TESTBED @ WASAL

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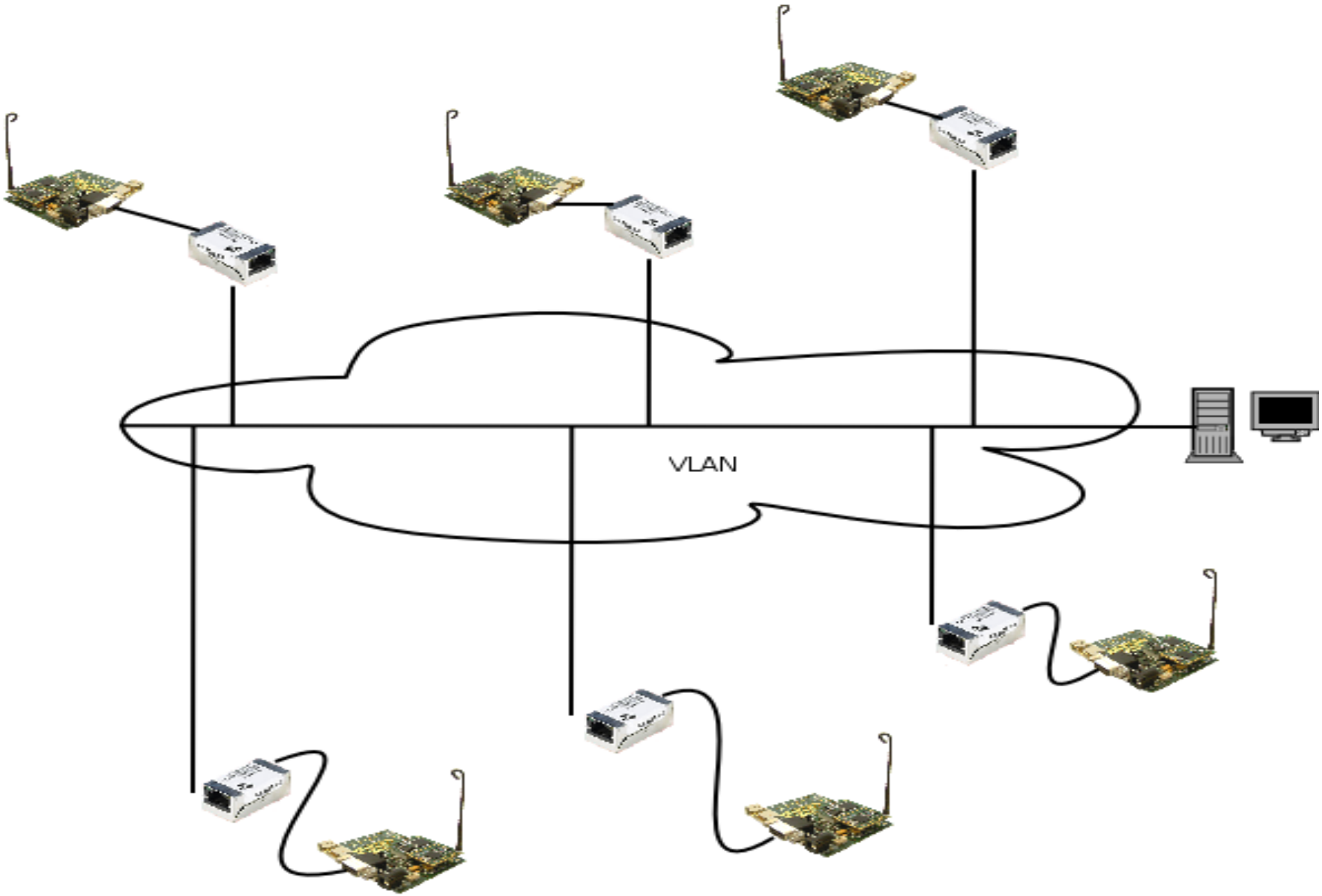
Motivation

- Imperfection of simulation tools
- Lack of proper monitoring of many real-world conditions for WSANs of realistic size
- Need of appropriate tools and methods for systematic testing and management of WSANs
- Need of demonstration platform for applications supported by WSANs

Goals

- Provide research infrastructure of networked sensors and actuators for the MICS Center at EPFL
- Real-time, Robust, Reliable -> Testbed should:
  - support multiple applications simultaneously
  - provide wired feedback channel for management/logging,
  - allow public data retrieval in real-time

HW Architecture



Idea: Full control capability provided by wired feedback channel
Approach: Use the existing LAN infrastructure

