Line Array Manual

This manual contains a short description on how to use the Line Array and various tutorials for configuration.

# Playing music

The Line Array is already configured to play music whenever it is turned on.

1. Plug in the wall power
2. Plug in any audio source into the jack cable

Note that this configuration only allows for a limited amount of audio beaming.

# Configuration

The configuration of the Line Array is done via either UART or SSH. For UART, there is a USB connection available on the back of the Line Array to access the Zynq ZYBO-3000. For SSH, only the public IP address are needed.

Commands will be displayed in this format

When a connection is made, the OS (Ubuntu 16.04) prompts a login.

The login credentials are:

**Login** xillinux

**Password** Pa55w0rd

There are two Unix shells available: fish and bash. Either one is fine, but this manual assumes the use of bash. The default Unix shell is fish. To enter bash:

bash

For Line Array configuration, the standard things to do are:

* Insert a new or existing bitstream onto the ZYNQ Zybo-3000
* Edit the scripts responsible for driving the Line Array hardware
* Change the default bitstream on a power cycle

## Inserting a bitstream

There are two prerequisites that must be met in order to insert a bitstream:

1. The user is a superuser
2. There’s a valid .bit file available

To meet the first requirement, the easiest way is to run command

su

This is a dangerous command as Ubuntu now runs every command as if sudo was prefixed. This is dangerous as the OS no longer warns for anything that could damage the OS in any way.

The bitfile is made available through Vivado. Upload the .bit file generated there onto the OS by any means, such WinSCP, ethernet, git, etc.

When this has been prepared, execute command:

cat <file>.bit > /dev/xdevcfg

That concluded the whole process of uploading a new .bitfile onto the system. This bitfile is lost on a power down, that requires additional configuration. But this method can be used during development for testing purposes.

## Editing Line Array scripts

There are several scripts and applications on the Line Array to ensure a steady dataflow from the webserver to the FPGA logic. The main controller is the file /home/xillinux/line-array/mainscript.

This is a bash script that calls various c applications and bash commands. The same line-array folder contains all the folders and files for compiling C applications. All of these can be edited with any suitable text editor. The standard used was cat.

cat <file>

This command will start the file editing process on Ubuntu. Save with CTRL+O. Exit with CTRL+C.

## Change the default bitstream

The Line Array loses its bitstream whenever it is powered down. To circumvent this, the Line Array loads in a default bitfile when it powers up. Note that the webserver scripts also start on a power up.

This takes the form of a bash script that calls two other scripts, to read this file:

cat /etc/init.d/rc.local

In this script are two calls,

cat /home/xillinux/line-array/fsa.bit > /dev/xdevcfg

/home/xillinux/line-array/mainscript &

Note that the exact filenames might have already changes from the date of writing of this document. Mainscript is called with an & because it is a looping function. The Line Array would not respond as it is stuck on the startup script without it.

In order to change the default bitstream, edit this line in this format:

cat <filepath>.bit > /dev/xdevcfg