

Application Note:

*Integrating xPico 200 Series
with Microsoft Azure*

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Contacts

Lantronix, Inc.
48 Discovery, Suite 250
Irvine, CA 92618, USA
Toll Free: 800-526-8766
Phone: 949-453-3990
Fax: 949-453-3995

Technical Support
Online: www.lantronix.com/support

Sales Offices
For a current list of our domestic and international sales offices, go to the Lantronix web site at www.lantronix.com/about/contact

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Revision History

Date	Rev.	Comments
June 2020	A	Initial document.
June 2021	B	Update openssl command to generate a private key.
June 2023	C	Fixed misspelling

For the latest revision of this product document, please check our online documentation at www.lantronix.com/support/documentation.

Contents

1 Overview	5
Prerequisites _____	5
2 Creating an IoT Hub in Microsoft Azure	6
3 Adding an xPico 200 Series Device to Azure IoT Hub	8
Adding a device using a SAS Token _____	8
Adding a device using a self-signed X.509 certificate _____	16
Adding a device using a CA-signed X.509 certificate _____	29
4 Calling Methods on an xPico 200 Series Device	41
Examples _____	41
ltrx_import_xml_config _____	41
ltrx_trusted_import_xml_config _____	43
ltrx_read_xml_status _____	44
ltrx_read_xml_config _____	45
ltrx_trusted_import_xml_config _____	46

1 Overview

This application note describes how to integrate an xPico 200 series device with Microsoft Azure. The Microsoft Azure service and the Azure portal may change. This document serves as an example but may not be up to date. Refer to the [Microsoft Azure documentation](#) for updated Azure instructions.

You can add a device to an IoT Hub in Azure using either a SAS Token, a self-signed X.509 certificate, or a CA-signed X.509 certificate. This document describes how to create an IoT Hub in Azure, the methods for adding a device, and examples for calling methods on an xPico 200 series device using the Device Explorer tool from the Azure IoT SDK.

Prerequisites

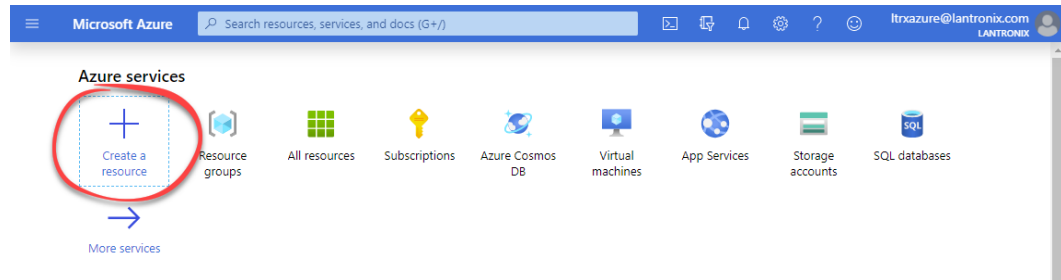
You will need the following software:

- Visual Studio Code: <https://code.visualstudio.com/download>
- Azure IoT Tools for Visual Studio Code: <https://marketplace.visualstudio.com/items?itemName=vsciot-vscode.azure-iot-tools>
- Device Explorer: <https://github.com/Azure/azure-iot-sdks/releases>
- D-TRUST.pem, DigiCert.pem, and baltimore-ca.pem: <https://github.com/Azure/azure-iot-sdk-c/tree/master/certs> (for the self-signed X.509 method)
- Certificate Authority files: <https://github.com/Azure/azure-iot-sdk-c/tree/master/tools/CACertificates> (for the CA-signed X.509 method)