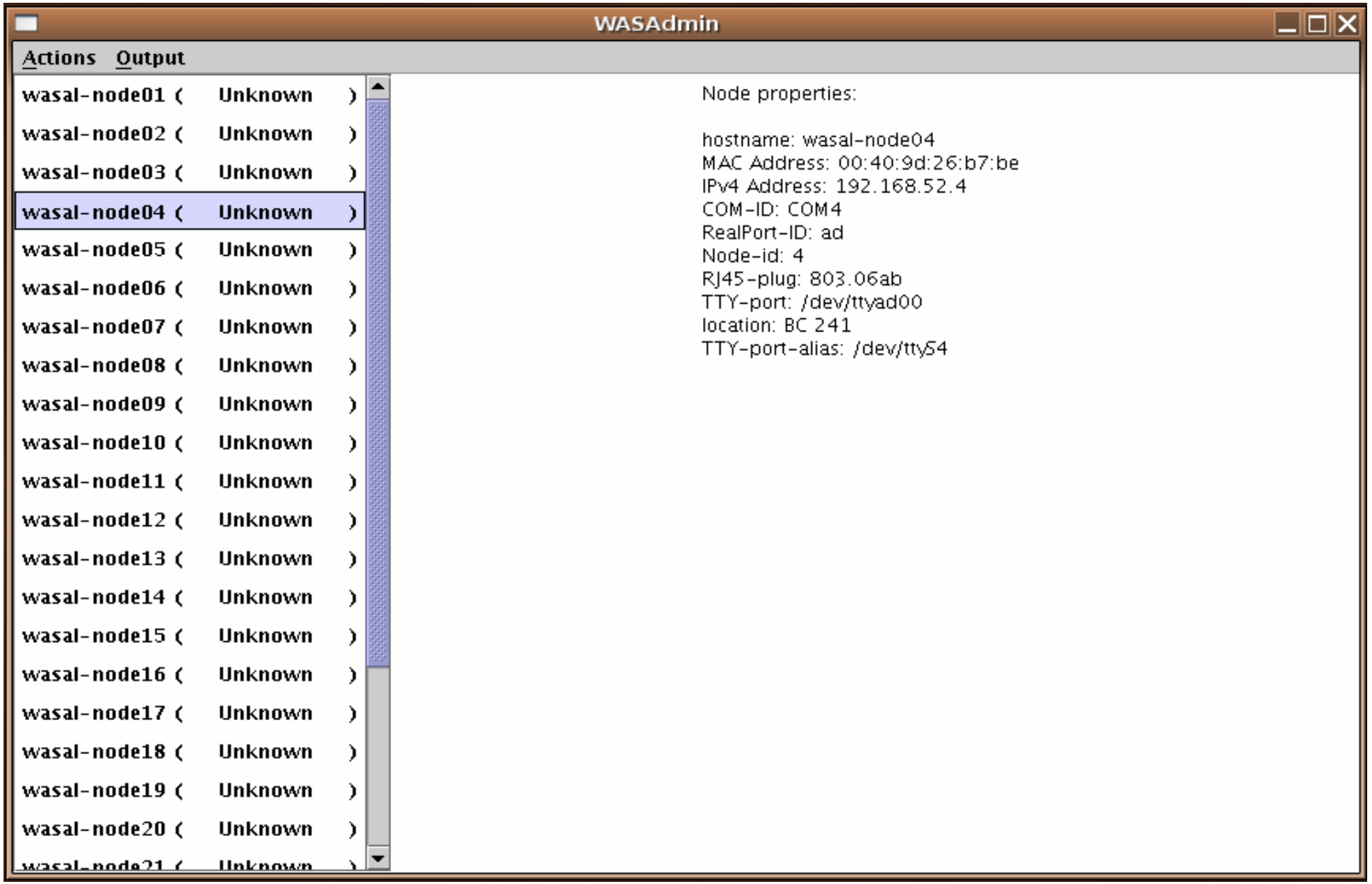
WASAdmin - Introduction

- WASAdmin: WASAL's SW Management Tool
- Approach:
  - concurrent execution of shell instance per target node, and script parsing.
- Configuration:
  - XML file `nodes.conf` includes:
    - all node-specific parameters: port, name, location etc.
    - all <shortcuts> that map needed information to a one-letter shortcut, e.g. 'I' -> IPv4 Address

