

# Amargi2018 Community Networks

## Network hardware and software specification v. 1

This list of essential hardware and software is the “bill of materials” for Amargi2018 project. Having these components tested and mastered by the field technician is the base to move ahead with the project. Current status of this process will be reflected in the checklist document, published separately.

### Routing Equipment

	Current	Alternate	Final
Level 1 <sup>1</sup> routers	TP Link WDR4310 <sup>2</sup> Recommended by LibreMesh people as a temporary (transitional) solution before the LibreRouter ships.	Banana Pi BPI-R2 <sup>3</sup> Expensive. Has everything but wheels. Can be used as integrated router/server for smaller networks and external devices controller.	LibreRouter <sup>4</sup> Tailored specifically for community netwo
Level 1 software	OpenWRT / LibreMesh	OpenWRT / Libremesh / Ubuntu <sup>5</sup>	LibreMesh Special Edition
Level 2 <sup>6</sup> routers	Gli.Net AR-300M(D) <sup>7</sup>	Raspberry Pi 2/3 <sup>8</sup> or equivalent.	Not defined
Level 2 software	OpenWRT / LibreMesh	OpenWRT / Libremesh / Ubuntu <sup>9</sup>	

1 Level 1 is the backbone of the network. Routers creating medium and long distance links, connecting remote parts of community – between villages or remote settlements. They normally would not serve clients directly, only making gateways for level 2 networks.

2 <https://www.aliexpress.com/item/openwrt-english-all-country-language-5-8g-2-4g-wifi-router-2-usb-1000mb-router-tplink/32783961018.html>

3 <https://www.aliexpress.com/item/BPI-R2-Banana-PI-R2-Smart-Open-source-Wireless-Router-BPI-R2-Smart-Home-Control-Device/32825598599.html>

4 <https://librerouter.org> and <https://www.youtube.com/watch?v=7gUvNM8Zbqs>

5 Ubuntu routing done the easy way: <https://killtacknine.com/building-an-ubuntu-16-04-router-part-1-network-interfaces/>

6 Level 2 is the access level of the network. Devices there are working, depending of particular needs, as access points, routers or nodes of wearable mesh network (for supermobile applications).

7 <https://www.gi-inet.com/ar300m/> various versions.

8 <https://www.aliexpress.com/item/Raspberry-pi-3-diy-kit-Raspberry-pi-3-transparent-acrylic-Case-Box-mini-cooling-fan-5/32796072125.html>

9 Ubuntu routing done the easy way: <https://killtacknine.com/building-an-ubuntu-16-04-router-part-1-network-interfaces/>

## Radio equipment

Description	Example of use	Notes
<b>Antennas<sup>10</sup></b>		
Narrow beam antenna	Point-to-point backbone link.	WiFi and VHF/UHF versions.
Tri-sector 3 x 120* =360*	Level 1 hub for Level 2 mesh network	WiFi for stationary and wearable mesh. VHF/UHF for vehicle-based mobile mesh.
High gain WiFi omnidirectional	Level 2 unit standard	
High gain VHF/UHF mobile (camper style) directional/omnidirectional.	Level 2 vehicle mounted for long distance links.	
<b>Radio units</b>		
WhiteSpace TV radio converter <sup>11</sup> by Elektra Wagenrad @ Freifunk.	Long distance links – point-to-point and with mobile units.	First prototypes are expected early 2018, so meanwhile we just wait patiently.
*** Hypothetical *** SDR USB dongle with specialised drivers/modules		It seems we have everything: routers have USB ports that can power and communicate with SDR dongles. There is an internal linux environment where appropriate module can run, making the SDR visible as another radio for the router and taking care of radio configuration. However, I could not find any example of such configuration in practice. What did I miss?

## Other components

Description	Notes
Power control unit	<p>We will be installing units in the environment without high quality power grid. So we will have to accept all sources of power: low-quality grid AC, solar panels, wind or water turbines, gensets. We will probably only have access to the most ubiquitous storage: car/motorbike batteries. So we need to find or develop a cheap unit to control them all, take care of the battery charging and to deliver power from the battery to the unit.</p> <p>All units on the list have GPIO pins, so we also should develop a software module to monitor and manage power from the module. The very basic function of it should be a battery low alert, sent to the managing network station in case of need.</p>

<sup>10</sup> All antennas are needed in two versions: ready made and DIY (depending on materials available). Preferably, production installations should use locally made antennas to ensure maintenance and replace-ability.

<sup>11</sup> <https://wiki.freifunk.net/images/5/54/Freifunk-in-TV-Whitespace2.pdf> and <https://www.youtube.com/watch?v=7gUvNM8Zbqs&feature=youtu.be&t=21m37s>

Description	Notes
Freeside <sup>12</sup>	Network management system with a lot of bells and whistles.
“Server in the box”	<p>There are several versions of servers made specifically for this kind of network. We will need to select a short list of such packages and give them a test run.</p> <p>Few candidates for starters:</p> <p>PirateBox<sup>13</sup> (white-label)</p> <p>FreedomBox<sup>14</sup></p> <p>Yuno Host<sup>15</sup></p>

This list will be expanded as the needs arise.

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12 <http://freeside.biz/freeside/>

13 <https://piratebox.cc/>

14 <https://freedomboxfoundation.org/>

15 <https://yunohost.org>