Project Santa Cruz Development Kit Overview

Devkit Contents

The Project Santa Cruz Development Kit contains the following major components:

- Carrier board with Wi-Fi antennas
- Azure Eye SoM
- Azure Ear SoM (includes microphone array)
- RBG camera (connects to Eye SoM)
- Required cables: MIPI, USB-C, USB Micro Type-B to USB-A, power cable.
- Welcome card with hex key
- Section of 80/20 1010 Series mounting rail

For more detailed specs, please see the datasheets for the devkit, Eye SoM, and Ear SoM.

Getting Started

There are three main stages to getting started with your Project Santa Cruz Development Kit:

1. Onboarding
2. Devkit unboxing and set up
3. Out of Box Experience (OOBE)

In the onboarding stage, you will assign an Azure subscription within your account to Project Santa Cruz. The onboarding tool will walk you through the process of creating an IoT Hub within your Azure subscription to use with Project Santa Cruz. You will have the option of enabling services, such as the Device Provisioning Service (DPS), Azure Device Update (ADU), and Automatic Import Updates, within your IoT Hub.

After onboarding has been completed, follow the devkit unboxing and set up guide for guidance on connecting the various components of the kit and powering on your device.

Once your devkit is powered on, work through the OOBE (out-of-box experience) to connect your devkit to a Wi-Fi network, set up an SSH login (optional), connect your devkit to your Azure account, and assign it to your Project Santa Cruz IoT Hub (created during onboarding).

After the onboarding, devkit set up, and OOBE have been completed, you are ready to begin prototyping.

Vision and Speech Experiences

There are a number of no-code vision and audio solutions available for prototyping with your devkit. For more information on these experiences, please reference the prototyping documentation.

Updating your Devkit

Your devkit OS and firmware may be updated over-the-air (OTA) or via USB. For more information on updating your device, please see the update experience documentation.

Project Santa Cruz onboarding

Welcome to Project Santa Cruz! Prior to getting started with the Santa Cruz devkit, please complete the onboarding as described herein. During onboarding, you will:

- create an IoT Hub within your Azure account and connect it to Project Santa Cruz
- enable Device Provisioning Service (DPS), Azure Device Update (ADU), and Automatic Import Update (AIU) within your IoT Hub

Please note that it may take up to two business days to process your request to access the onboarding portal.

Why is onboarding important?

An IoT Hub is required for working with the Project Santa Cruz devkit. In addition, the onboarding portal is currently the only location where you may create an IoT Hub with ADU enabled. ADU allows you to perform over-the-air (OTA) updates from within the Azure portal--a feature we highly recommend.

Onboarding also allows for easy enablement of DPS and AIU, both recommended features. DPS enables zero-touch provisioning of devices, and AIU will automatically upload new device updates to your ADU account.

Prerequisites

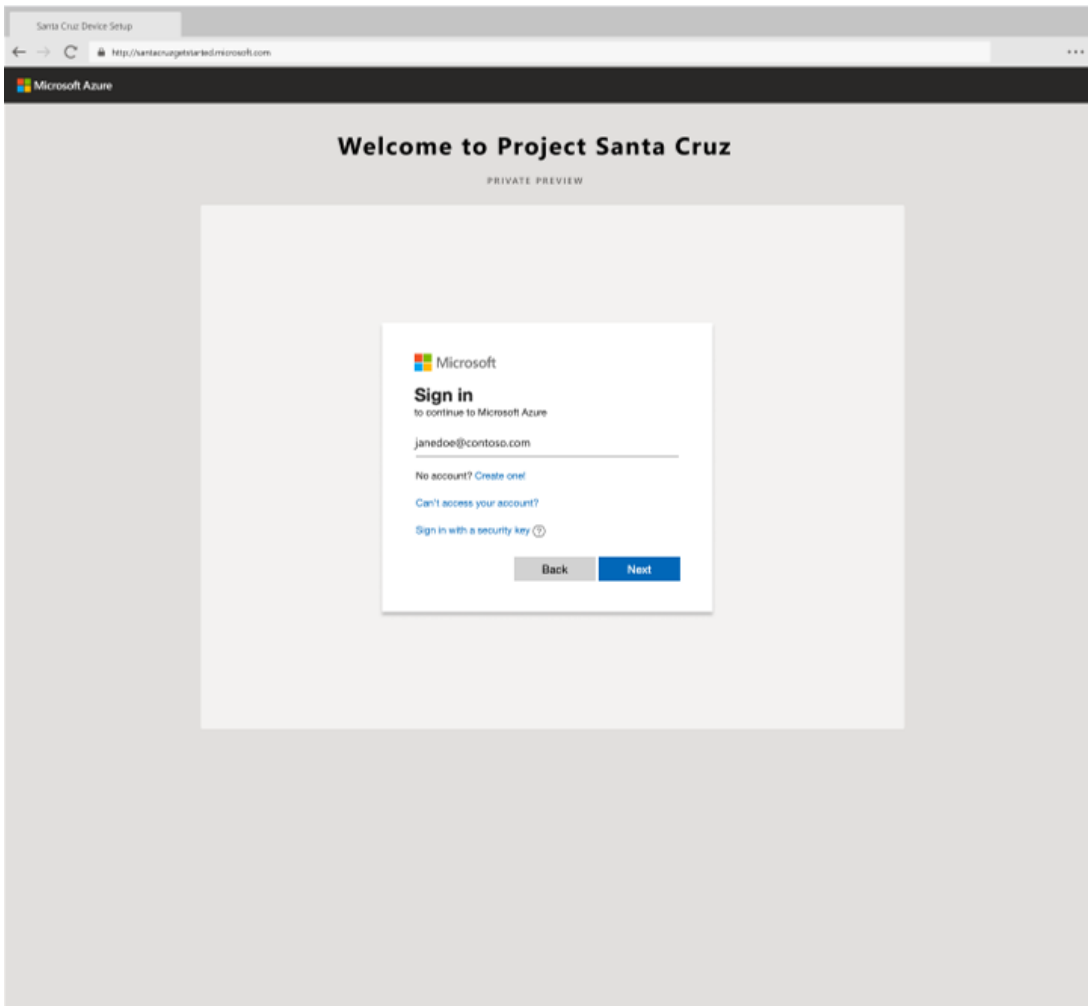
- Azure account with Azure Active Directory enabled and "owner" or "contributor" permissions

Request access

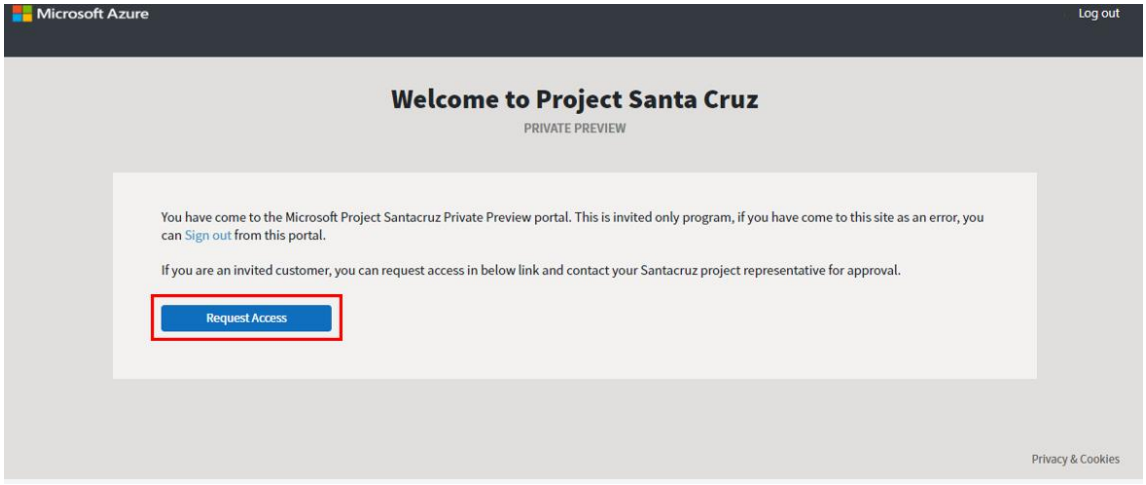
1. Open a browser and enter https://projectsantacruz.microsoft.com/ in the address bar to open the onboarding portal.

2. Enter your account login details and click **Next**.

   [!IMPORTANT] To ensure you onboard the correct Azure subscription, you must log into the site with an Azure Active Directory-enabled account that is a member of the Azure subscription you wish to onboard. In most cases, users will want to onboard a subscription from their company's Azure account, in which case they should log in with their corporate credentials. If you want to onboard an Azure subscription that is different than your corporate subscription, you will need to log in with a user account that is a member of that subscription. If you do not have a user account for that subscription, or if your company does not use Azure Active Directory, you can follow the MSA account onboarding access instructions to create an account. Once you have successfully created your new user, return to this article for guidance on completing the rest of the onboarding process.



