



life.augmented

A night-time aerial view of a city skyline with numerous skyscrapers. Overlaid on the image is a network diagram with white nodes and lines connecting them. Several nodes are accompanied by blue Wi-Fi signal icons, representing IoT connectivity across the urban environment.

# STM32U5 Azure IoT Hands-on

Presenter

Date

# Agenda ADD FOR WHOLE HANDS ON

# Topic

# Topic

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# Topic

# Workshop Requirements

```
git clone https://github.com/AlnurElberier/ST\_Azure\_Workshop\_2022.git
```

- Windows
- Python3
- Azure CLI
- STM32CubeProgrammer
- Git Hub
- X-CUBE-AZURE

# STM32U5 Microcontrollers

The new reference for secure and smart IoT applications



## Higher Security

Certified PSA L3 and SESIP L3

## Lower Power

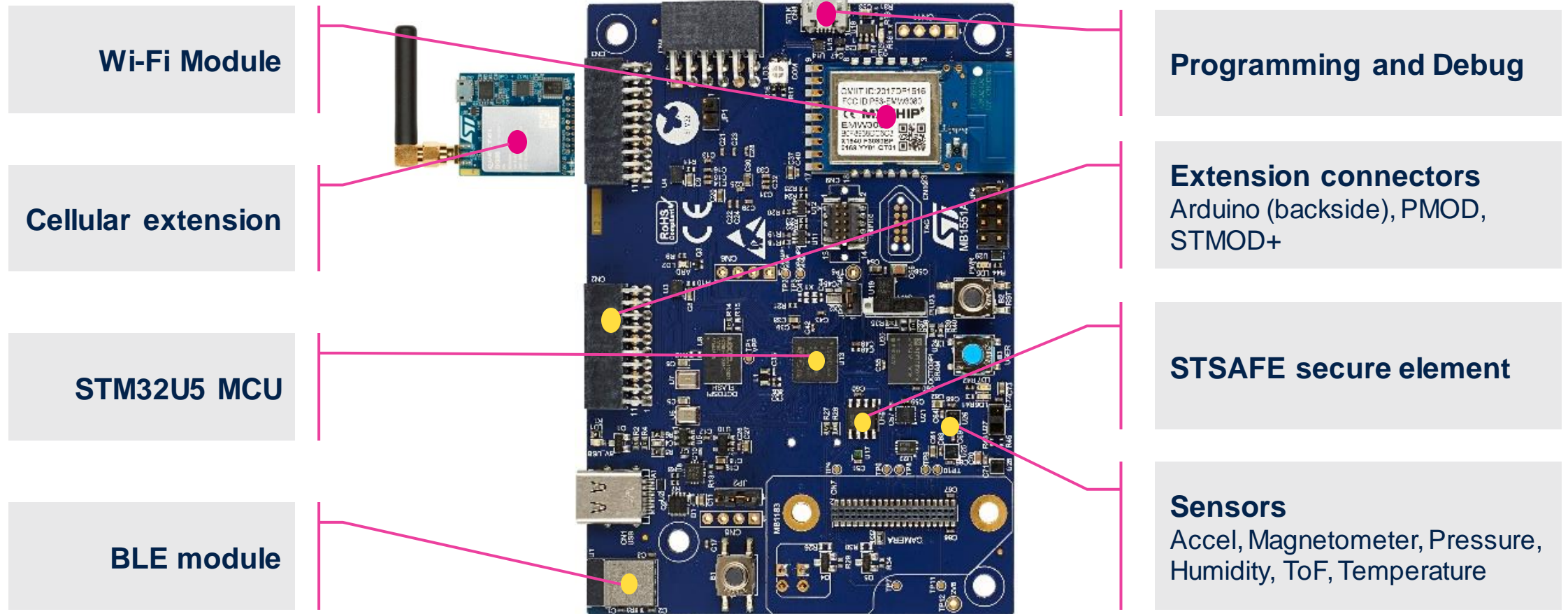
58 ULPMark-CM

## Richer applications

Cortex-M33 @160MHz, extended features set

# STM32U5 IoT Kit

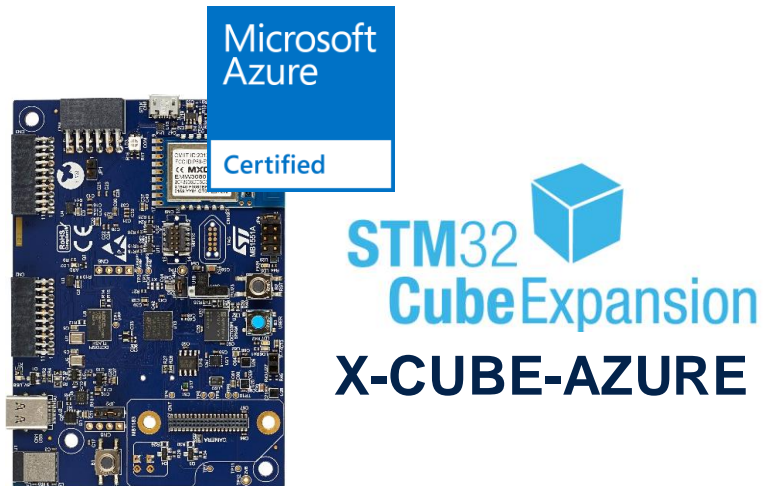
Your reference board for IoT Proof-of-Concept



