Smart Radio + VOXL Integration Guide

Advanced Mesh Router for Resilient Private Wireless Networks

Introduction

VOXL is an autonomous computing platform built by ModalAI and based on the Qualcomm Snapdragon 821. The VOXL computing platform combined with a depth camera, flight controller and the Doodle Labs Smart Radio forms the core of fully autonomous connected robots and drones [1]. Refer to ModalAI's technical documentation for information on the various computing tasks offered by VOXL [2]. This guide covers using the Doodle Labs Smart Radio as a communications link between VOXL and the QGC GCS.

Smart Radio VOXL Integration

Updating VOXL Firmware

Older versions of VOXL's firmware do not include the necessary USB-Ethernet driver required by the Smart Radio Helix. Make sure to update your VOXL firmware following the instructions on the website [3].

Smart Radio VOXL Setup

Fig. 1 is a system diagram showing how a Helix Smart Radio can be connected to a VOXL-based robot system. The Helix (and Wearable/OEM) variants of the Smart Radio include a USB Device port which can be connected directly to VOXL's USB Host port. Other versions of the Smart Radio will require a USB to Ethernet adapter as described in ModalAI's documentation [4].
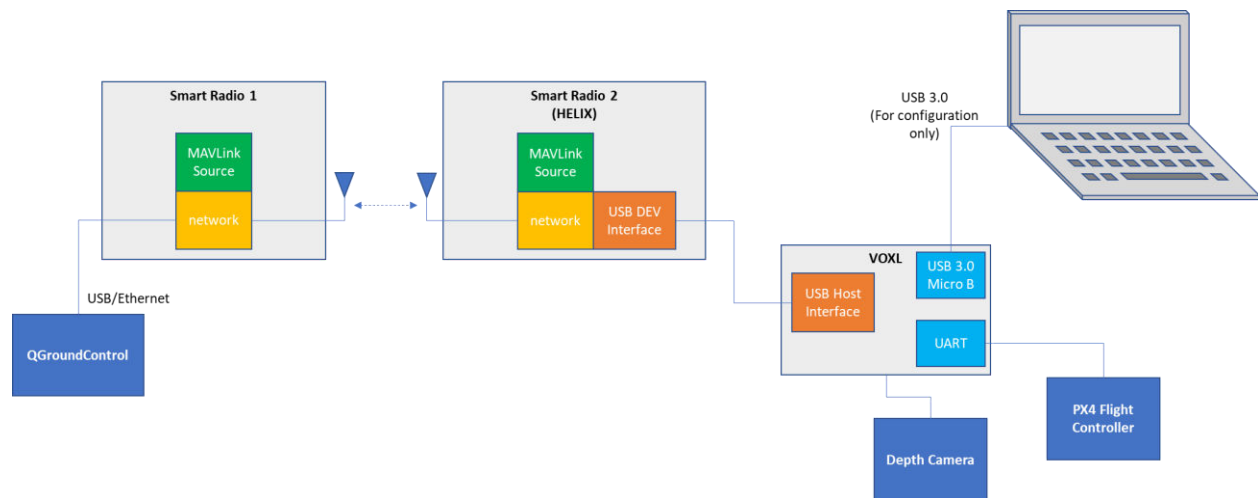
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Fig. 1 – Smart Radio (Helix) to VOXL Integration

As VOXL handles the connection to the px4 flight controller, it is not necessary to setup the Serial port on the Smart Radio. After connecting the hardware, Modify the IP address of the host machine running QGC so that it is on the 10.223.0.0/16 subnet, for example 10.223.0.150 with netmask 255.255.0.0. In order to configure the IP address, you will need to access VOXL's shell. You can do that by connecting your PC to the USB 3.0 Micro B port on the VOXL. After that, follow the steps below.

1. In order to access VOXL's shell, run

```
# On host machine
adb shell
```

2. From VOXL's shell, run

```
# On VOXL
voxl-configure-modem
```

You will be asked which modem you are using.

```
What type of modem are you using?
```

Choose the Doodle Labs Smart Radio. You may then select between the default IP address (10.223.0.100) or a custom one.

```
Enter the IP address you would like to the VOXL to use on the Doodle network:
Note: The chosen IP address must be of the form: 10.220.XXX.XXX, where XXX is
a 3 digit number

Default - 10.223.0.100

1) default
2) custom
```

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If you choose a custom IP address, you will need to modify the Smart Radios' IP addresses to be on the same subnet as VOXL and the QGC host machine. Once you have made your selection, VOXL will configure it's networking to enable the connection to the Smart Radio network on boot up.

```
Making new interface file /etc/network/interfaces
reloading systemd services
enabling voxl-modem systemd service
starting voxl-modem systemd service
DONE configuring voxl-modem
```

Once this is complete, running `ifconfig` should display a new interface, `eth0`, with the IP address which you selected.

3. Connect to QGC from VOXL. VOXL uses `voxl-vision-px4` to connect VOXL to the hostmachine running QGC. If you have not yet run `voxl-vision-px4`, then you can do so now, and you will be asked a series of questions including the IP address of the host machine running QGC. Otherwise you can edit the `voxl-vision-px4` configuration file and update `qgc-ip`.

```
vi /etc/modalai/voxl-vision-px4.conf
```

You will then need to restart the `voxl-vision-px4` service.

```
systemctl restart voxl-vision-px4
```

At this point, VOXL should automatically connect to QGroundControl.

References

[1]   ModalAI, https://www.modalai.com/, 10-8-2021

[2]   ModalAI Technical Docs – VOXL, https://docs.modalai.com/voxl/, 10-8-2021

[3]   voxl-build, https://gitlab.com/voxl-public/system-image-build/voxl-build, 25-7-2022

[4]   ModalAI Using USB to Ethernet with VOXL, https://docs.modalai.com/usb-to-ethernet-with-voxl/, 10-8-2021

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