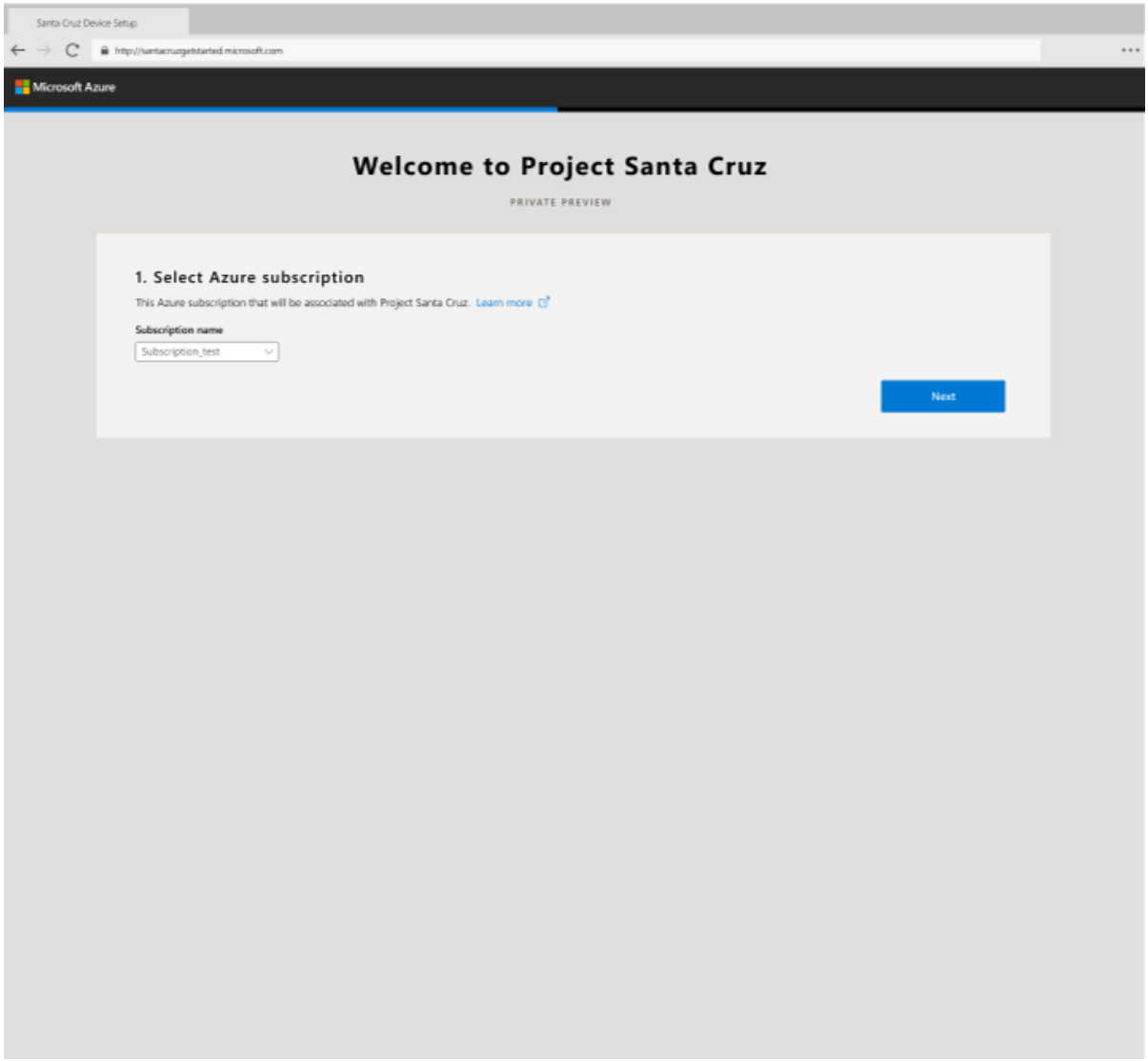
3. Click **Request access**. It may take up to 2 business days to process your request to access the onboarding portal.



Create an IoT Hub and enable Azure services

1. Once your access request has been processed, return to the onboarding portal. Click **Get Started** on the welcome screen.

2. Select the Azure subscription you would like to use with Project Santa Cruz from the drop-down menu. If you do not have an Azure subscription, or if you would like to create a new subscription to use with Project Santa Cruz, click the blue **Learn more** icon. This link redirects to the Azure website where you may create a new Azure account. Please note that the free account is sufficient to get started with Project Santa Cruz. Your account credit card will be charged for usage following the exhaustion or expiration of account credits. After you have selected the appropriate Azure subscription from the drop-down on the onboarding screen, click **Next**.



3. Create an IoT Hub.

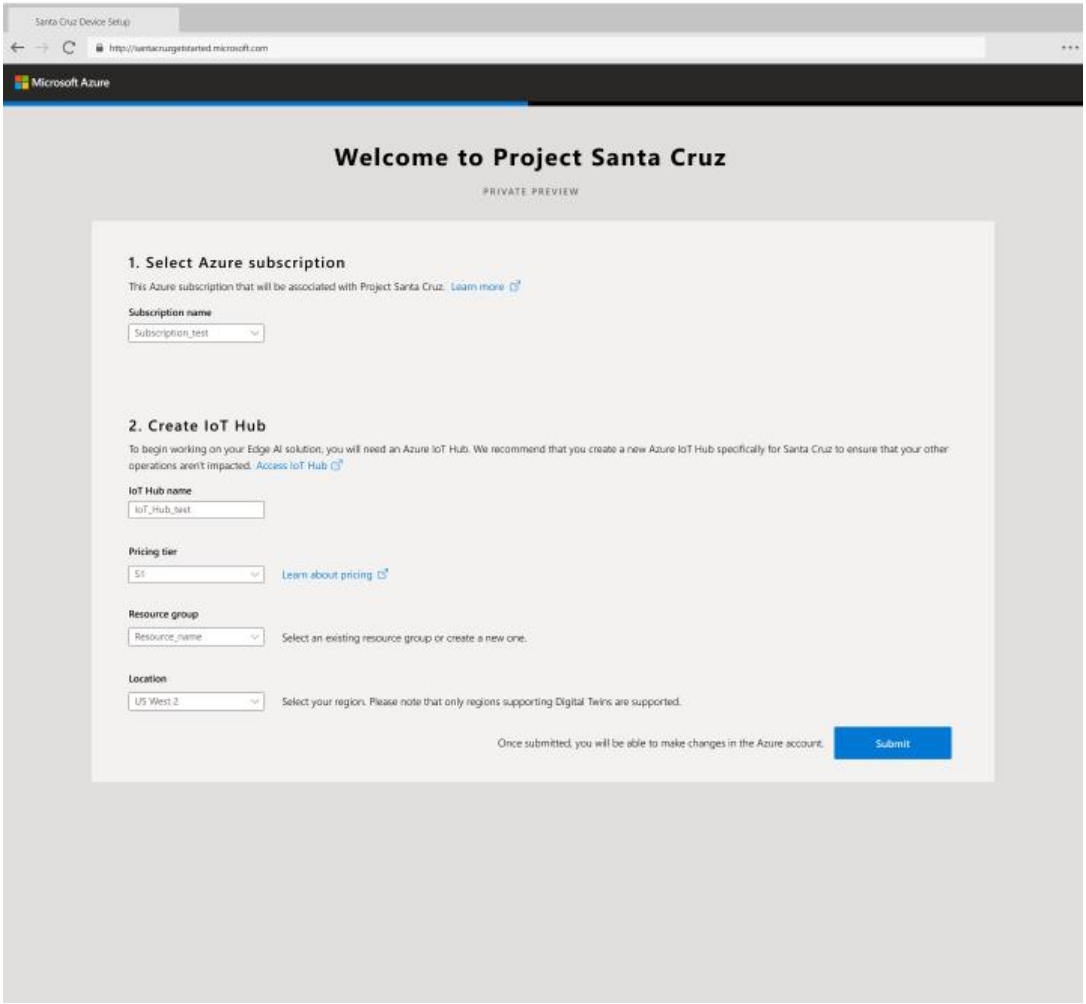
    i. Enter your IoT Hub name. It is recommended that you create a new IoT Hub for working solely with Project Santa Cruz.

    ii. Select your hub's pricing tier from the drop-down menu. The S1 tier is recommended for use with Project Santa Cruz because other pricing tiers do not support IoT Edge, which is required. Note that Azure account credits may be used towards IoT Hub fees.

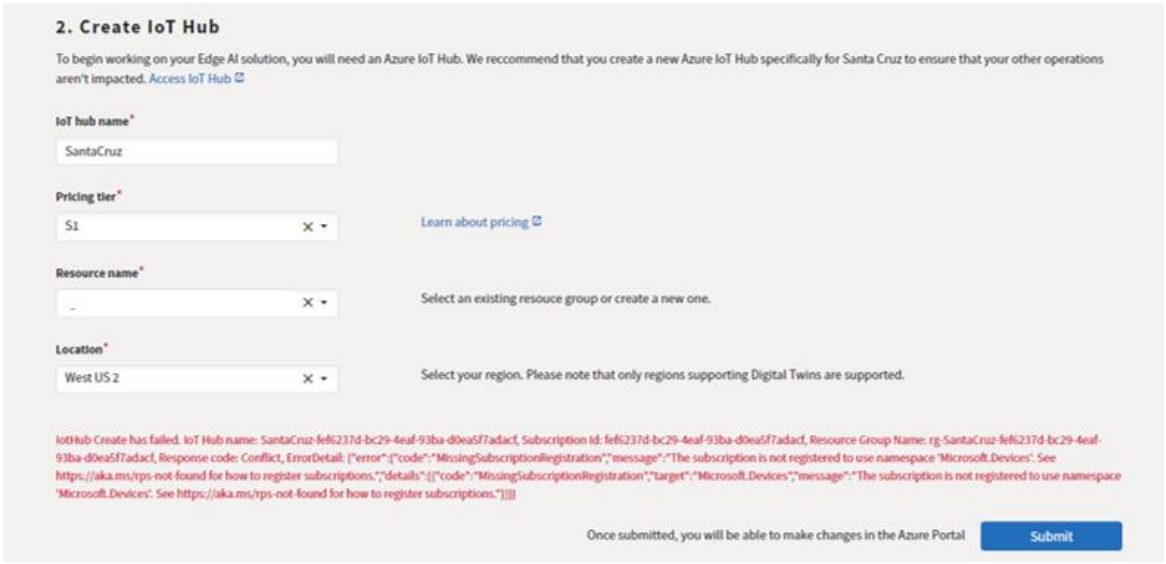
    iii. Select a resource group from the drop-down menu or create a new one.

    iv. Select your location from the drop-down menu. Note that you may use any available region regardless of your country of residence.

    v. After selecting your IoT Hub properties, click **Submit**. It will take a few minutes to create and activate your new IoT Hub. After submitting, any changes to your IoT Hub properties can be made in your Azure account.

