# Atmosic ISP Tool User Guide

## Revision History

| Date | Version | Description |
|---|---|---|
| June 28 2020 | 0.50 | Initial version created. |
| April 14, 2021 | 0.51 | Updated format, no content change. |
| September 29, 2021 | 0.52 | Changed name to user guide, new contents. |
| December 22, 2021 | 0.53 | Updated section 5 Win USB to reflect the removal of Zadig in favor of the Atmosic InstRDI.exe. |

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# 1 Overview

The Atmosic In-System Programming Tool (ISP) is for programming an Atmosic device without the SDK. The typical workflow is that an SDK user builds the firmware and NVDS flash (and optionally OTP) content, bundles them into an archive called an “Atmosic archive”, commonly having a **.atm** suffix, and provides the result to a non-SDK user to program the device. The ISP tool simply decomposes the archive into its parts, writes them to the appropriate storage areas, and resets the device. It interacts with the device via a USB FTDI-based interface board.

The ISP tool comes in two forms -- CLI and GUI. The CLI tool can be run from the command line on any platform (Linux, macOS, and Windows). It is light-weight and can be used in automation scripts. The GUI tool is only available for Windows. It provides a friendly graphical interface and saves the user some typing. What follows in this document demonstrates their usage.

# 2 Common Prerequisites

Both the CLI and GUI tools use OpenOCD to program a device via a FTDI-based USB interface board. Both only allow using one board at a time. Moreover, for Windows, the WinUSB driver must be installed first. The USB driver update is not automatic, but it is a one-time step for a given interface board. See section “WinUSB” for more information.

# 3 CLI Tool

The CLI tool is shipped as a zipped folder, e.g. atm_isp_Windows_NT.zip. After unzipping this file, run the atm_isp executable located in the atmosic_sdk/tools subdirectory with “burn -h” to see the help message. (The “burn” subcommand is used to program the device.) The following shows this for Windows.

```
C:\Users\lab\Downloads\atm_isp_Windows_NT>.\atmosic_sdk\tools\atm_isp.exe burn -h

usage: atm_isp.exe burn [-h] [-i ARCHIVE] [-r OPENOCD_PKG_ROOT] [-E] [-e] [-v]
                        [-c] [-t TCL_SCRIPT] [-d DST_DIR] [-p]

optional arguments:
  -h, --help            show this help message and exit
  -i ARCHIVE, --input ARCHIVE
                        Input archive file
  -r OPENOCD_PKG_ROOT, --openocd_pkg_root OPENOCD_PKG_ROOT
                        Path to directory where openocd and its scripts are
                        found
  -E, --openocd_script_only
                        Stop after preparing OpenOCD script
  -e, --erase_workarounds
                        Erase workaround tags in OTP before loading OTP
  -v, --verbose         Verbose mode
  -c, --check_image     Verify OTP/flash image after burning/loading
  -t TCL_SCRIPT, --tcl_script TCL_SCRIPT
                        Path to output Jim Tcl script for use by OpenOCD
                        (generates Jim Tcl script only; delays all operations
```

```
                        post-unpacking of archive to Tcl/OpenOCD); implies -E
  -d DST_DIR, --dst_dir DST_DIR
                        Use this directory to dump openocd script in; implies
                        -E
  -p, --program_only    Program the device only (no reset hard on exit)
C:\Users\lab\Downloads\atm_isp_Windows_NT>
```