[B-U585H-IOT02A](#)

# Azure IoT on STM32U5

**X-CUBE-AZURE reference integration simplifying your development**



**Certified for Microsoft Azure plug and play**

**Leveraging ARM Trusted Firmware-M (TF-M)**

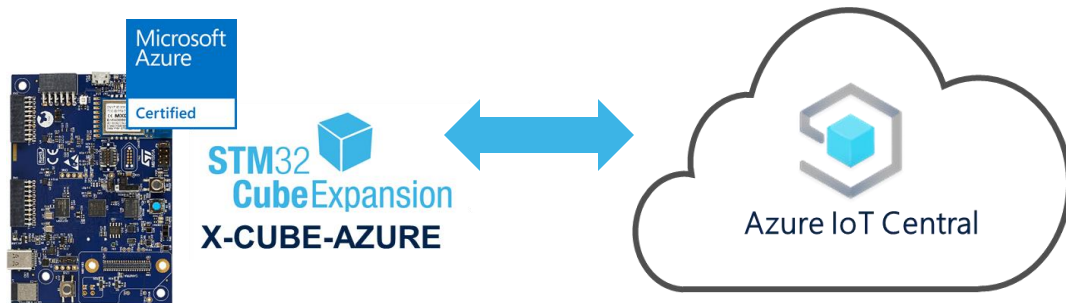
**Based on AzureRTOS middleware**

**Supporting WIFI and Cellular (Cat M1)**

**using STSAFE for simpler provisioning and even higher security**

# Azure IoT on STM32U5

## Reference implementation supporting Azure IoT and app Services



### Azure IoT Central

Data visualization and analysis, device management and

### Azure IoT Hub

device provisioning services

### IoT plug and Play

### Device update for IoT Hub (public preview)

### Microsoft Defender for IoT



# Azure IoT Central Quick Connect

## Abstracts Firmware customization and registration process

- Allows Cloud IoT/Data architects to focus on developing power of the Cloud IoT platform proof of concepts.
- Connect to Microsoft Azure IoT Central and perform telemetry in minutes
- Solution Components:
  - *B-U585I-IOT02A Discovery Kit*
  - *Reference Binary*
  - *Quick connect scripts*
  - *Cloud visualization*



# STM32U5 Security



The slide features a dark blue background with a subtle circuit pattern. In the top left corner is the ST logo with the tagline 'life.augmented'. In the top right corner is the Microsoft Azure logo. On the left side, there is a video inset of a man with a beard and glasses, wearing a black shirt with a small Microsoft logo. To the right of the video inset is a circular icon with a white butterfly and the text 'STM32'. Further right is an image of a blue STM32U5 development board. Below the board, the title 'Azure RTOS + ST U5 Security Overview' is displayed in white text. At the bottom, a subtitle reads 'Using ST's Secure, Ultra Low Power, Sensor to Cloud Reference Hardware'.