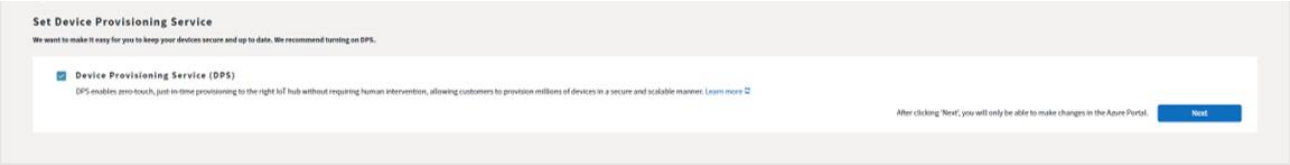


vi. In some cases, you may receive the following error message after clicking **Submit**:

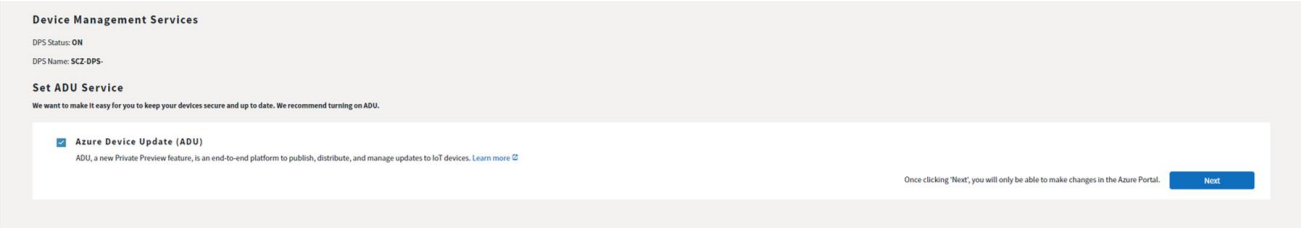


The error message indicates that your Azure subscription is not registered to use the **Microsoft.Devices** namespace. To fix this, register your Azure subscription through the Azure portal by following the steps described here. There is no charge associated with the **Microsoft.Devices** namespace. Wait approximately 30 minutes after registering before trying to create your IoT Hub through the onboarding tool again.

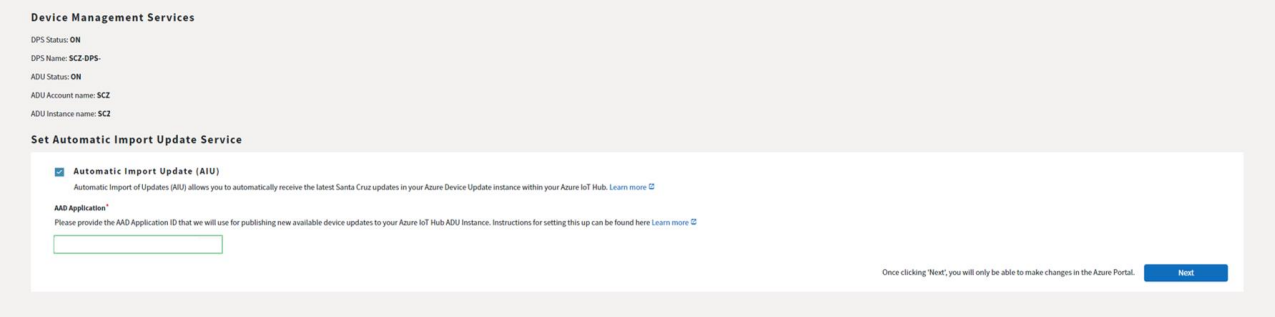
4. After creating your IoT Hub, you will see a new option at the bottom of the screen for enabling the Device Provisioning Service (DPS). Check the box and click **Next** to create your DPS instance and link it to your IoT Hub. This may take a few minutes to complete. When finished, you will see a new section for **Device Management Services** that lists your DPS status (**ON**) and your DPS name.



5. Next, you will see an option at the bottom of the screen for enabling Azure Device Update (ADU). We recommend enabling ADU so you may update your devkit over-the-air (OTA). Check the box and click **Next** to create your ADU account. This may take a few minutes to complete. When finished, you will see your ADU status (**ON**), ADU account name, and ADU instance name listed under **Device Management Services** on your screen.



6. Finally, you will see an option at the bottom of the screen for enabling Automatic Import Update (AIU). Like the name implies, AIU automatically imports new device updates into your ADU account, removing the need to manually download update files from the Project Santa Cruz Update Management website. Please note that AIU is not required to perform OTA updates. To enable AIU, first complete the steps detailed in this AIU setup guide. When you are done, check the box, enter your AAD Application ID, and click **Next**.



7. After enabling AIU, you will see your AIU status (**ON**) and your AIU application ID listed under **Device Management Services** on your screen.

Congratulations! You have successfully completed the onboarding tool and are ready to get started with Project Santa Cruz. Any changes to the settings you selected in the onboarding tool can now be made in your in your Azure account (this link allows you to access the Azure Device Update extension, which is a Private Preview service).

Next steps

Once you have received a Project Santa Cruz Development Kit, please see the unboxing guide for information on powering on your device and accessing the OOBE (out of box experience).

Project Santa Cruz Development Kit unboxing and setup

Reference this guide for information on connecting the devkit components and powering on the device.

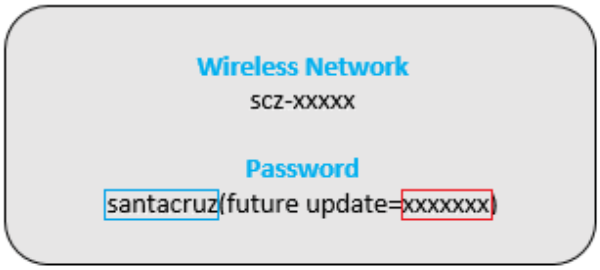
Prerequisites

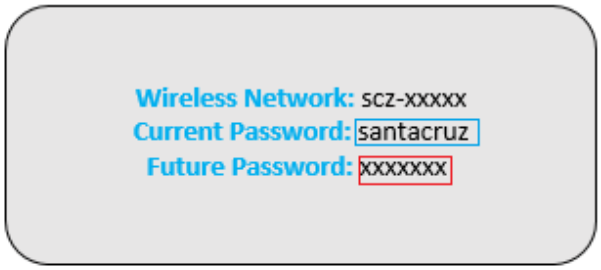
- Project Santa Cruz Devkit.
- P7 screwdriver (optional, used for securing the power cable connector to the carrier board).

Devkit unboxing and setup procedure

1. Unbox the devkit components.

- The devkit contains a carrier board, Azure Eye SoM, Azure Ear SoM, RGB camera, accessories box with antennas and required cables, a section of 80/20 1010 Series mounting rail, and a welcome card with a hex key.
- The welcome card includes a sticker that has two passwords needed to access the dev kit's wifi access point. The first password is "santacruz" and is what should be used with the dev kit out of the box. The second password is "scz-***xxxx***" (where ***xxxx*** are the last four digits of the dev kit's MAC address), and will be activated after you upgrade the dev kit to the latest OS version. **DO NOT LOSE THIS PASSWORD**.





- The major components come mounted to the 80/20 rail out of the box, but they can be removed or adjusted with the included hex key as desired.

2. Connect the devkit components:

   [!NOTE] The power adapter port is located on the right side of the carrier board. The remaining ports (2x USB-A, 1x USB-C, 1x HDMI, and 1x Ethernet) and the reset button are located on the left side of the carrier board.

   i. Hand screw both Wi-Fi antennas into the carrier board.

   ii. Connect the Azure Eye SoM to the carrier board's USB-C port with the USB-C cable.

   iii. Connect the Azure Ear SoM to the carrier board with the USB Micro Type-B to USB Type-A cable. Connect the Micro Type-B end of the cable to the SoM and the Type-A end to the carrier board.

   iv. Connect the power cable to the power adapter.

   v. Remove any remaining plastic packaging from the devices.

   vi. Connect the power adapter/cable to the carrier board and a wall outlet. To fully secure the power cable connector to the carrier board, use a P7 screwdriver (not included in the devkit) to tighten the connector screws.

vii. After plugging the power cable into a wall outlet, the device will automatically power on. The reset button on the left side of the carrier board will be illuminated, and the Ear SoM LEDs will turn green, indicating device authentication is in progress (specifically, the LED marked L01 will turn on and remain green, and LED L02 will flash green). Please allow some time for the device to boot up.

[!NOTE] The reset button is for powering off or resetting the device while connected to a power outlet. In the event of a power outage, the device will automatically reset and power back on.

Next steps

Now that your devkit is powered on, please see the OOBE (out-of-box-experience) walkthrough for guidance on connecting to and working through the OOBE. The OOBE allows you to connect your devkit to a Wi-Fi network, set up an SSH login, and provision it to your Azure account. Once you have completed the OOBE, you will be ready to dive into our prototyping experiences.