WASAdmin - Configuration

```
<WASAL>
        <shortcuts>
                <!--
                Hardcoded shortcuts :
                  'I' : IPv4 Address
                  'H' : Fully Qualified Domain Name (ex: wasal-node01.vlan.epfl.ch)
                  'h' : Custom defined hostname (ex: wasal-node01) -->
                <key value="p">TTY-port</key>
                <key value="l">location</key>
                <key value="R">RJ45-plug</key>
                <key value="r">RealPort-ID</key>
                <key value="C">COM-ID</key>
                <key value="P">TTY-port-alias</key>
                <key value="i">Node-id</key>
        </shortcuts>
        <node>
                <mac-address>00:40:9D:26:B7:8A</mac-address>
                <DNS-hostname>wasal-node01</DNS-hostname>
                <IPv4-address>192.168.52.1</IPv4-address>
                <location>BC 247</location>
                <RJ45-plug>806.01ab</RJ45-plug>
                <RealPort-ID>aa</RealPort-ID>
                <TTY-port>/dev/ttyaa00</TTY-port>
                <TTY-port-alias>/dev/ttyS1</TTY-port-alias>
                <COM-ID>COM1</COM-ID>
                <Node-id>1</Node-id>
        </node>
<WASAL>
```

WASAdmin Example



WASAdmin - Scripts

Examples:

Mote Alive

```
ping -q -c 1 %I
exit
```

Mote Programming

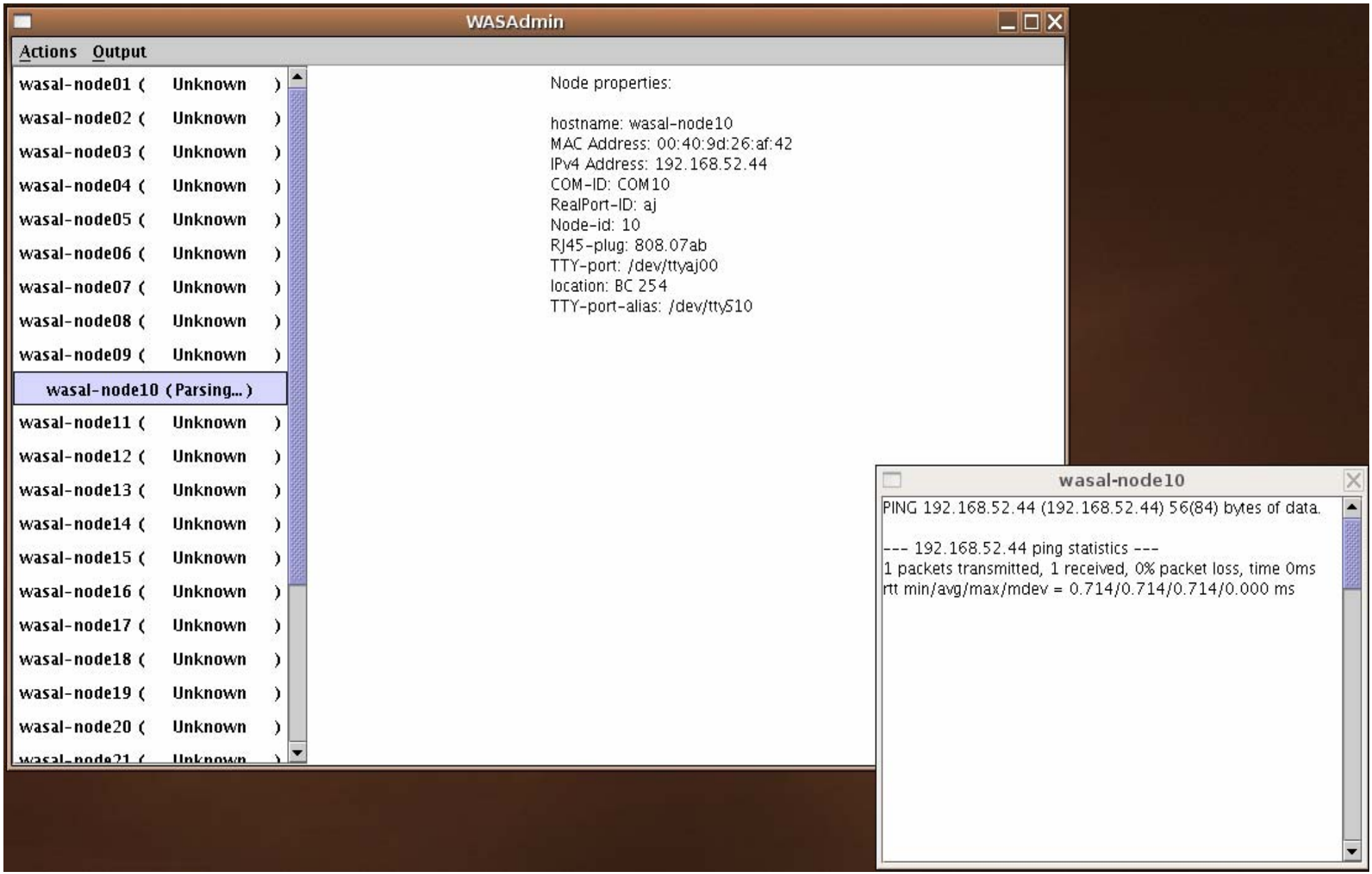
```
make -C $TOSROOT/contrib/shockfish/apps/OscilloscopeTOS tinynode reinstall digi bsl,%p
exit
```