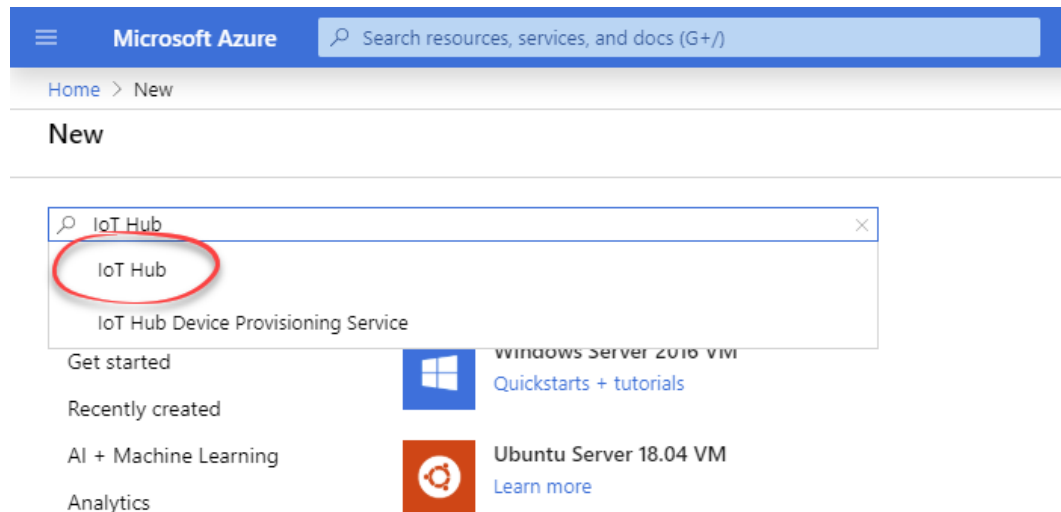
2 Creating an IoT Hub in Microsoft Azure

To create an IoT Hub in Microsoft Azure:

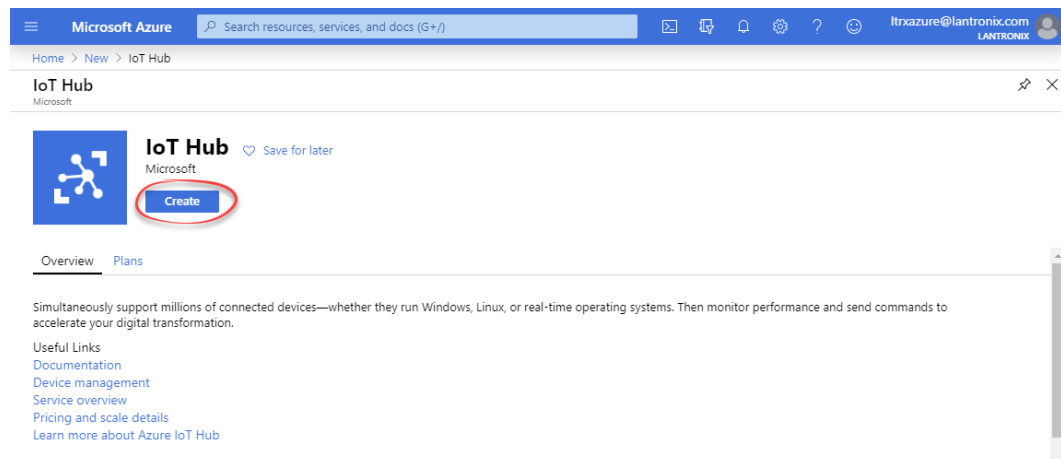
1. Sign in to the Azure portal at <https://portal.azure.com/>.
2. Click **Create a resource**.



3. In the **Search the Marketplace** field, type “IoT Hub” and select it from the results.



4. Click **Create**.



5. On the **Basics** tab, select a **Subscription**, select a **Resource Group** or create a

new one by clicking **Create new** and typing a name, select a **Region**, and enter a globally unique **IoT Hub Name**. This information will be publicly available, so do not use private information.

6. Click **Next: Size and scale**.

The screenshot shows the 'Next: Size and scale' step of the IoT Hub creation wizard. The 'Basics' tab is selected, and the 'Size and scale' sub-tab is active. The form contains the following fields:

- Subscription**: Pay-As-You-Go
- Resource group**: LtrnHub (with a 'Create new' link below it)
- Region**: West US
- IoT hub name**: LtrnDevice

At the bottom, there are three buttons: 'Review + create', '< Previous', and 'Next: Size and scale >'. The 'Next: Size and scale >' button is circled in red.

7. On the **Size and scale** tab, select a **Pricing and scale tier**, specify the **IoT Hub units**, and under **Advanced Settings**, choose the number of **Device-to-cloud partitions** (most likely four).

8. Click **Review + create**.

The screenshot shows the 'Review + create' step of the IoT Hub creation wizard. The 'Size and scale' tab is selected. The form contains the following fields:

- Scale tier and units**:
 - Pricing and scale tier**: S1: Standard tier
 - Number of S1 IoT hub units**: 1 (with a slider and a note: 'Determines how your IoT hub can scale. You can change this later if your needs increase.') and a 'Learn how to choose the right IoT hub tier for your solution' link.
- Azure Security Center**: On (with a 'Learn more' link).

At the bottom, there are three buttons: 'Review + create', '< Previous: Basics', and 'Next: Tags >'. The 'Review + create' button is circled in red.