OOBE (out-of-box experience) Walkthrough

After completing the onboarding for Project Santa Cruz Private Preview and setting up your devkit, you may proceed with the OOBE (out-of-box experience). The OOBE walks you through the process of connecting your devkit to a Wi-Fi network, setting up an SSH login for your devkit, connecting your devkit to your Azure account, and assigning your devkit to your Project Santa Cruz IoT Hub.

Prerequisites

- Project Santa Cruz devkit
- Ethernet cable (optional)
- Onboarding completed
- Project Santa Cruz Devkit setup completed
- Device with Wi-Fi connectivity and browser

Connecting to OOBE for Initial Setup

What is SoftAP?

SoftAP, or software-enabled access point, allows your devkit to act as a wireless access point/hotspot through its integrated Wi-Fi module. The devkit's SoftAP IP address is 10.1.1.1. We will be using the devkit's SoftAP for the initial setup.

Connect to OOBE

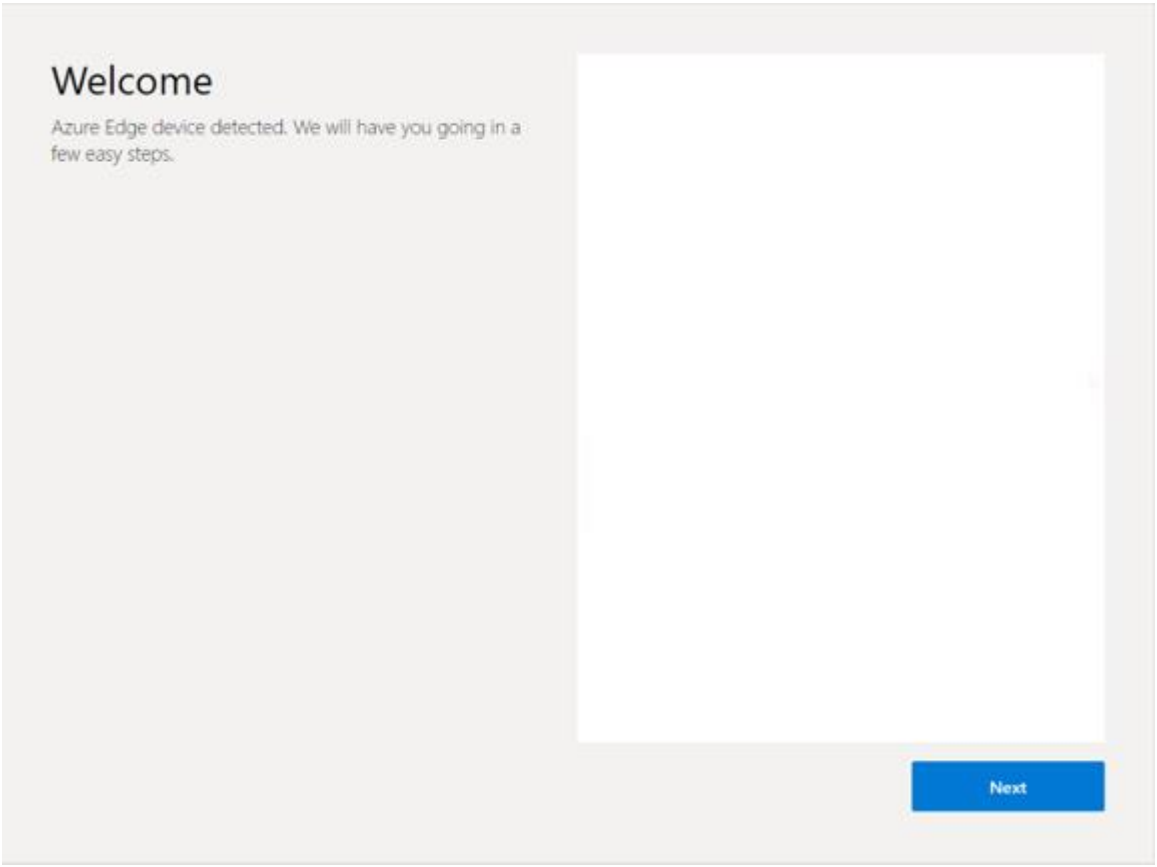
Warning: If completing OOBE via a mobile device, be aware that data rates from your mobile carrier may apply.

1. To get started, power on your devkit.
2. If the host computer you will be using has an active WWAN/Cellular connection, disconnect from it before proceeding. This can sometimes cause interference to the SoftAP.
3. From your host computer, establish a Wi-Fi connection to the devkit's SoftAP. This varies by platform (Windows/Linux/Mac).
    i. SoftAP/Hotspot SSID: scz-xxxx (where xxxx = the last four digits of the devkit's Wi-Fi MAC address)
    ii. Password: santacruz (if you have already manually set your SoftAP password during the OOBE, enter that password here)

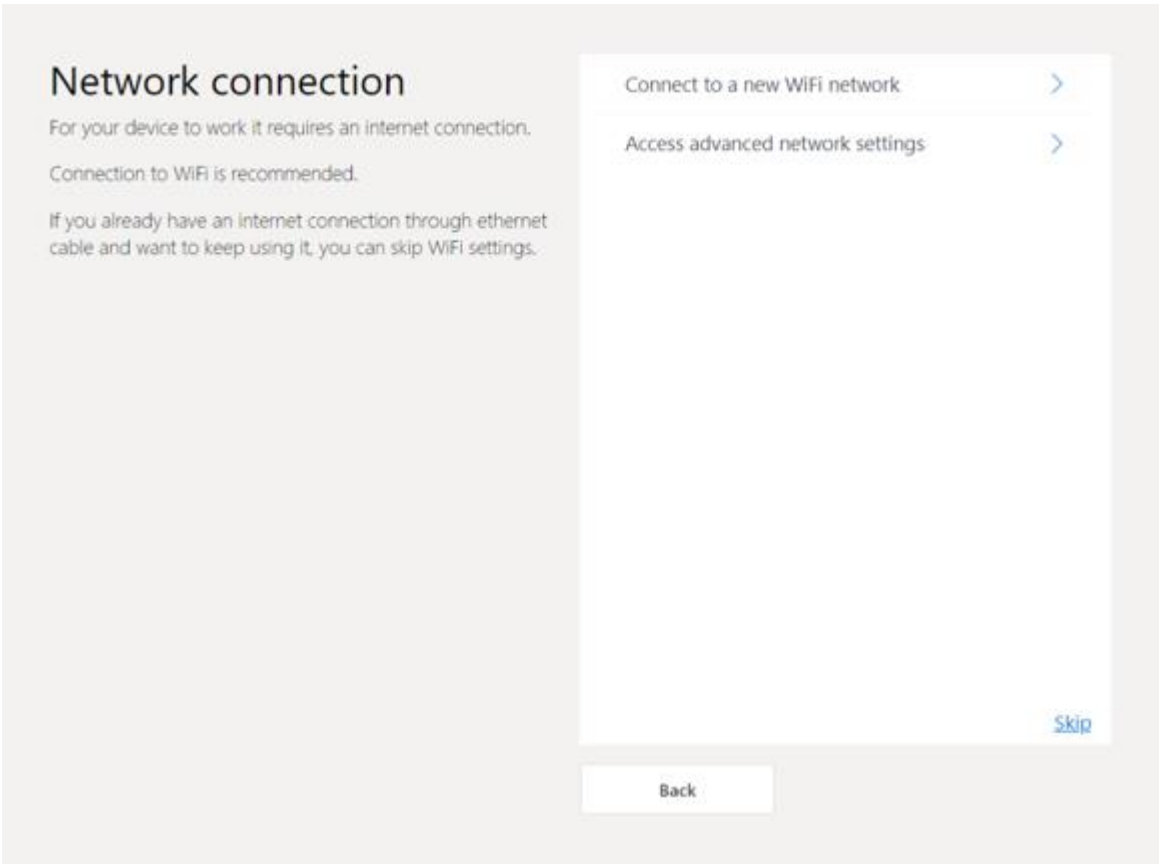
    [!NOTE] If you experience issues while trying to connect with the devkit's SoftAP please review the known issues page. Windows may complain about the SoftAP using a less secure standard (WPA2+TKIP cipher). This will be addressed in a future build to only allow connections via the CCMP pairwise cipher.
4. Open a browser and go to http://10.1.1.1:4242 to access the OOBE. If you have already flashed your device to a newer build, use http://10.1.1.1.

