ATM33/e with Zephyr RTOS

Quick Start Guide

SUMMARY: This document provides instructions on getting started using Zephyr RTOS with the ATM33/e Wireless SoC.

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1. Overview

The Atmosic ATM33/e Wireless SoC series can be built and operated with Zephyr RTOS. This document will provide the initial guidance for setting up the environment to develop and load Zephyr sample applications into the ATM33/e Evaluation Boards (EVB).

2. Hardware and Software Requirements

Applicable ATM33/e EVKs:

EVK (Evaluation Kits)	Kit Part Number	Zephyr Build Board Name "$BOARD"	Bare-metal SDK Board Name "BOARD="
Evaluation Kit for ATM3325 5x5 mm QFN Package	ATMEVK-3325-QK-6	ATMEVK-3325-QK-5	ATMEVK_3325_QK
Evaluation Kit for ATM3325 5x5 mm QFN with Extended Storage Package	ATMEVK-3325-LQK-6	ATMEVK-3325-LQK	ATMEVK_3325_LQK
Evaluation Kit for ATM3330 7x7 mm QFN Package	ATMEVK-3330-QN-6	ATMEVK-3330-QN-5	ATMEVK_3330_QN
Evaluation Kit for ATM3330e 7x7 mm QFN Package	ATMEVK-3330e-QN-5 ATMEVK-3330e-QN-6	ATMEVK-3330e-QN-5	ATMEVK_3330e_QN
Evaluation Kit for ATM3330e 7x7 mm QFN Package, with multiple charging booster options on Evaluation Kit	ATMEVK-3330e-QN-7	ATMEVK-3330e-QN-7	ATMEVK_3330e_QN_7

Table 2-1 - Applicable ATM33/e EVKs

1) ATM33/e EVK listed above.
2) Laptop with Linux, macOS, or Windows for building software.

3. Setup Instructions

1) Go to https://github.com/Atmosic/openair
    - An account with GitHub is not required.
2) Follow the README section from the above link. It will direct the user to another link at: https://docs.zephyrproject.org/latest/develop/getting_started/index.html
    - Which will guide the user through setting up the Zephyr development environment provided by the “Zephryproject-rtos” through GitHub.
    - NOTE: After the section, “Install the Zephyr SDK”, the user can skip the rest of the instructions (i.e. skip the “Build the Blinky Sample” section onward) and move back to the main link to set up the Atmosic Zephyr SDK workspace.
    - For Linux Only: In the last set of instructions, copy 60-openocd.rules to /etc/udev/rules.d, the user must also manually add the PID for the Atmosic EVB J-Link into the 60-openocd.rules file after copying to the destination. If this is not added, the flashing code for the EVB will not be successful. Add the line shown to add PID=1050.

```
# SEGGER J-Link
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="0101", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="0102", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="0103", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="0104", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="0105", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="0107", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="0108", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1010", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1011", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1012", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1013", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1014", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1015", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1016", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1017", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1018", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1020", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1050", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1051", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1055", MODE="660", GROUP="plugdev", TAG+="uaccess"
ATTRS{idVendor}=="1366", ATTRS{idProduct}=="1061", MODE="660", GROUP="plugdev", TAG+="uaccess"
```

    - The user should go back to one directory level to get out of the main Zephyr SDK directory, then create a directory as an example *atmosic* and go into this directory before installing the Atmosic Zephyr SDK. Before issuing the west init instructions, the directory path should look like this /home/user/atmosic. This ensures that the Zephyr workspace and the Atmosic workspace remain independent and do not interfere with each other.

- Installation for both the “Zephyr development environment” and the “Atmosic Zephyr SDK workspace” is now complete and users can build and flash applications from the main “Programming and Debugging” section for the ATM33/e Wireless SoCs.

3) Detail of Release Versions located at: https://github.com/Atmosic/openair/releases
4) Zephyr location of examples and demos at: https://docs.zephyrproject.org/latest/samples/index.html
    - NOTE: Not all are supported.

4. FAQ/Troubleshooting

Q1: Executing *west init -m git@github.com:Atmosic/openair zephyrproject* causes permission errors.

- git@github.com: Permission denied (publickey).
- fatal: Could not read from remote repository.

A1: Issue *rm -r -f zephyrproject* first, then issue *git config --global url."https://github.com/".insteadOf git@github.com:* and then reissue the original west init command.

Q2: FATAL ERROR: already initialized in /home/<user>/zephyrproject, aborting.
A2: The zephyrproject folder was already created due to a previous installation or error condition. Remove this directory and execute the last command again. Issue the following *rm -r -f zephyrproject* to remove the directory. Using this command will remove everything in this directory. **Please make sure no other files are needed here before executing this command**.