Setting	Value	Setting	Value
Pricing and scale tier	S1	Device-to-cloud-messages	Enabled
Messages per day	400,000	Message routing	Enabled
Cost per month	25.00 USD	Cloud-to-device commands	Enabled

3 Adding an xPico 200 Series Device to Azure IoT Hub

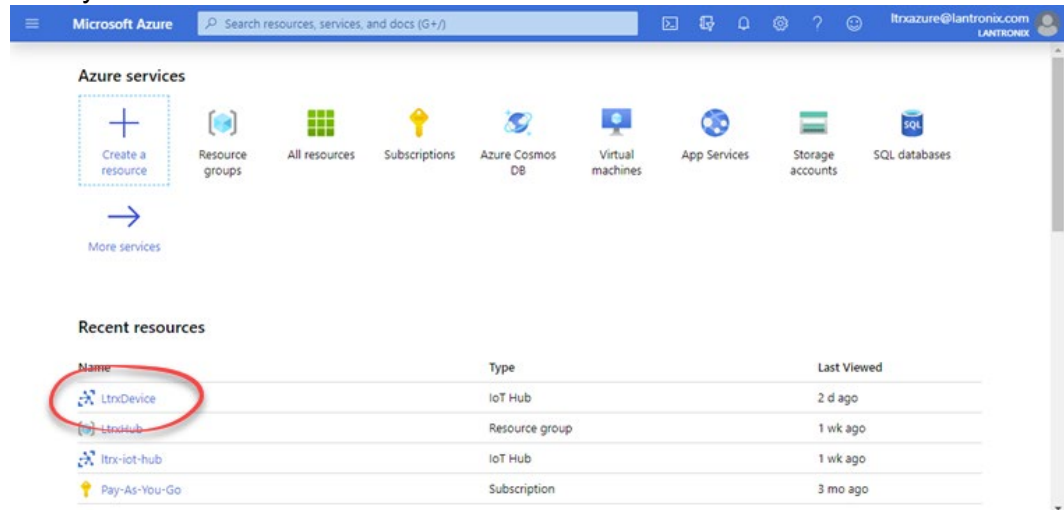
Use one of the methods described in this section to add the xPico 200 device to your IoT Hub in Microsoft Azure.

Adding a device using a SAS Token

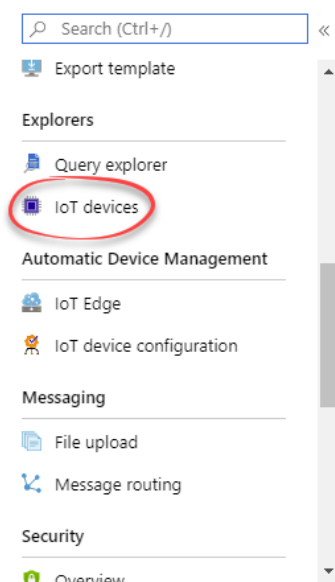
To add a device:

STEP 1. Create a device in your IoT Hub

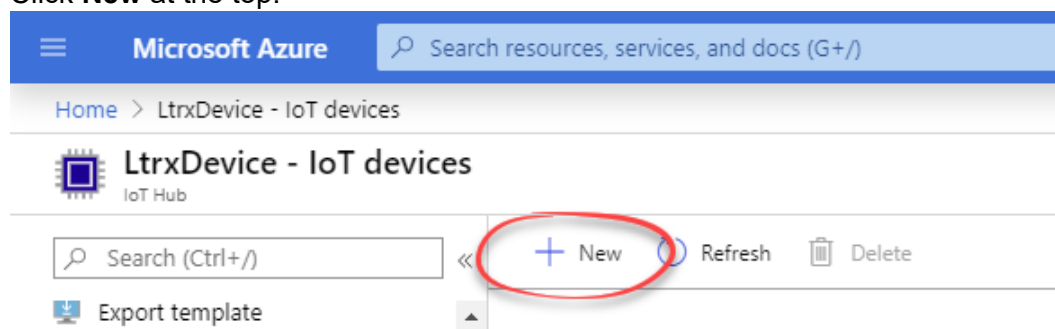
1. Log in to <https://portal.azure.com>.
2. Click **Home** if you are not already at the home page.
3. Click your **IoT Hub**.



4. On the left, click **IoT devices**.



5. Click **New** at the top.



6. Enter a unique name for the device in **Device ID**. Under **Authentication type**, select **Symmetric key**. Leave **Auto-generate keys** checked. Leave **Connect this device to an IoT hub** set to **Enable**. Click **Save**.