OOBE procedure

1. Click **Next** on the OOBE **Welcome** screen.

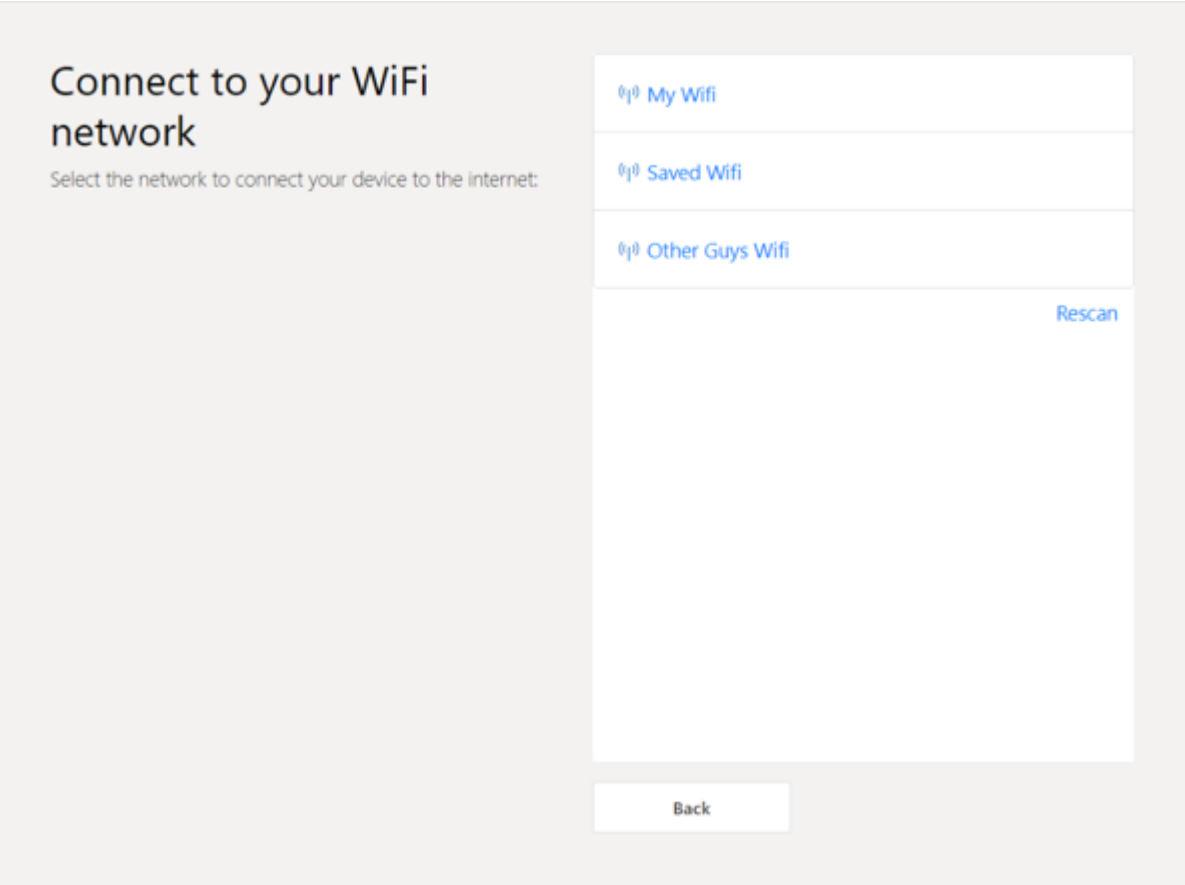


2. On the **Network connection** page, click **Connect to a new WiFi network** to connect your devkit to a Wi-Fi network.

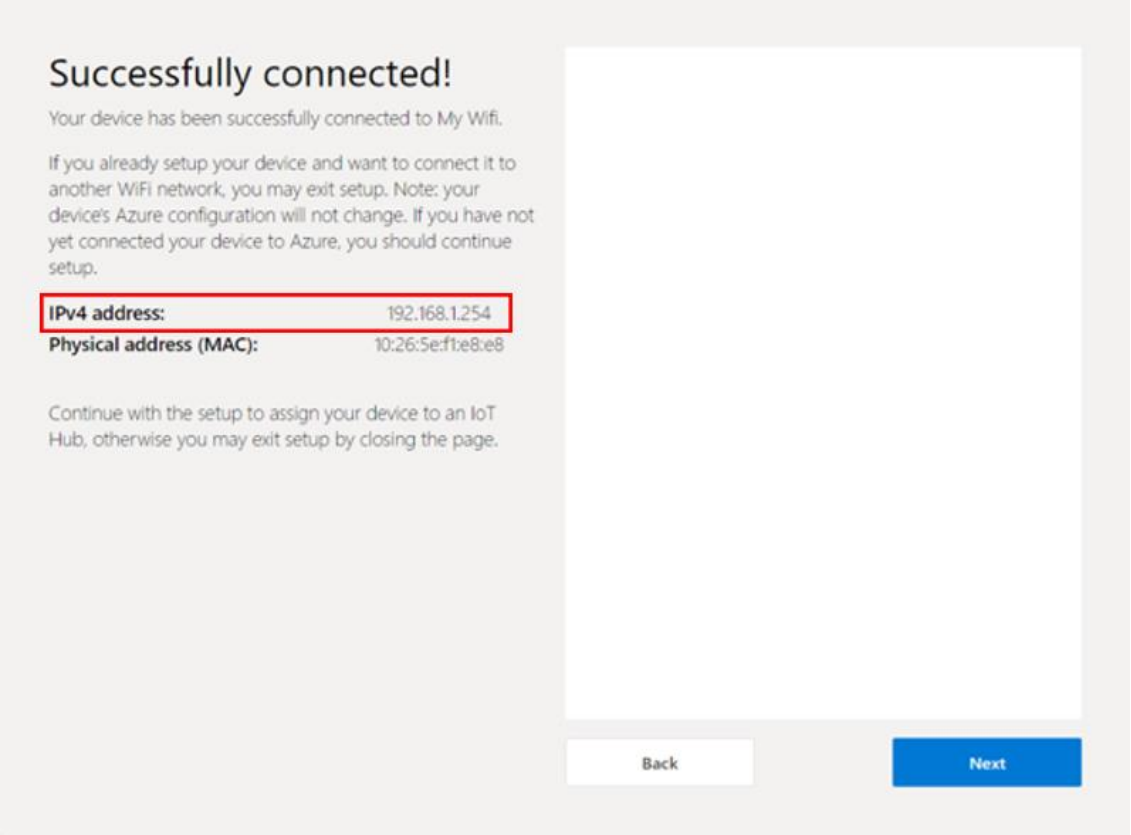


3. Select your Wi-Fi network from the available connections.

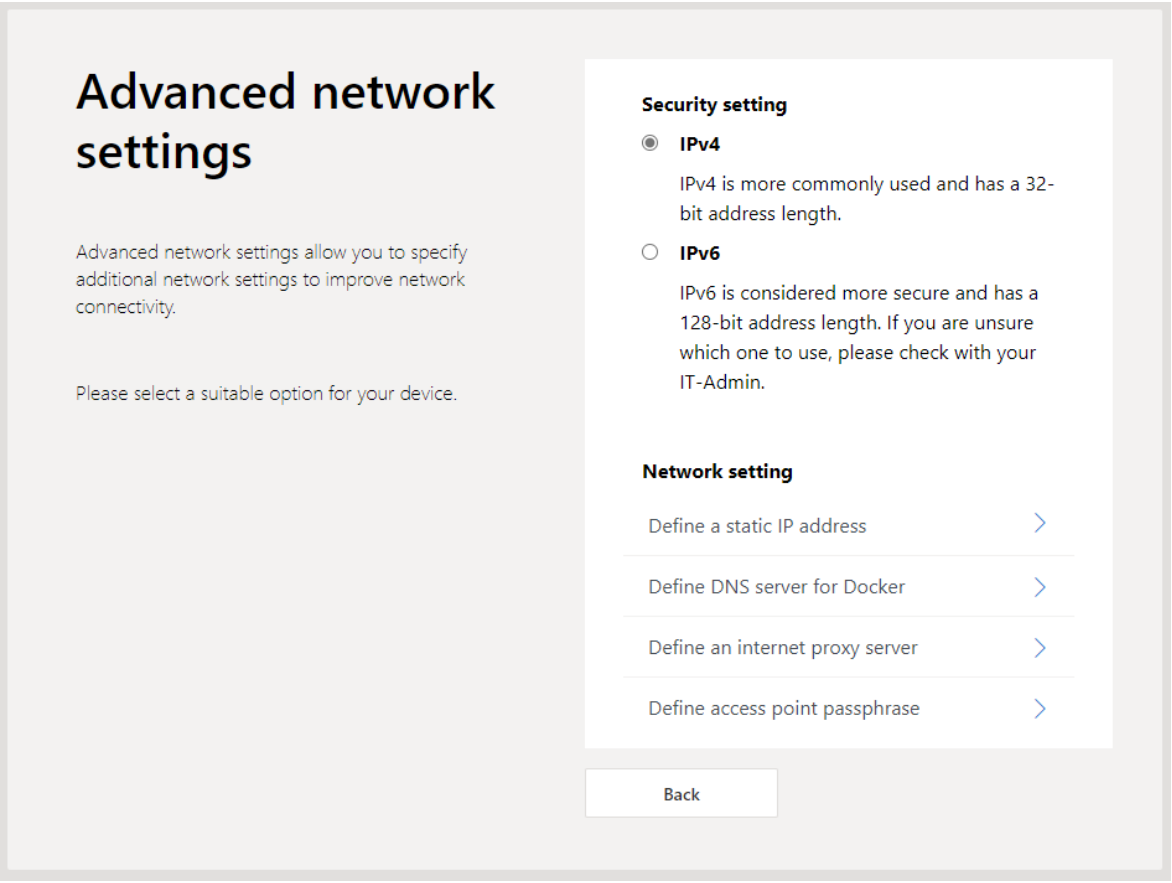
[!NOTE] The Wi-Fi network you connect to must currently have internet connectivity so we can communicate with Azure. EAP[PEAP/MSCHAP], captive portals, and Enterprise EAP-TLS connectivity is currently not supported.