ST life.augmented

Microsoft Azure

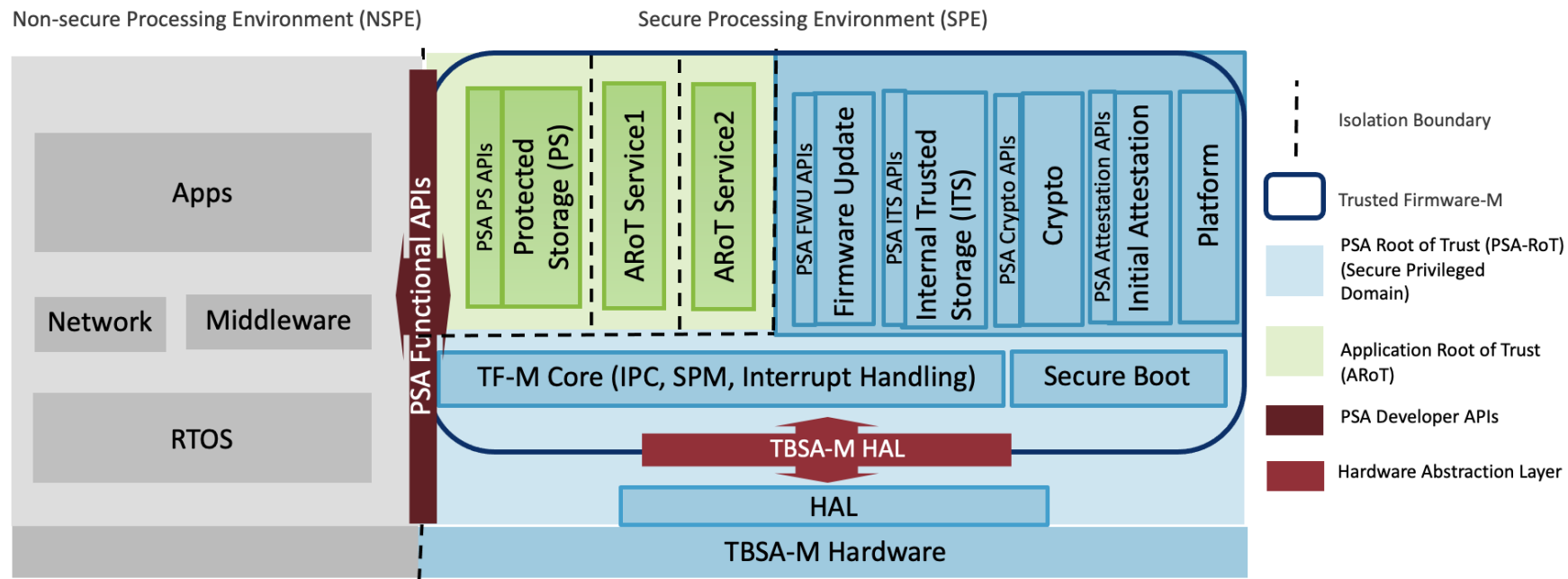
STM32

Azure RTOS + ST U5 Security Overview

Using ST's Secure, Ultra Low Power, Sensor to Cloud Reference Hardware

# Trusted Firmware-M (TF-M)

- Trusted Firmware for Cortex M (TF-M) implements the Secure Processing Environment (SPE) for Armv8-M, Armv8.1-M
- **Trusted Firmware-M consists of:**
  - Secure Boot , Control the isolation, communication and execution within SPE and with NSPE
  - Crypto, Internal Trusted Storage (ITS), Protected Storage (PS) and Attestation secure services