Create a device

Find Certified for Azure IoT devices in the Device Catalog

Device ID *

Authentication type ☐ Symmetric key ☐ X.509 Self-Signed ☐ X.509 CA Signed

Primary key

Secondary key

Auto-generate keys ☒

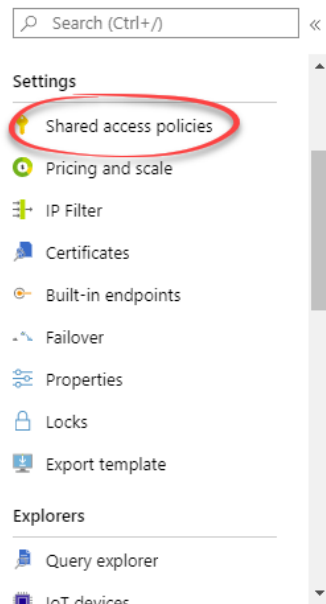
Connect this device to an IoT hub ☐ Enable ☐ Disable

Parent device **No parent device**
[Set a parent device](#)

Save

7. Click **Home**.
8. Click your **IoT Hub**.

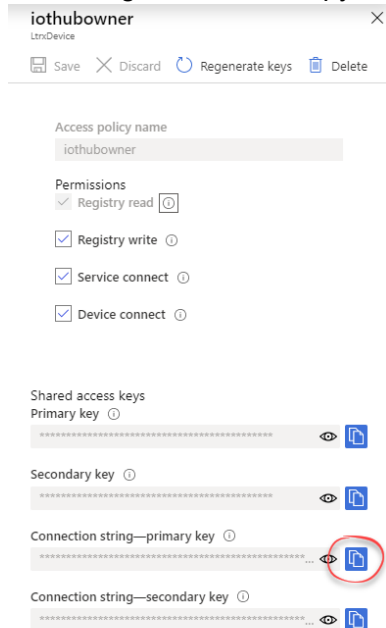
9. Click **Shared access policies** on the left.



10. Under **Policy**, click **iothubowner**.

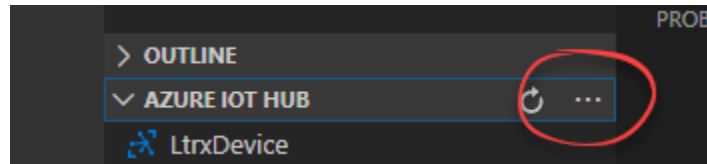
Search to filter items...	
Policy	Permissions
iothubowner	registry write, service connect, device connect
service	service connect
device	device connect
registryRead	registry read
registryReadWrite	registry write

11. On the right, click the copy button next to **Connection string – primary key**.

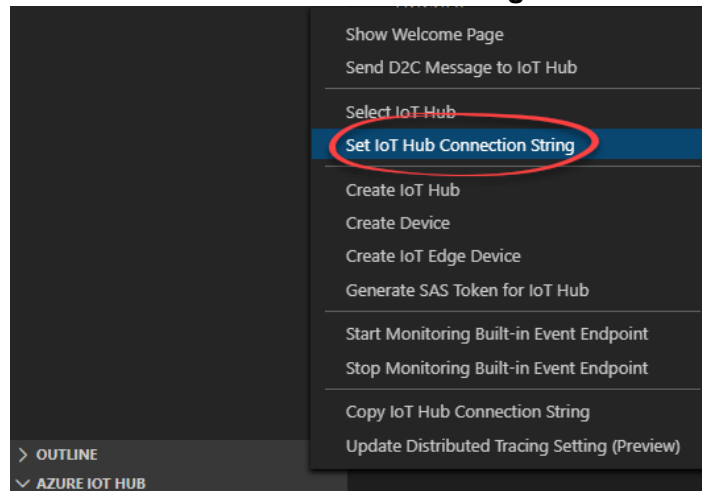


STEP 2. Generate a SAS Token for the device.

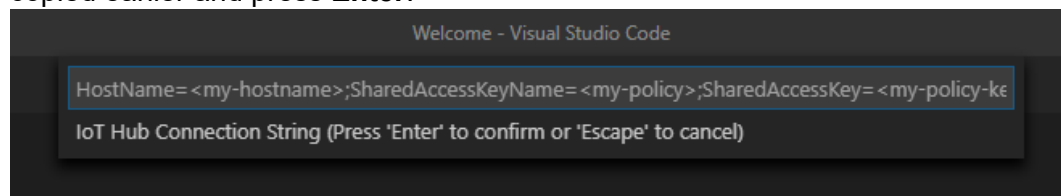
1. Open **Visual Studio Code** with Azure IoT Tools installed.
2. If you are not signed in to Azure, you will be prompted to sign in to Azure and select a subscription.
3. In the bottom-left, click **AZURE IOT HUB** and then click the menu button.