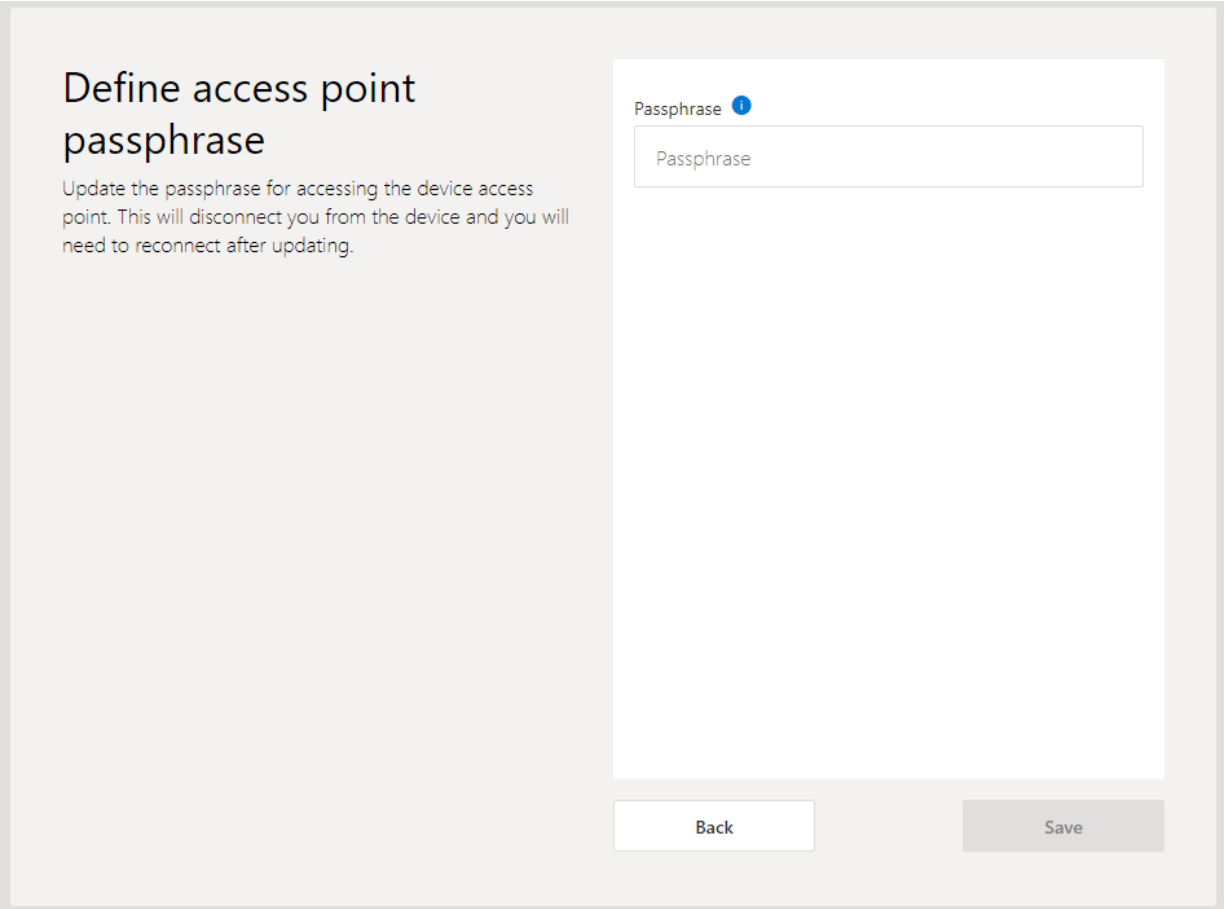
4. Write down the IP address you are shown once a connection is established. You will want to use this IP address after OOBE completes for viewing the Preview Video Output instead of 10.1.1.1:3000. You can also use this IP address for SSH sessions and connecting to OOBE. Once you've noted your IP address, navigate to the **Network connection** page.



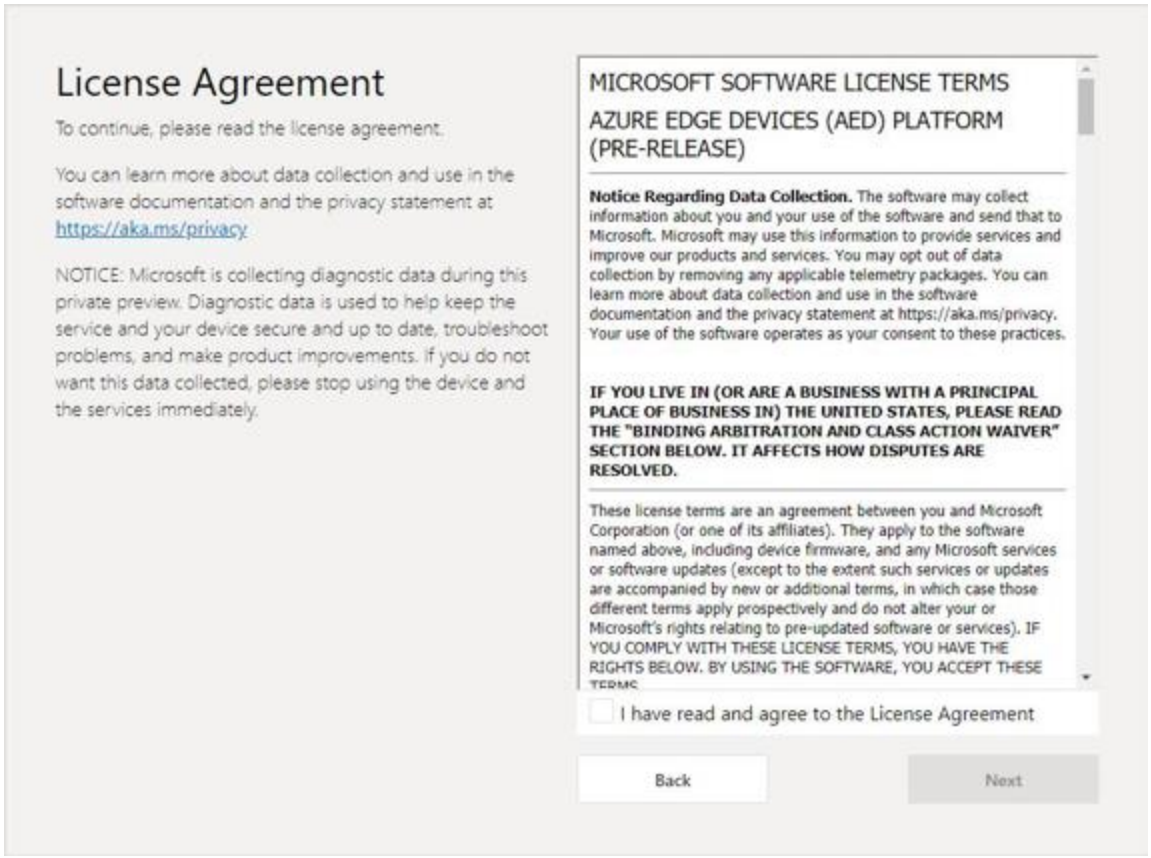
5. On the **Network connection** page, click **Access advanced network settings**.
6. On the **Advanced network settings** page, click **Define access point passphrase**.



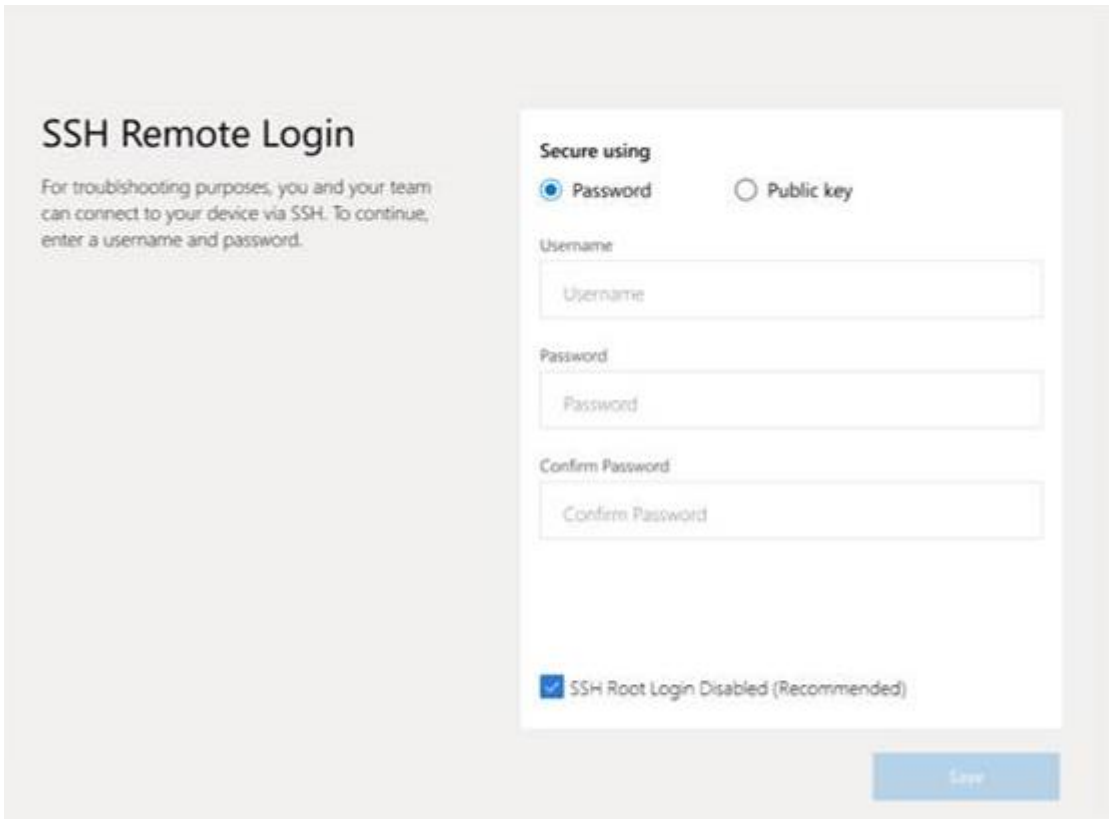
7. On the **Define access point passphrase** page, enter a passphrase/password for your device's SoftAP hotspot and click **Save**. After changing your password, you will be disconnected from the SoftAP and will need to reconnect your device to proceed with the OOBE. Instead of reconnecting to the SoftAP with your new password, we recommend connecting to either your Wi-Fi network that was set up in a previous step or over Ethernet. Once you are back on your home/office network, use the IP address you noted from above to restart OOBE (if connected over Ethernet, use the IP gathered from your router) and skip the Wi-Fi connection screen. To restart OOBE, open a browser and go to http://<your_devices_ip>:4242 or http://<your_devices_ip>, depending on your build.