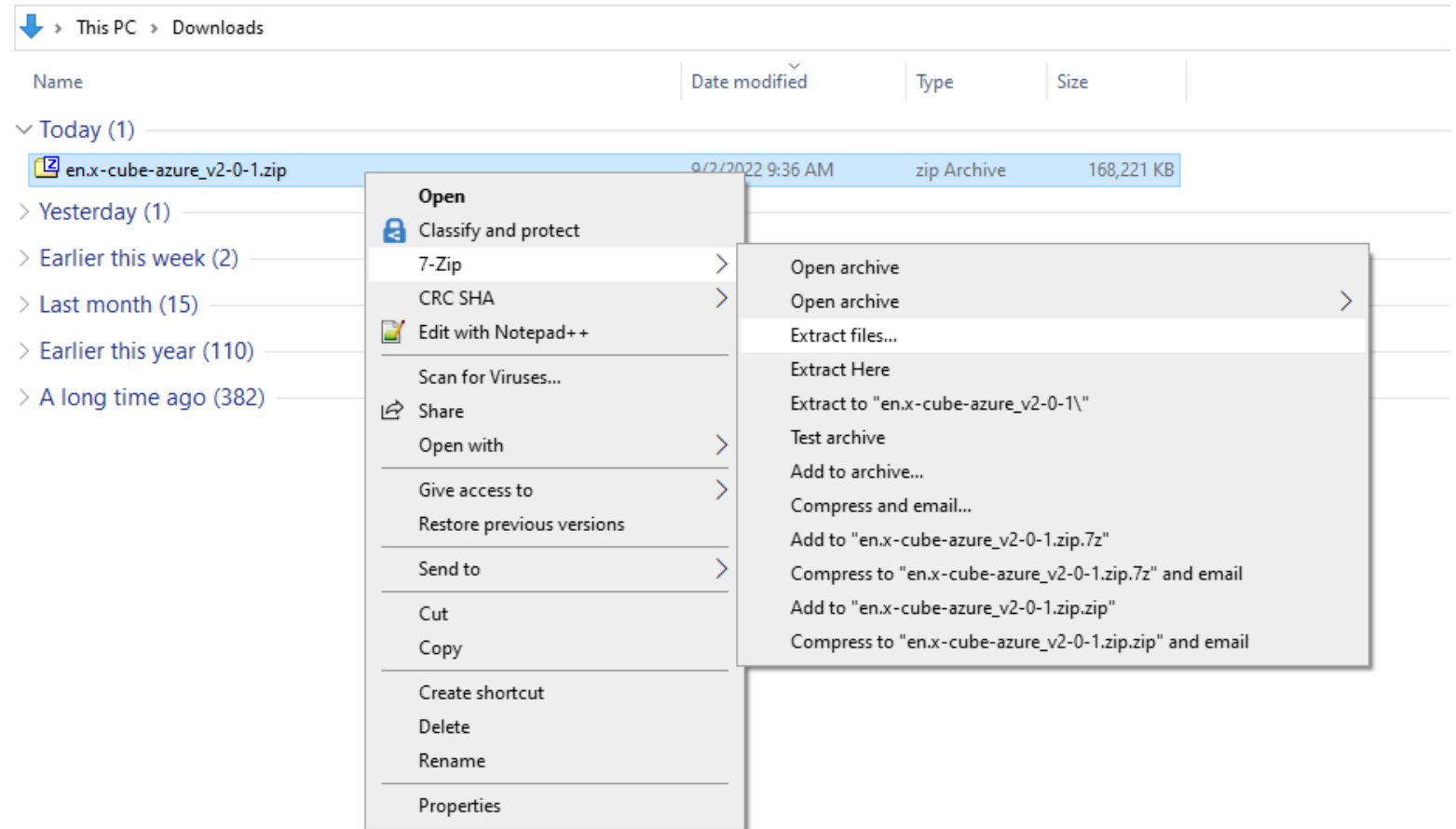
# Directory Walk-Through: X-CUBE-AZURE

- Download the X-CUBE-AZURE Software package and become familiar with the directory structure
- Download Link:
  - [www.st.com/en/embedded-software/x-cube-azure](http://www.st.com/en/embedded-software/x-cube-azure)



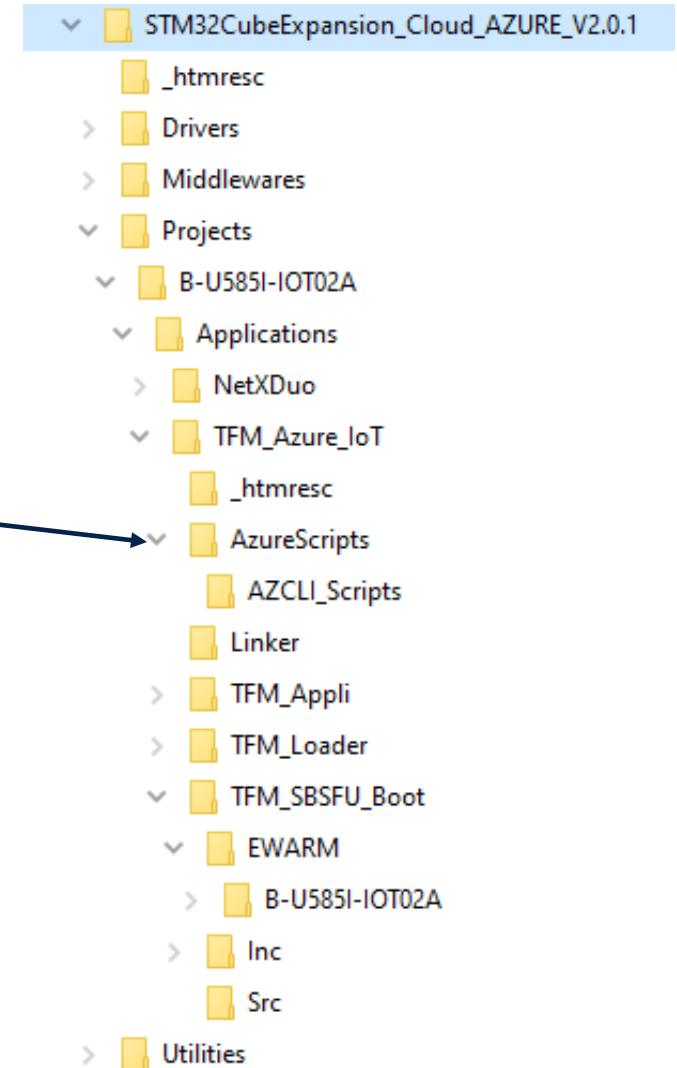
# Extracting X-CUBE-AZURE to C Drive

- Navigate to download directory
- Select the **en.x-cube-azure\_v2-0-1.zip** file you just downloaded
- Extract the file to your **C drive**