The following is an example of “burning” a .atm file (an Atmosic archive) under Windows onto an Atmosic device connected with an Atmosic USB interface board.

```
C:\Users\lab\Downloads\atm_isp_Windows_NT>.\atmosic_sdk\tools\atm_isp.exe burn -c -v -i
C:\Users\lab\Desktop\arch.atm
calling exec_script
Executing
"C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\bin\Windows_NT\o
penocd -s C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\tcl -s
C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\platform\atm2\ATM22xx-x0x\openocd -f
atm2x_openocd.cfg -c 'init; exit'"
Open On-Chip Debugger 0.10.0+dev-g6584b4ff-dirty (2020-11-10-10:33)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
Using FTDI
Using Interface Board
Info : FTDI SWD mode enabled
get_coredump
Info : clock speed 1000 kHz
Info : SWD DPIDR 0x0bb11477
Info : Sydney.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : Sydney.cpu: external reset detected
Info : gdb port disabled
Executing
"C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\bin\Windows_NT\o
penocd -s C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\tcl -s
C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\platform\atm2\ATM22xx-x0x\openocd -f
atm2x_openocd.cfg -c 'init; exit'"
Open On-Chip Debugger 0.10.0+dev-g6584b4ff-dirty (2020-11-10-10:33)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
Using FTDI
Using Interface Board
Info : FTDI SWD mode enabled
get_coredump
Info : clock speed 1000 kHz
Info : SWD DPIDR 0x0bb11477
Info : Sydney.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : gdb port disabled
Executing
"C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\bin\Windows_NT\o
penocd -s C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\tcl -s
C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\platform\atm2\ATM22xx-x0x\openocd -f
atm2x_openocd.cfg -c 'init; set_normal_boot; exit'"
Open On-Chip Debugger 0.10.0+dev-g6584b4ff-dirty (2020-11-10-10:33)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
Using FTDI
Using Interface Board
Info : FTDI SWD mode enabled
get_coredump
Info : clock speed 1000 kHz
Info : SWD DPIDR 0x0bb11477
Info : Sydney.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : gdb port disabled
```

```
Executing
"C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\bin\Windows_NT\o
penocd -s C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\tools\openocd-0.10.0\tcl -s
C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\platform\atm2\ATM22xx-x0x\openocd -f
atm2x_openocd.cfg -f
C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\burn_arch_n_y_pnvq\atm.tcl"
Open On-Chip Debugger 0.10.0+dev-g6584b4ff-dirty (2020-11-10-10:33)
Licensed under GNU GPL v2
For bug reports, read
        http://openocd.org/doc/doxygen/bugs.html
Using FTDI
Using Interface Board
Info : FTDI SWD mode enabled
get_coredump
Info : clock speed 1000 kHz
Info : SWD DPIDR 0x0bb11477
Info : Sydney.cpu: hardware has 4 breakpoints, 2 watchpoints
Info : gdb port disabled
Executing 'sydney_load_nvds
{C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\burn_arch_n_y_pnvq\sydney_load_nvds.0
} 229376 32768'
target halted due to debug-request, current mode: Thread
xPSR: 0xc1000000 pc: 0x000053ec msp: 0x20014000
Macronix 4Mb flash (524288 bytes)
55 bytes written at address 0x10038000
downloaded 55 bytes in 0.017557s (3.059 KiB/s)
Executing 'sydney_load_flash
{C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\burn_arch_n_y_pnvq\sydney_load_flash.
0} 0 229376 268435456'
target halted due to debug-request, current mode: Thread
xPSR: 0xc1000000 pc: 0x000053ec msp: 0x20014000
Macronix 4Mb flash (524288 bytes)
Erasing upgd sector at 0x00040000 to 0x00041000
68808 bytes written at address 0x10000000
downloaded 68808 bytes in 12.541335s (5.358 KiB/s)
Executing 'sydney_verify_flash
{C:\Users\lab\Downloads\atm_isp_Windows_NT\atmosic_sdk\burn_arch_n_y_pnvq\sydney_load_flash.
0} 268435456'
target halted due to debug-request, current mode: Thread
xPSR: 0xc1000000 pc: 0x000053ec msp: 0x20014000
Macronix 4Mb flash (524288 bytes)
verified 68808 bytes in 0.623206s (107.822 KiB/s)

C:\Users\lab\Downloads\atm_isp_Windows_NT>
```

# 4 GUI Tool

The GUI tool is a browser application and can run in Microsoft Edge, Firefox, and Google Chrome.

The ISP GUI tool also ships as a zipped folder, e.g. atm_isp_gui.zip. After unzipping this file, follow the steps below to program a device.

1) Connect an Atmosic device using an Atmosic interface board (USB port labeled UART1)
2) Double-click isp.bat or one of its variants for Firefox or Google Chrome
   This opens two programs -- a browser with the ISP tool loaded and the OpenOCD server. The tool will be ready in at most 5 seconds and show "Status: Connected" at the bottom of the page.
3) In the browser, use the input button next to "Atmosic Archive:" to upload a .atm
4) Use the checkboxes to select the sections of the archive to be downloaded onto the device

By default, "OTP", "Flash NVDS", and "Firmware" are pre-selected. If any one of these three is unavailable, the box will be inactive and grayed out.

5) Click “Push”
   Once the ISP tool has successfully downloaded the selected sections from the archive onto the Atmosic device, it will pop up a window with a message that reads "Push successful".
6) Click "Shutdown" when done
   This signals OpenOCD to shutdown and tries to close the browser.
   Note: do not use the browser's close tab or close window buttons to shut down the ISP tool

## 4.1 Troubleshooting Tips

- If the browser was closed without before clicking the "Shutdown" button to stop the server, simply close the cmd.exe window and repeat step #2.
- The OpenOCD log (from the cmd.exe window) provides messages from the backend server. The front-end uses pop-up windows to communicate with the user. The JavaScript console log may contain additional information.

# 5 Win USB

Microsoft by default installs the FTDIBUS driver for the FTDI device on the Atmosic board. This makes the device show as a COM port in the Windows Device Manager.

For Interface 0 of the Atmosic FTDI interface board, the FTDI driver must be replaced with WinUSB in order for it to become available as a USB device and usable by OpenOCD. This can be done using InstRDI/InstRDI.exe in the top-level directory. It is a one-time necessity.

Verify the successful installation of WinUSB by going to the Windows Device Manager and confirming that the Atmosic FTDI USB1 device shows as such rather than a COM port. (In Device Manager, expand category "Universal Serial Bus devices" and look for "Atmosic RDI USB1".) Also, verify that the driver provider is libwdi. (Right-click on "Atmosic RDI USB1", go to "Properties", go to the "Driver" tab, and check the "Driver Provider" line.) Restart Windows if necessary.


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