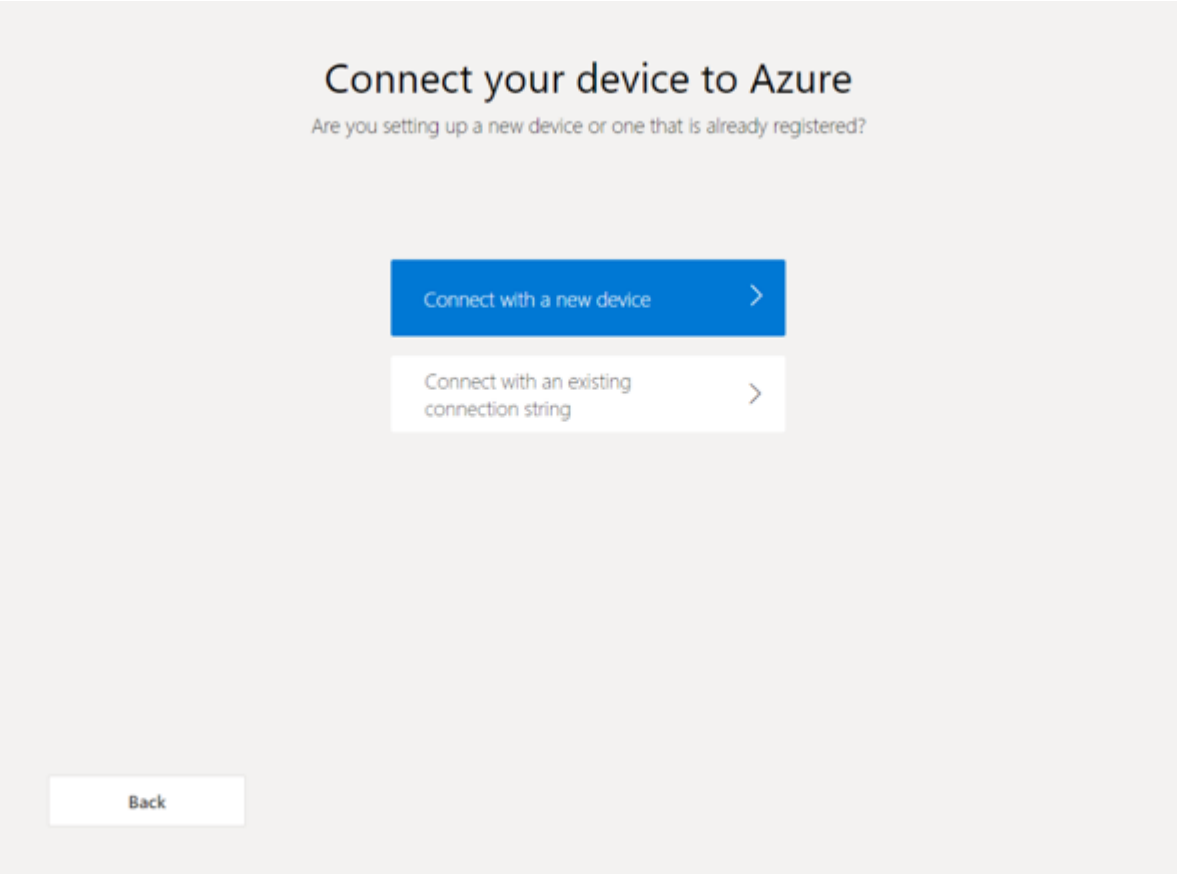
8. Read through the License Agreement, select **I have read and agree to the License Agreement**, and click **Next**.



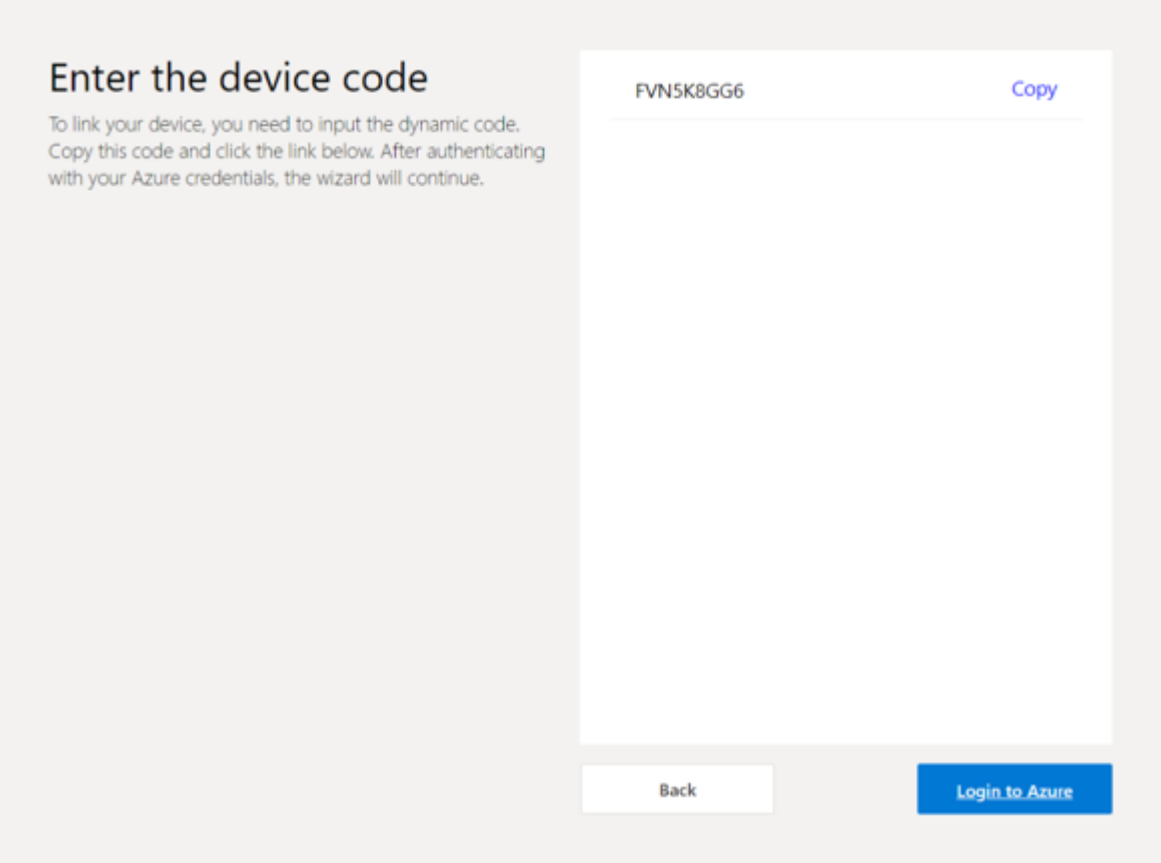
9. If you would like to set up SSH for remote access to your devkit, enter your SSH username and password. To disable the root SSH login (username = root, password = p@ssw0rd), check the box next to **SSH Root Login Disabled (Recommended)**. To prevent brute force security attacks, we recommend keeping SSH root login disabled. If you are an advanced user and choose to enable root login, please enable appropriate security measures for your deployment environment. Finally, click **Save**.



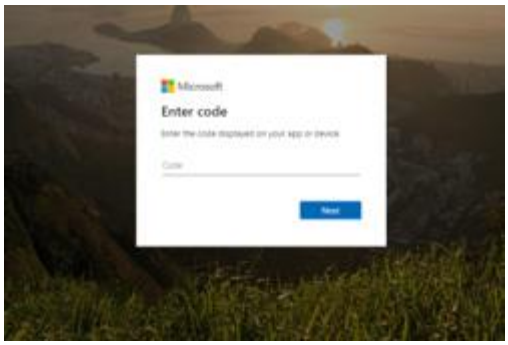
10. On the next screen, click **Connect with a new device** to begin the process of linking your devkit to Azure. To check your Azure subscription status go to https://ms.portal.azure.com/#home, then tap Subscriptions.



