OpenPi
A OpenWSN-ready distribution for the Raspberry Pi

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www.OpenWSN.org

- Open-source implementation of the state-of-the-art standardized protocol stack for the IoT
  - Running on 11 popular platforms
- Over 60 direct contributors, catalyst for research around TSCH networks
- State-of-the-art software project management tools: Atlassian, Jenkins, Travis-CI, GitHub, Doxygen
- Open-source (BSD license)
Architecture

Internet

OpenVisualizer

serial

DAGroot

motes

software

firmware

Standardization

Applications

CoAP

HTTP

UDP

TCP

RPL

6LoWPAN

6top (6TISCH)

IEEE802.15.4e TSCH

IEEE802.15.4 (PHY)

Platforms

90% hardware independent

10% BSP

IETF

ETSI

Plugtests

Interop Events
Easy-of-use Effort

• Integrated Scons build system
• OpenVM – Virtual Machine
  – run with (free) vmware/VirtualBox
  – all toolchains pre-installed
• Teaching Material
  – OpenWSN|OpenMote tutorial, GLOBECOM, December 2015

OpenPi

OpenWSN  RaspBian  OpenPi

• OpenVisualizer pre-installed on Raspberry Pi image
• built nightly with latest OpenVisualizer

openpi.openwsn.org
How to Cook an OpenPi
Ingredients
Recipe
Make them a lot

Ingredients

• NOOBS.zip installation system for RaspberryPi
• Python Bottle
  – https://pypi.python.org/packages/source/b/bottle/bottle-0.12.7.tar.gz
• Python PyDispatcher
  – https://pypi.python.org/packages/source/P/PyDispatcher/PyDispatcher-2.0.3.tar.gz
• OpenVisualizer software
  – https://github.com/openwsn-berkeley/openwsn-sw/archive/REL-1.8.0.zip
• OpenWSN look-and-feel
  – OpenPi.png https://github.com/openwsn-berkeley/openpi/blob/master/bits_n_pieces/OpenPi.png
  – Slide https://github.com/openwsn-berkeley/openpi/tree/master/bits_n_pieces/slides_vga
**Recipe**

- Extract `build/os/OpenPi/root.tar.xz`
- Update the background:
  - `build/os/OpenPi/root/etc/alternatives/desktop-background`
- Install python module dependencies:
  - Bottle: extract `bottle-0.12.7` and dispatcher to `build/os/OpenPi/root/usr/local/lib/python2.7/dist-packages/` and
  - `build/os/OpenPi/root/usr/local/lib/bin/`
- Install `openwsn-sw`
  - Copy `openwsn-sw` repository to `build/os/OpenPi/root/home/pi/`
- Wrap everything into a zip file (OpenPi!)

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**Making lots of Pi**
Abstract

- OpenWSN (http://www.openwsn.org/) is de-facto implementation of a standard-based protocols stack for the Industrial Internet of Thing (IoT). It implements standards such as IEEE802.15.4e Time Synchronized Channel Hopping, IETF RPL, 6LoWPAN and CoAP. To make it trivially simple to use OpenWSN, we created the OpenPi which turns any off-the-shelf Raspberry Pi into an OpenWSN gateway. OpenPi is a customized version of the Raspbian operating system which packs all the required OpenWSN features such as 6LoWPAN compaction/decompaction, RPL source source calculation, Internet connectivity and a web-based configuration interface. The OpenPi source code is fully published under a BSD license and available through the OpenWSN GitHub repositories. OpenPi allows a user to deploy an OpenWSN network without requiring ANY knowledge in programming or (constrained) networking.