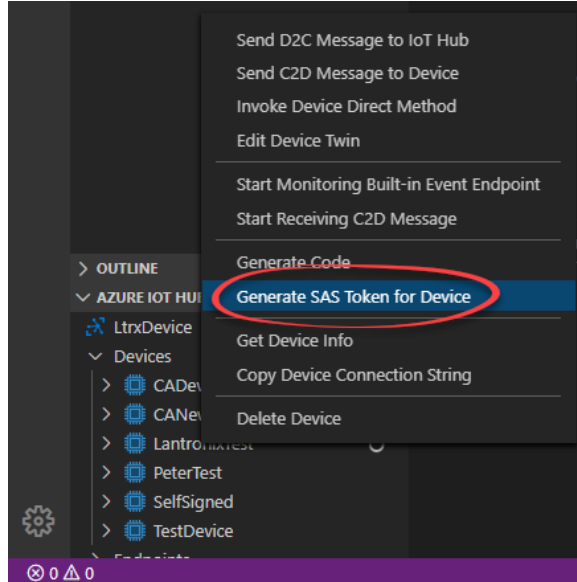
4. Select **Set IoT Hub Connection String**.



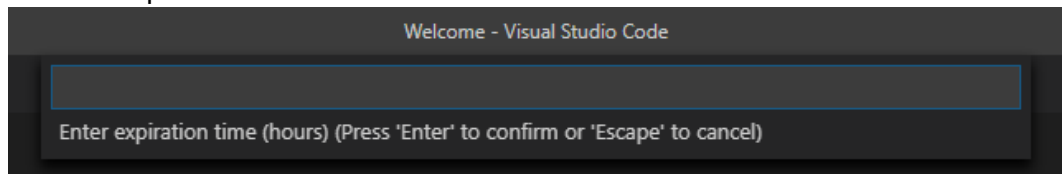
5. A prompt will appear at the top of the window. Enter the connection string you copied earlier and press **Enter**.



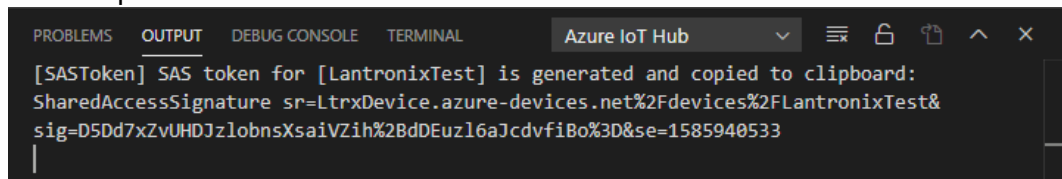
- A device list will be shown under AZURE IOT HUB. Right-click the device you created and select **Generate SAS Token for Device**.



- A prompt will appear at the top of the window. Specify the expiration time in hours and press **Enter**.



- The SAS Token will be generated, shown in the output, and automatically copied to the clipboard.