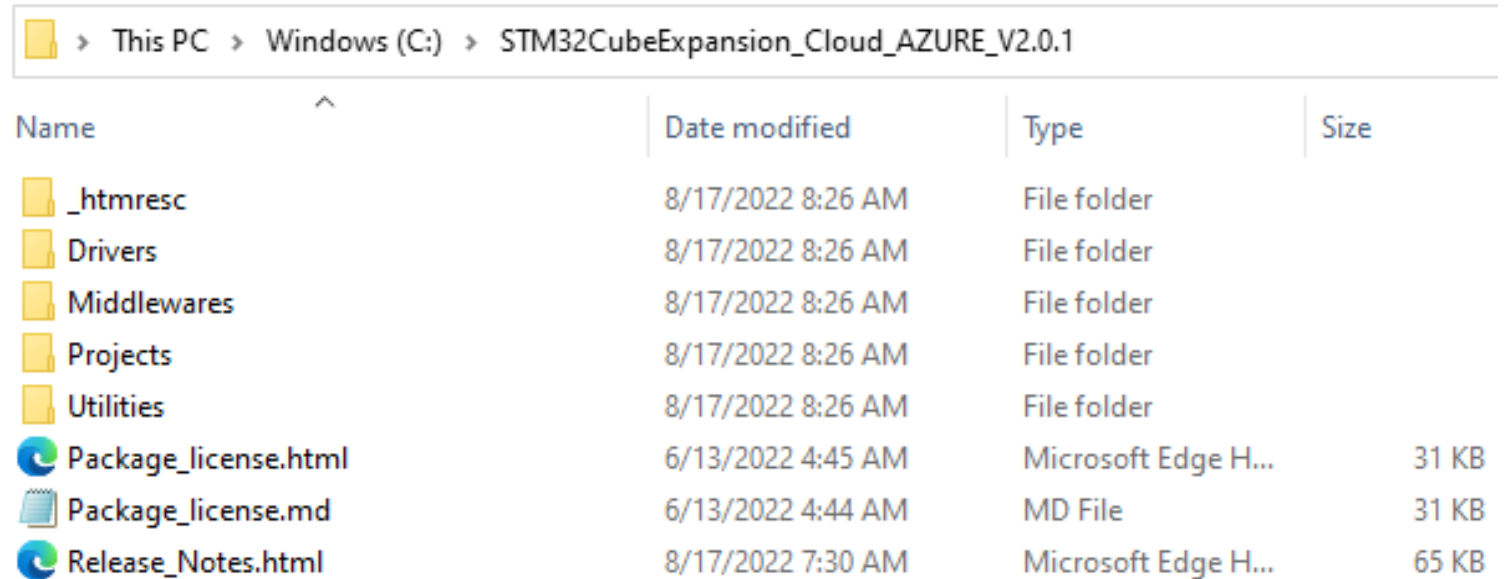
# X-CUBE-AZURE Directory Structure

- C:\STM32CubeExpansion\_Cloud\_AZURE\_V2.0.1\Projects\B-U585I-IOT02A\Applications\TFM\_Azure\_IoT\AzureScripts



# X-CUBE-AZURE Root Directory

- Drivers
  - BSP, CMSIS, and HAL Drivers
- Middlewares
  - Both ST and Third-Party Middleware
- Projects
  - Sample Projects and applications
- Utilities
  - Additional software and patches