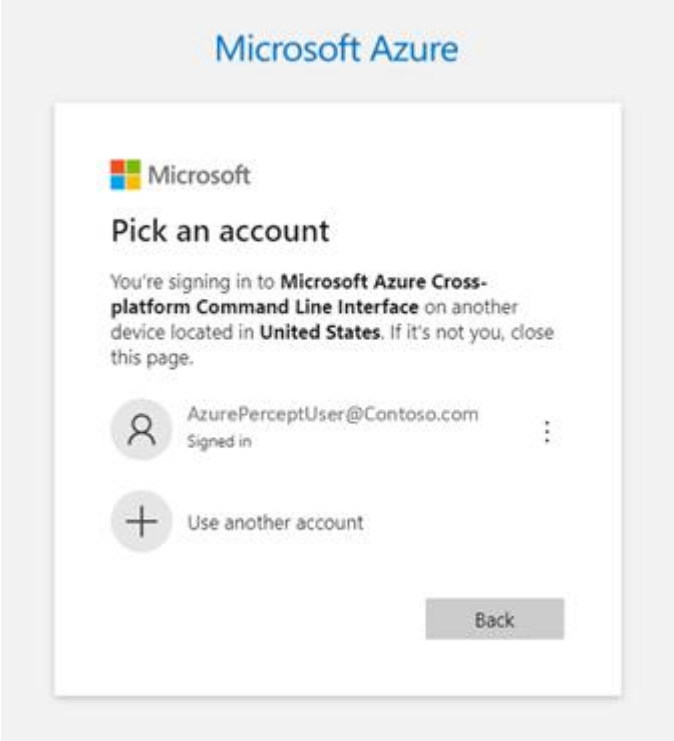
11. Click **Copy** to copy your device code (this may take a few seconds to generate). Once you have copied your device code, click **Login to Azure**, which opens a new browser tab.



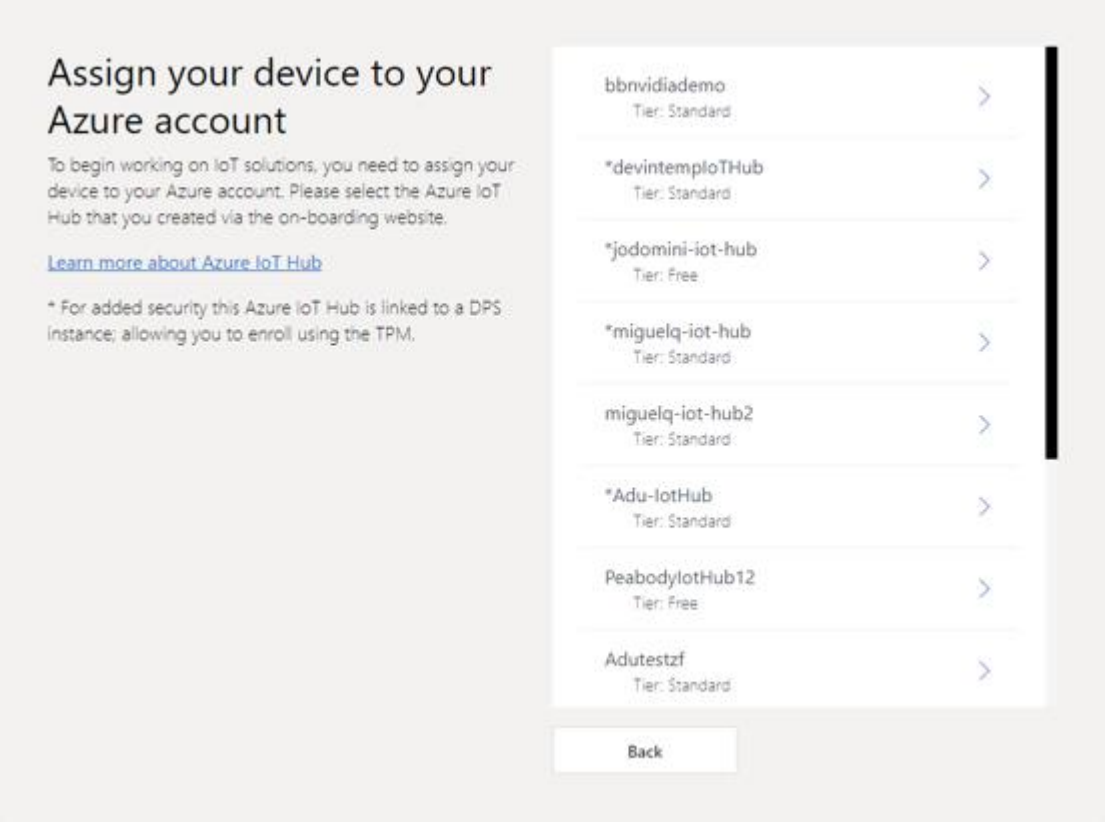
i. On the new browser tab, paste the device code you copied in the previous step into the window and click **Next**.



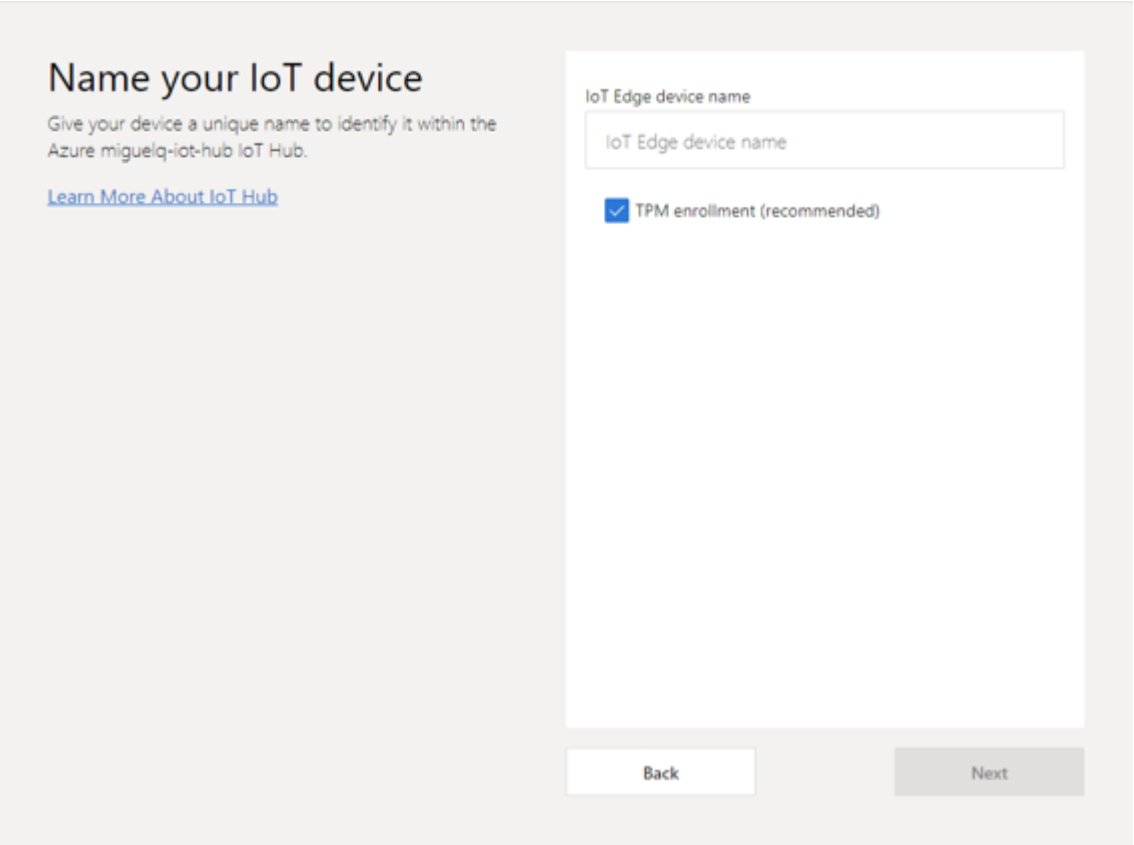
ii. Sign into your Azure account (the same account used during the onboarding process) and click **Next**. Navigate back to the OOBE window, which will show "Successfully Linked" once account sign-in is successful.



12. Select the IoT Hub you created during the onboarding process to assign it to your devkit. If you are not sure which IoT Hub was created during onboarding, please check the onboarding website.



13. Enter a device name for your devkit, check the TPM enrollment box, and click **Next**.



14. Congratulations! Your devkit has been successfully linked to your Azure account and Project Santa Cruz IoT Hub. You may now access your device within the Azure Portal. Before doing so, disconnect your computer from the devkit's SoftAP.

    [!NOTE] The Preview Video Output hyperlink on the final screen will no longer work once disconnected. Instead, use the IP address you wrote down in step 4 to preview the video output for the best streaming performance: http://<your_noted_IP_address>:3000. If you need to SSH into your devkit, use <your_noted_IP_address>.

Notes

1. To protect your security, after 30 minutes of inactivity, we stop the OOBE process (and we remove the port 80 allow rule). If this occurs, please restart the OOBE.
2. If at anytime during OOBE you see blue dots and then OOBE restarts, this is due to losing internet connectivity. Please verify you have a consistent internet connection.
3. During the WiFi connection, three blue dots will be shown. These will go away once the WiFi connection has been established.
4. Captive portal is not supported on IPV6
5. If you have added an IoT Hub outside of OOBE, please refresh the browser and wait a few minutes for it propogate on the IoT Hub screen.

Update your device's root SSH password

The root SSH password for your device (p@ssw0rd) will expire after 90 days. We recommend updating this password now to avoid any interruption to root SSH access.

1. SSH into your device with the root login:
    - User: root
    - Password: p@ssw0rd

2. You will be prompted to enter a new password, which must contain letters and numbers and be least 12 characters in length. Type your new password into the PuTTY terminal and hit **Enter**.
3. Write down your password in a safe place.
4. You are now free to close the PuTTY terminal.

Provide Feedback

After completing the OOBE, please provide feedback on your experience via this questionnaire. Your feedback will help us continue to fine-tune and improve the OOBE experience.

For more information on Project Santa Cruz Quests and to provide feedback on other experiences, please visit the test scenarios page.

Next Steps

You may now begin solution development with your Project Santa Cruz Development Kit. To get started, check out the no-code vision experience and no-code speech experience to create, train, and deploy simple AI models to your device.