partners

- get sensor data from testbeds all over europe

Testbed at University of Bern

- Currently operating a 30-nodes Wireless Mesh nodes (WMN)
  testbed (Alix Geode WRAP2.C/E) using IEEE 802.11a GHZ

- own very memory-optimized embedded Linux flavor ~ 10mb

- Setting up 20-30 TelosB nodes testbed

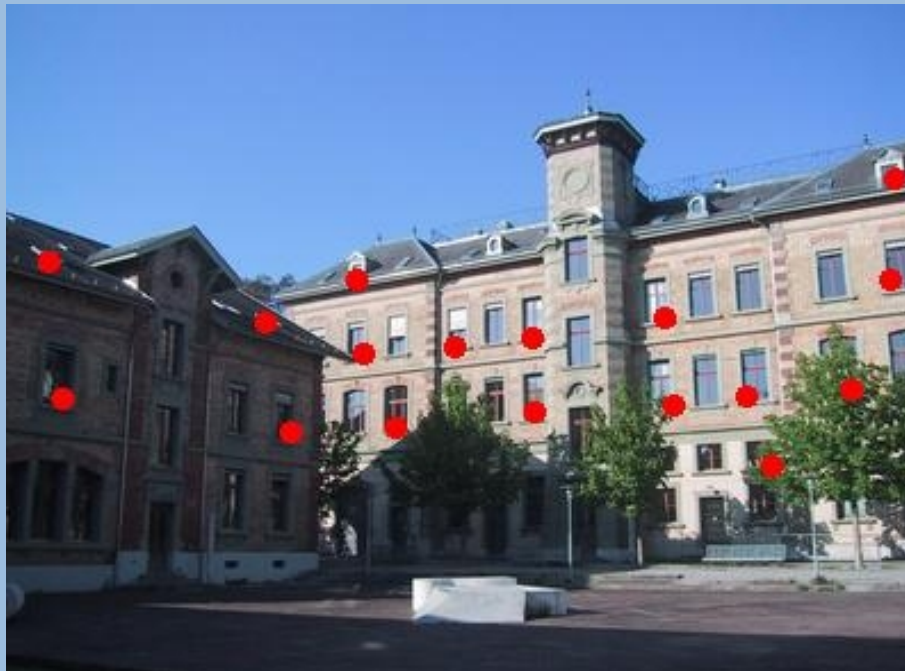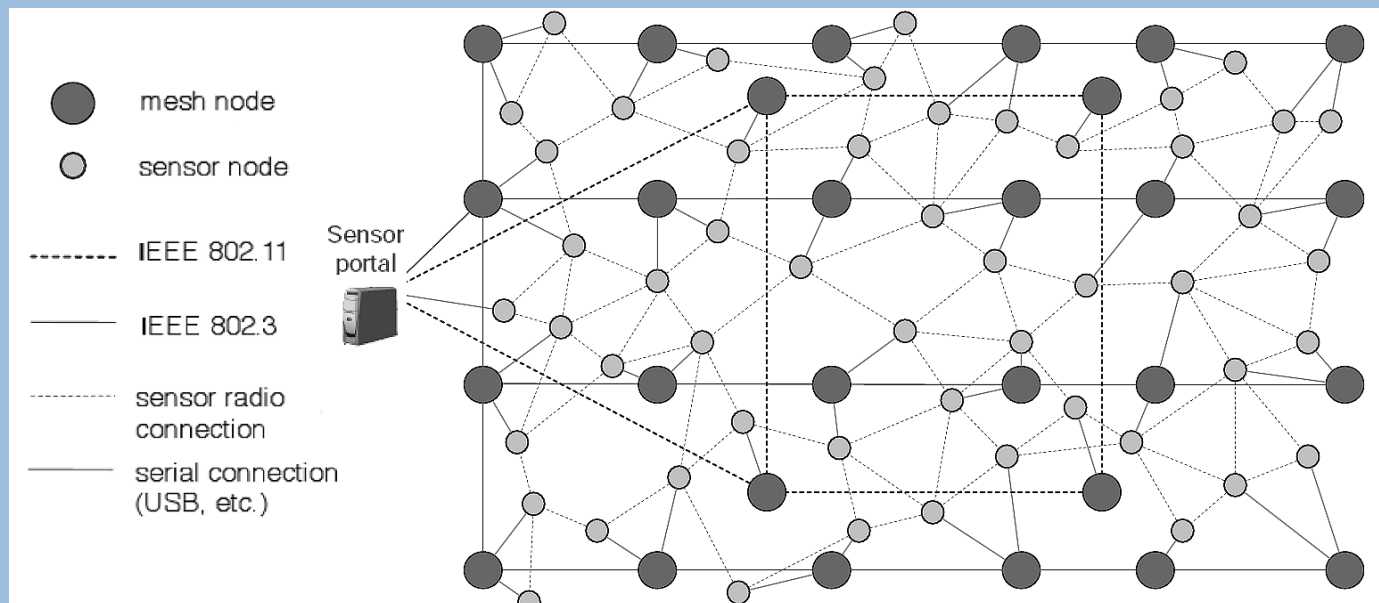- Later integration of ~20 MicaZ nodes planned