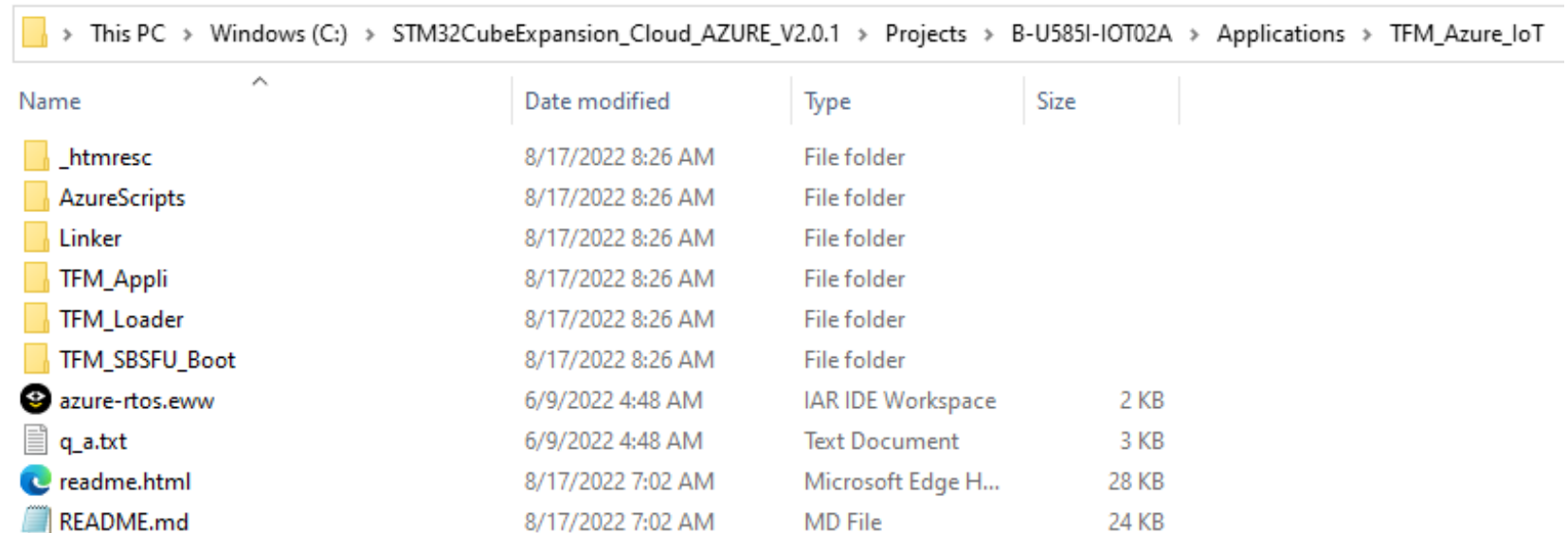


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Drivers	8/17/2022 8:26 AM	File folder	
Middlewares	8/17/2022 8:26 AM	File folder	
Projects	8/17/2022 8:26 AM	File folder	
Utilities	8/17/2022 8:26 AM	File folder	
Package_license.html	6/13/2022 4:45 AM	Microsoft Edge H...	31 KB
Package_license.md	6/13/2022 4:44 AM	MD File	31 KB
Release_Notes.html	8/17/2022 7:30 AM	Microsoft Edge H...	65 KB



# X-CUBE-AZURE TFM\_Azure\_IoT

- Azure Scripts
  - Supporting software
- Linker
- TFM\_Appli
  - Main application
- TFM\_Loader
- TFM\_SBSFU\_Boot
  - Boot firmware and scripts
- azure-rtos.eww
  - EWARm project shortcut

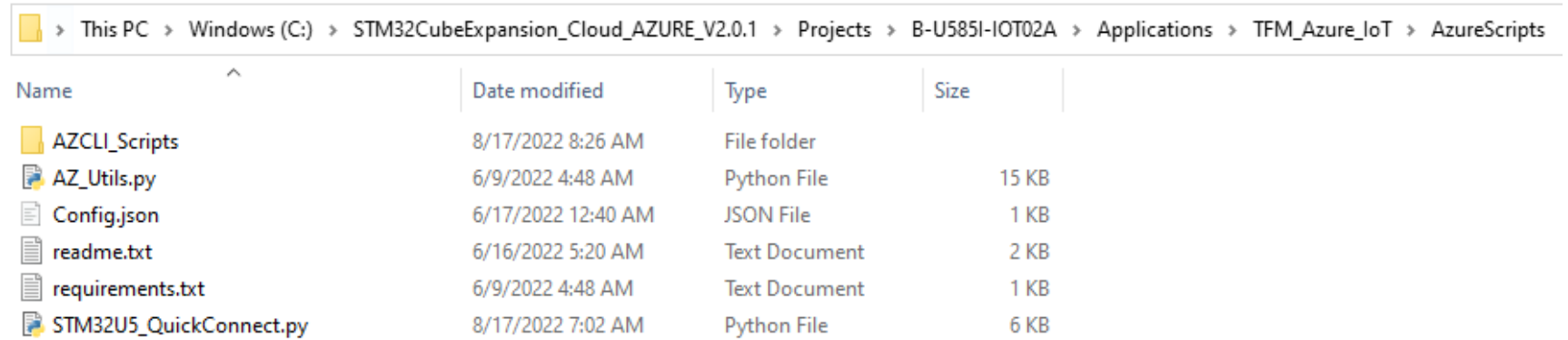


Name	Date modified	Type	Size
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AzureScripts	8/17/2022 8:26 AM	File folder	
Linker	8/17/2022 8:26 AM	File folder	
TFM_Appli	8/17/2022 8:26 AM	File folder	
TFM_Loader	8/17/2022 8:26 AM	File folder	
TFM_SBSFU_Boot	8/17/2022 8:26 AM	File folder	
azure-rtos.eww	6/9/2022 4:48 AM	IAR IDE Workspace	2 KB
q_a.txt	6/9/2022 4:48 AM	Text Document	3 KB
readme.html	8/17/2022 7:02 AM	Microsoft Edge H...	28 KB
README.md	8/17/2022 7:02 AM	MD File	24 KB



# X-CUBE-AZURE TFM\_Azure\_IoT\AzureScripts\

- **Config.json**
  - Configuration file for Quick Connect Script
- **Requirements.txt**
  - Python library requirements
- **STM32U5\_QuickConnect.py**
  - Quick connect script for connecting B-U585I-IOT02A to Azure IoT Central