Feedback Channel

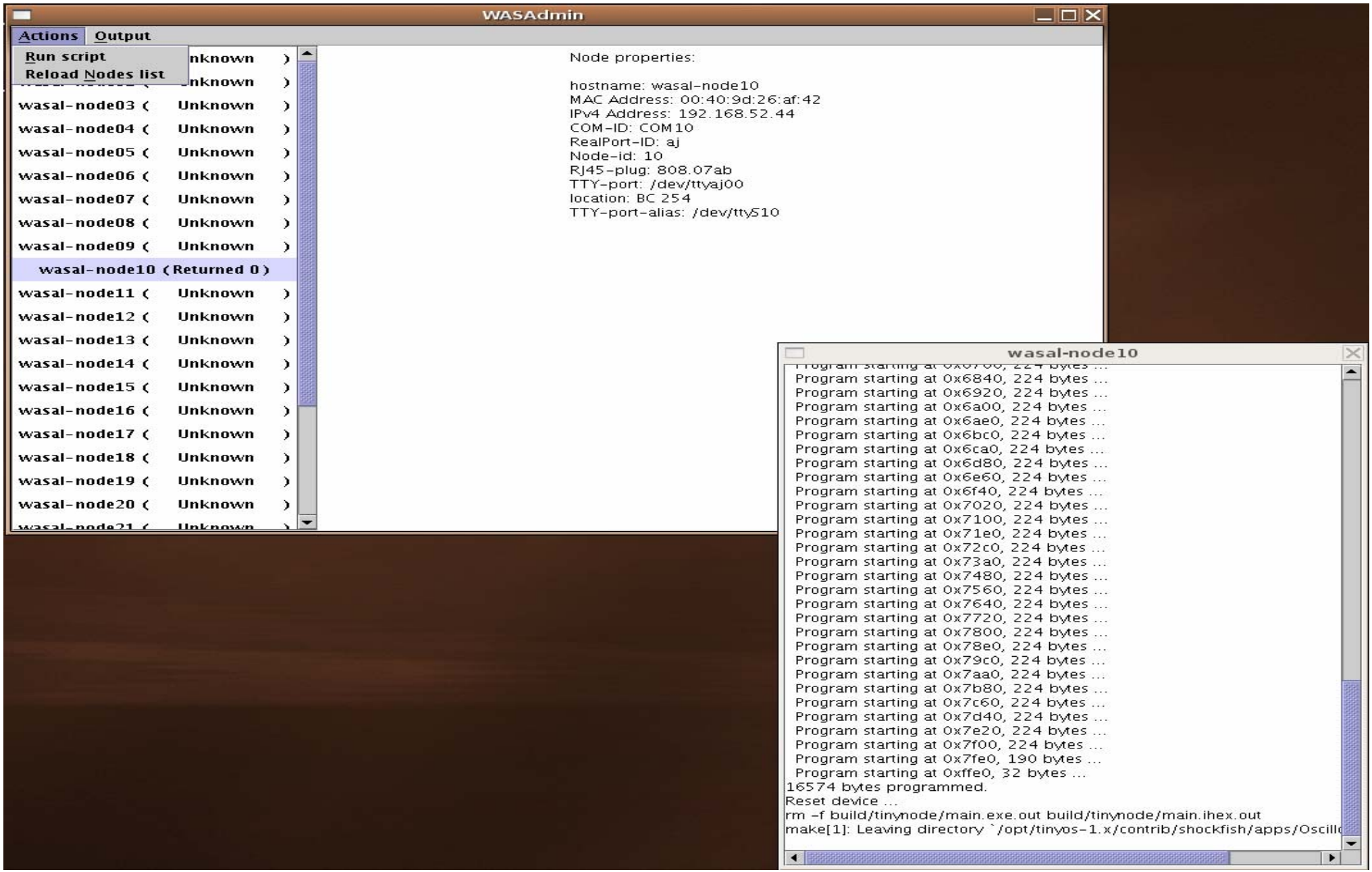
```
export MOTECOM=serial@%P:57600
java -cp $TOSROOT/tools/java net.tinyos.tools.Listen
```

