ZBOSS Network Simulator User Manual

DSR Corporation

14818 W. Warren Ave., Suite 101

Lakewood, CO 80228, USA

Office: +1.720.962.9525 | Fax: +1.720.962.6625

www.dsr-company.com |www.dsr-wireless.com

REVISION HISTORY

DATE	REVISION TYPE	REVISION #	COMMENTS	INITIALS
10/23/2013	Major	1	Initial version	AV

CONTENTS

1. INTRODUCTION

1.1 DOCUMENT'S PURPOSE

The document describes installation and usage of ZBOSS Network Simulator – debug tool that supports ZigBee stacks communication on the Linux PC without any other hardware required.

1.2 INTENDED AUDIENCE

Developers
QA Engineers
Users

1.3 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

ZBOSS ZigBee Open Source stack http://zboss.dsr-wireless.com

Wireshark open source packet analyzer http://www.wireshark.org

2. WHAT IS ZBOSS NETWORK SIMULATOR?

ZBOSS Network simulator is a development and debug tool which supports the communication between ZBOSS stacks run on the Linux desktop PC. ZBOSS Stacks interconnected by the network simulator don't need any hardware other then PC.

Network Simulator is a cheap and comfortable environment for the stack logic development. It resolves the problem of lack of devices. More than that, simulator can be used to imitate large networks with the different visibility zones which are hard to create and debug using real hardware.

3. INSTALLATION

ZBOSS Network simulator included in ZBOSS/devtools is compiled during the stack build with all the other development tools. Separate Network Simulator can be compiled running "make" from its directory.

To use with Network Simulator ZBOSS stack should be compiled with ZB_NS_BUILD define. In this case ZBOSS will use Linux pipes as mac transport.

4. USAGE

1.4 RUNNING NETWORK SIMULATOR

Network simulator is the command line Linux application. Its command line has the following format:

```
./network_simulator --nNode=<number of virtual devices>
[--pipeName=<pipe name prefix>] [--xgml=<xgml with topology>]
```

In this case:

- nNode is the number of virtual devices (running stack instances);

- pipeName is the Network simulator pipes name prefix ,it should be used when more then one instance of Network Simulator should be running (for several tests, for example);

- xgml is the xgml document containing the description of the network devices' visibility areas.

By default all the virtual devices are visible to each other. Specifying xgml document for the network simulator is the way to limit such all-to-all visibility. For example, getting the following areas of visibility:
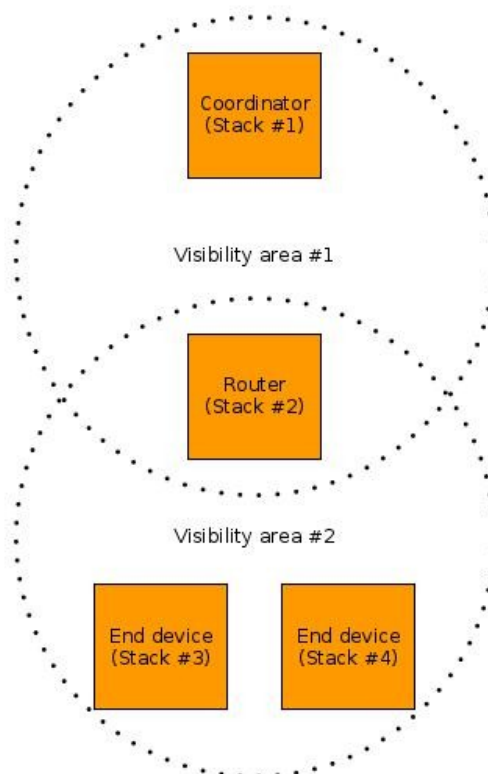
is performed by passing the following topology to the network simulator via xgml document.
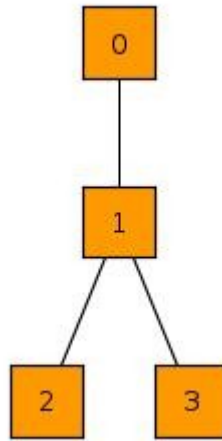
To create topologies yEd graph editor (http://www.yworks.com) is convenient, but not strictly necessary. Any other tool can be used for that purpose.

There are some conventions that each topology passed to the Network Simulator should follow:

- Node numbering starts with 0

- The node with 0 number is coordinator.

- Other node numbers must be consecutive.

- If nodes are visible to each other they should be connected by the line in the editor.

1.5 RUNNING ZBOSS STACK INSTANCES WITH NETWORK SIMULATOR

ZBOSS Stack processes use named pipes to communicate with Network Simulator. Pipe names contain prefix , suffix and the number, which is node number. Prefix can be set via --pipeName parameter when starting Network Simulator, There are two suffixes:
- "read" means that pipe's direction is from stack to simulator;
- "write" means that pipe's direction is from simulator to stack.

 There are several conventions for correlation between the node number in the pipe name and long (64 bit) device address in the stack instance:
- Coordinator can have any long address (for example "aa.aa.aa.aa.aa.aa.aa.aa").
- Other devices (router, end device) must have the node number in the least significant byte of the long address.

In conclusion, to start ZBOSS stack instance with Network Simulator, run it with read and write pipes as parameters. For example, the following command starts coordinator:

```
./zdo_startup /tmp/zb0.write /tmp/zb0.read
```

Proprietary and Confidential

And the following can be used for device with "01.00.00.00.00.00.00.00" long address:

```
./zdo_startup /tmp/zb1.write /tmp/zb1.read
```

Notice that Network Simulator must have already been started before running any stack instance.

To give more complicated example, the full instruction in a case with three virtual devices is provided:

```
./network_simulator --nNode=3 --pipeName=/tmp/zt

./intra_pan_portability_zc /tmp/zt0.write /tmp/zt0.read

./intra_pan_portability_zr /tmp/zt1.write /tmp/zt1.read

./intra_pan_portability_ze /tmp/zt2.write /tmp/zt2.read
```

1.6 NETWORK SIMULATOR'S TRAFFIC DUMP

Network simulator produces dump that can be converted to use with Wireshark. Dump file has ".dump" extension and can be converted by "dump_converter" utility. Dump_converter is located in stack/devtools/dump_converter directory. It can be built for Linux PC only. To convert dump file, run dump_converter with "-ns" key and specify the path to file. For example:

```
./dump_converter -ns file.dump file.pcap
```