Name	Date modified	Type	Size
AZCLI_Scripts	8/17/2022 8:26 AM	File folder	
AZ_Utils.py	6/9/2022 4:48 AM	Python File	15 KB
Config.json	6/17/2022 12:40 AM	JSON File	1 KB
readme.txt	6/16/2022 5:20 AM	Text Document	2 KB
requirements.txt	6/9/2022 4:48 AM	Text Document	1 KB
STM32U5_QuickConnect.py	8/17/2022 7:02 AM	Python File	6 KB

# X-CUBE-AZURE TFM\_Azure\_IoT\TFM\_SBSFU\_Boot\EWARM

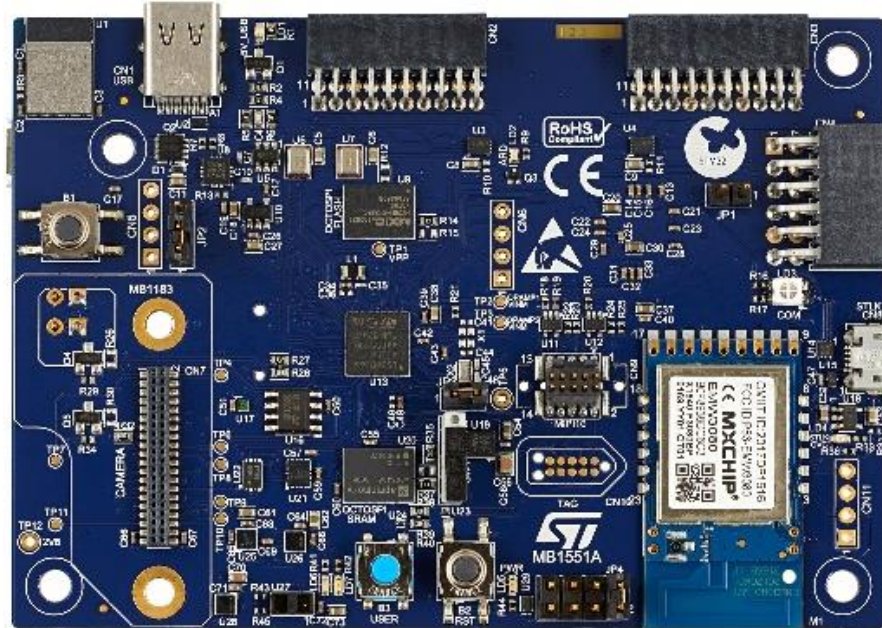
- regression.bat
  - Script to set option bytes on board
- TFM\_UPDATE.bat
  - Flashing Script
- STM32CubeProg\_Reset.bat
  - Script to reset board
- STM32U5\_TrustZone\_Disable.bat
  - Script to disable TZ option byte

This PC > Windows (C:) > STM32CubeExpansion_Cloud_AZURE_V2.0.1 > Projects > B-U585I-IOT02A > Applications > TFM_Azure_IoT > TFM_SBSFU_Boot > EWARM			
Name	Date modified	Type	Size
B-U585I-IOT02A	8/17/2022 8:26 AM	File folder	
dataimg.bat	8/17/2022 8:22 AM	Windows Batch File	7 KB
hardening.bat	8/17/2022 8:22 AM	Windows Batch File	2 KB
keygen.bat	6/9/2022 4:48 AM	Windows Batch File	5 KB
postbuild.bat	6/9/2022 4:48 AM	Windows Batch File	10 KB
prebuild.cmd	6/9/2022 4:48 AM	Windows Comma...	1 KB
Project.ewd	8/16/2022 6:12 AM	EWD File	53 KB
Project.ewp	6/9/2022 4:48 AM	EWP File	52 KB
Project.eww	6/9/2022 4:48 AM	IAR IDE Workspace	1 KB
regression.bat	8/17/2022 8:22 AM	Windows Batch File	3 KB
STM32CubeProg_Reset.bat	6/9/2022 4:48 AM	Windows Batch File	2 KB
STM32U5_TrustZone_Disable.bat	6/9/2022 4:48 AM	Windows Batch File	2 KB
stm32u585xx_bl2.icf	6/9/2022 4:48 AM	ICF File	3 KB
TFM_UPDATE.bat	8/17/2022 8:22 AM	Windows Batch File	3 KB

# Board Distribution

# Boards distribution

- Believe it or Not, even at ST we have hard time to get boards. Unfortunately, we need to collect the board at the end of the workshop to use them in the next one.
- We'll disinfect the boards at the end of the workshop and before re-distribution.
- <Still need info on voucher for attendees to buy a board after the workshop>