Q3: Executing *west build -s $MCUBOOT -b $BOARD@mcuboot -d build/$BOARD/$MCUBOOT -- -DCONFIG_BOOT_SIGNATURE_TYPE_ECDSA_P256=y -DCONFIG_DEBUG=n -DCONFIG_BOOT_MAX_IMG_SECTORS=512*

-DDTC_OVERLAY_FILE="$WEST_TOPDIR/zephyr/boards/atmosic/atm33evk/${BOARD}_mcuboot_bl.overlay" results in the following fatal error.
<command-line>: fatal error: /zephyr/boards/atmosic/atm33evk/ATMEVK-3330-QN-5_mcuboot_bl.overlay: No such file or directory compilation terminated.
CMake Error at /home/user/Atmosic/zephyrproject/zephyr/cmake/modules/extensions.cmake:3885 (message): failed to preprocess devicetree files (error code 1):
A3: WEST_TOPDIR was not assigned. The user can assign the directory by *WEST_TOPDIR=$PWD* and then execute the command again.

Q4: Anytime the below error is encountered:
ERROR: Build directory /home/user/atmosic/zephyrproject/build/ATMEVK-3330-QN-5/modules/hal/atmosic/ATM33xx-5/samples/spe targets board ATMEVK-3330-QN-5, but board ATMEVK-3330-QN-5@mcuboot was specified. (Clean the directory, use --pristine, or use --build-dir to specify a different one.)
FATAL ERROR: refusing to proceed without --force due to above error
A4: Add -p after west build so the command to execute is as shown: *west build -p*

Q5: Linux Only: Unable to program/flash the Atmosic EVB.
A5: Need to add PID 1050 entry to the /etc/udev/rules.d/60-openocd.rules file as stated above in the initial instructions.

Q6: Can command line examples be provided for using J-Link to program the EVB?
A6, example #1: *SPE=openair/samples/spe*
APP=zephyr/samples/hello_world
MCUBOOT=bootloader/mcuboot/boot/zephyr
BOARD=ATMEVK-3330-QN-5
WEST_TOPDIR=$PWD
west flash --verify --device=000900036846 -d build/$BOARD/bootloader/mcuboot/boot/zephyr --erase_flash --noreset --jlink
A6, example #2, with a script: *zephyr/boards/atmosic/atm33evk/support/run.sh -n -e -d -w PD50LL -a zephyr/samples/bluetooth/peripheral/ -j -s 000900036846 ATMEVK-3330e-QN-5*

Q7: Can command line examples be provided for using FTDI to program the EVB?
A7, example #1: *SPE=openair/samples/spe*
APP=zephyr/samples/hello_world
MCUBOOT=bootloader/mcuboot/boot/zephyr
BOARD=ATMEVK-3330-QN-5
WEST_TOPDIR=$PWD
west flash --verify --device=ATRDI1414 -d
build/$BOARD/bootloader/mcuboot/boot/zephyr --erase_flash --noreset
A7, example #2, with a script: *zephyr/boards/atmosic/atm33evk/support/run.sh -n -e -d -w PD50LL -a zephyr/samples/bluetooth/peripheral/ -s ATRDI1414 ATMEVK-3330e-QN-5*

Q8: Can command line examples be provided for enabling low power?
A8, example #1: In the samples directory, add the following two entries to the prj.conf:
CONFIG_PM=y
CONFIG_PM_DEVICE=y
Then execute the below command:
zephyr/boards/atmosic/atm33evk/support/run.sh -n -e -d -w LL -a zephyr/samples/bluetooth/periodic_adv/ -g -j -s 000900036846 ATMEVK-3330e-QN-5
A8, example #2: In the samples directory, add the following two entries to the prj.conf:
CONFIG_PM=y
CONFIG_PM_DEVICE=y
Then execute the below command:
zephyr/boards/atmosic/atm33evk/support/run.sh -n -e -d -w PD50LL -a zephyr/samples/bluetooth/beacon/ -g -j -s 000900036846 ATMEVK-3330e-QN-5
A8, example #3: Atmosic custom beacon sample:
zephyr/boards/atmosic/atm33evk/support/run.sh -n -e -d -w PD50LL -a openair/samples/bluetooth/beacon/ -g -j -s 000900036846 ATMEVK-3330e-QN-5

Q9: Build errors complaining “No such file or directory” and the file/directory does exist.
A9: Try adding the full path into the script or command line.

Q10: Build errors complaining about the python3 version not found.
A10: Please install python3.

Reference Documents

Title	Document Number
ATM33/e Series Evaluation Kit User Guide	ATM33_e-UGEVK

Revision History

Date	Version	Description
January 9, 2025	0.10	Initial version created.

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