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- current Mesh network across two buildings on campus

- Mesh network as backbone for wireless sensor network testbed

- 2-tier architecture of the testbed with a sensor network portal

- Sensor Portal connects to Mesh nodes via Ethernet 802.3

- WSN nodes attached to Mesh nodes with USB cables

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1.2 Hardware Installation

Advantages of Mesh network backbone:

- Mesh network shall remain "behind the scenes" when it comes to wireless sensor network experimentation

- wired remote shell access to every node

- obtain sensor nodes status information during experiments

- Fast and reliable code update and configuration

- remote hard-reset in case of node failures via usb power management (libusb)

Secure Remote Authentication, Operation and Management Infrastructure

- Secure remote authentication and authorization

- Account management

- Scheduling (Reservation System)

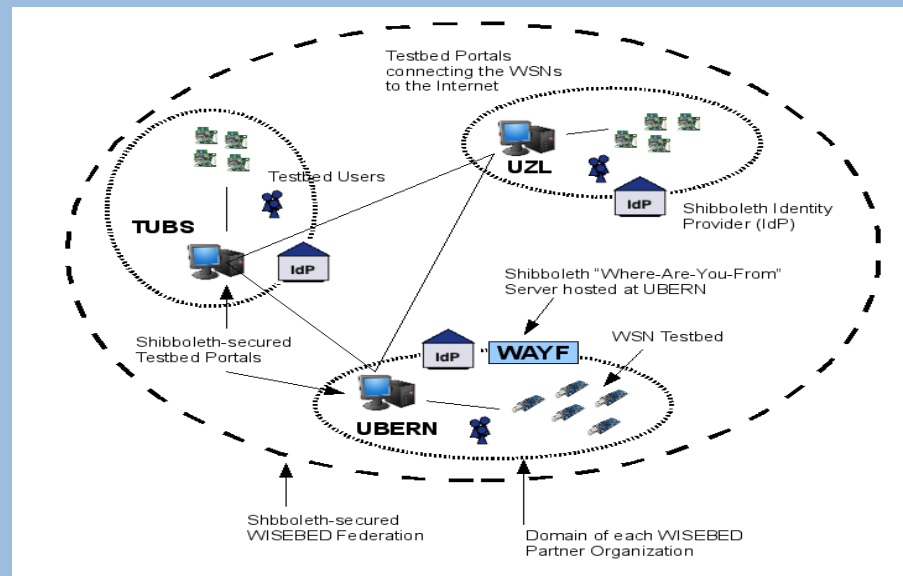- Testbed Management

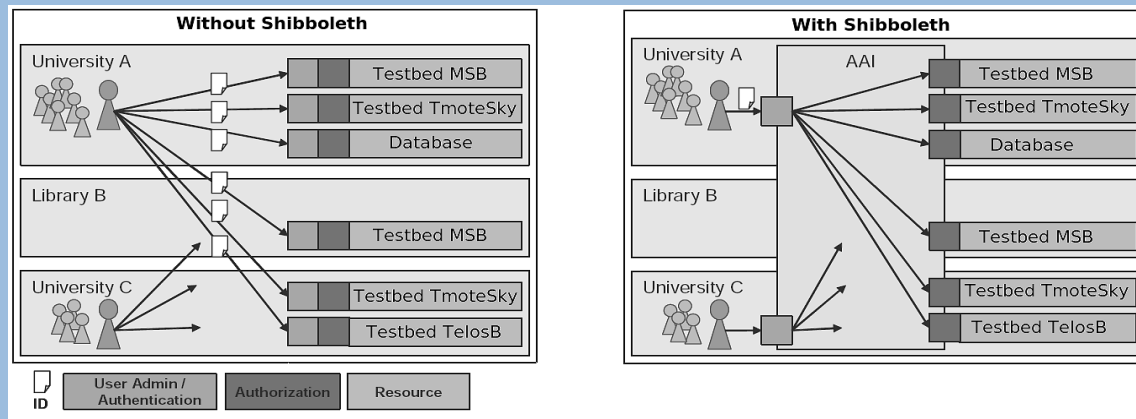## Secure Remote Authentication, Operation and Management Infrastructure

- Shibboleth Federation spanning across all partners

- PKI-based Authentication and Access Control System

- decentralized architecture: define users locally, use them globally

- Single-Sign On (SSO) – enter credentials only once

- Use Shibboleth SSO to protect / manage sensor network testbed access and resources

- Idea: more and more testbeds shall join the federation, in analogy to PlanetLab

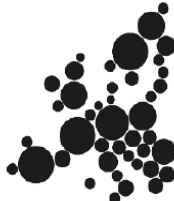# Secure Remote Authentication, Operation and Management Infrastructure

Testbed management system shall support:

- convenient secure remote access to a portal server
   of each testbed

- easy and fair resource allocation & scheduling

- remote online experiment configuration

- remote experiment operation and extraction of results

Testbed Reservation System

Testbed Reservation system

- users can schedule time slots during which they have
  unique access to the testbed

- "fair" resource allocation – definition of maximum
  maximum timeslots per user/week etc -> allocation problem