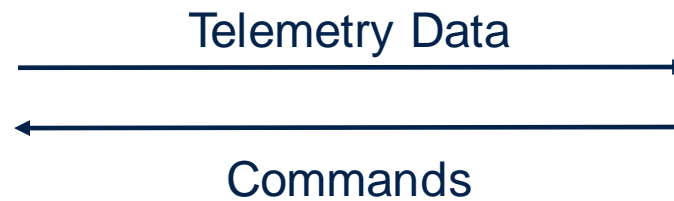
# Lab: Run The Quick Connect

# Goal

- Create an [Azure IoT Central application](#) and connect the [B-U585I-IOT02A - Discovery kit for IoT node](#) for bi-directional communication



B-U585I-IOT02A

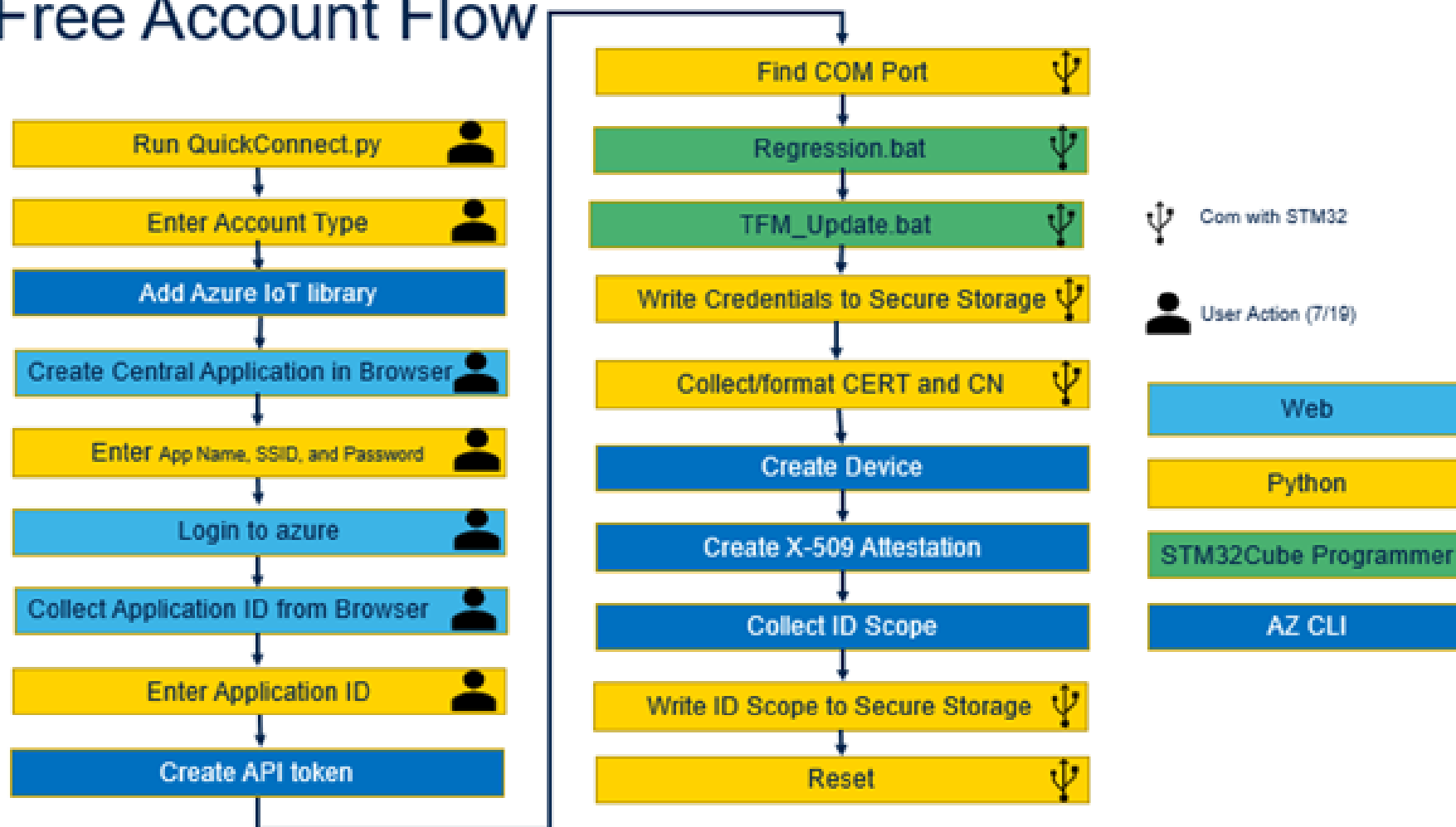


IoT Central Application



# Quick Connect Flow

## Free Account Flow



# Connect your board

- Connect your board to the PC



# Our technology starts with You



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