Each sequence %x is replaced by parameter whose shortcut ‘x‘ is taken from `nodes.conf` file

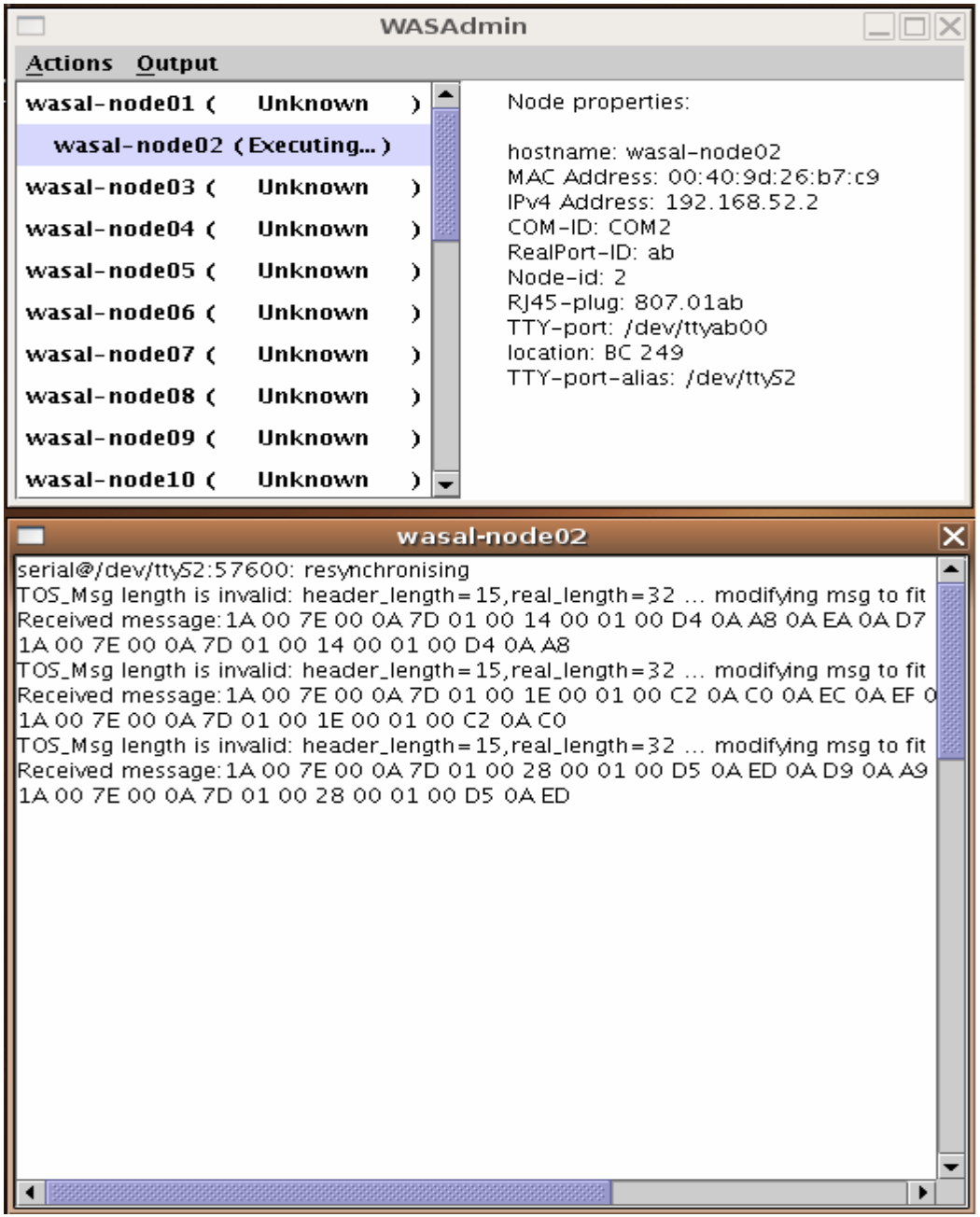
WASAdmin – Mote Alive



WASAdmin – Mote Programming



WASAdmin - Feedback Channel



Test Scenarios

- Indoor RSSI measurements
- Deluge 2.0 Testing
- Mobile Sink Testing
- Full-Fledge Demo for SmartPark
- ...

Future Work

- Merge testbeds from BC building at EPFL
- Mobile Testbed -> Digi Connect Wi-ME
- Extend WASAdmin's functionality