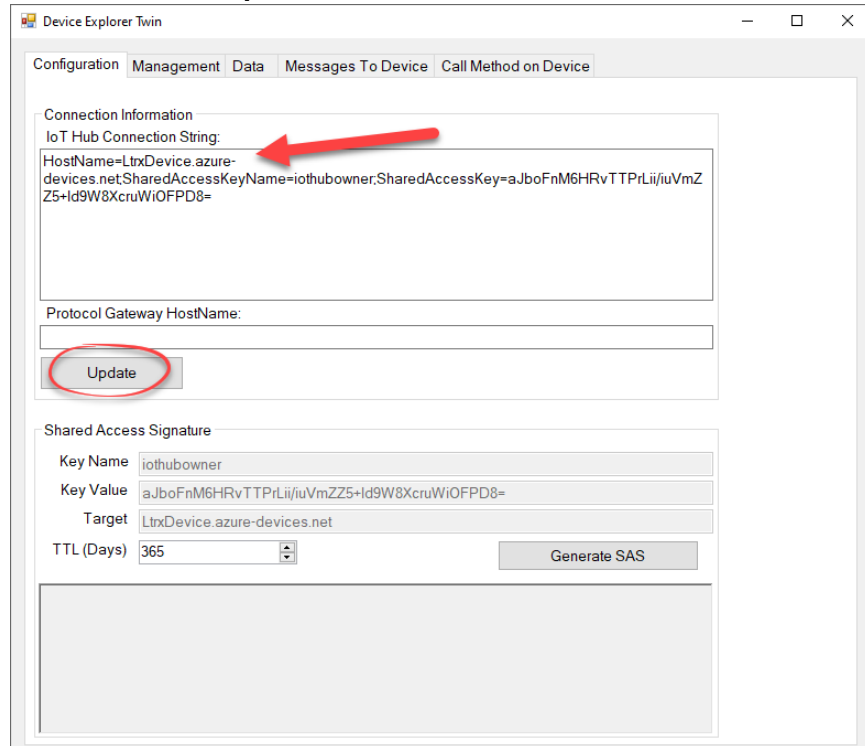


STEP 3. Configure the xPico 200 series device via Web Manager or CLI

- Set the **Line 1 protocol** to Azure IoT.
- Set the Azure Configuration as follows:
State: Enabled
Hub Name: The name of the IoT Hub in Azure
Device ID: The Device ID set in Azure when the device was created
Security: Security Keys
SAS Token: The SAS Token generated in Visual Studio Code
MQTT Local Port: <Random>

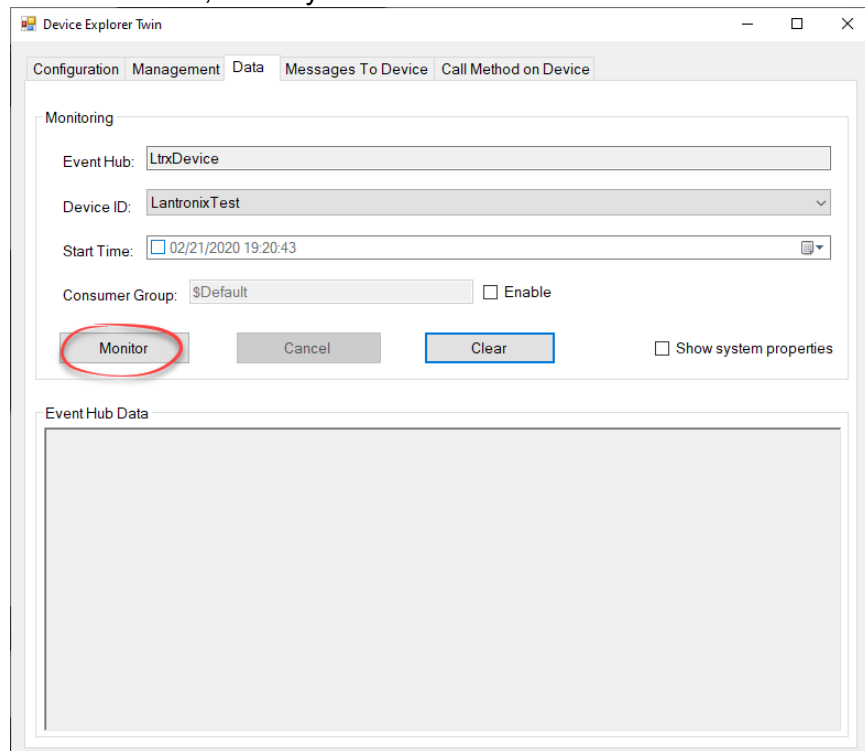
STEP 4. Test the integration

1. Using TeraTerm, connect to the xPico 200 series device via serial connection on line 1.
2. Click **Setup > Terminal**.
3. Under **New-line**, set **Receive** and **Transmit** to **LF** and click **OK**.
4. Open **Device Explorer**.
5. Under **IoT Hub Connection String**, paste the connection string you obtained earlier and click **Update**.

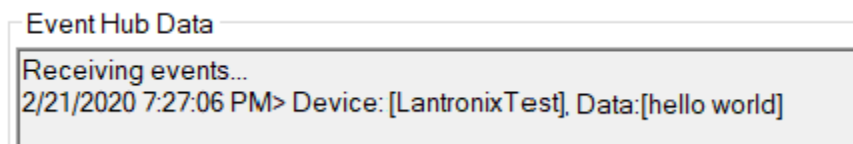


The screenshot shows the 'Device Explorer Twin' window with the 'Configuration' tab selected. The 'IoT Hub Connection String' section is highlighted with a red arrow pointing to the text box containing the connection string: `HostName=LtrxDevice.azure-devices.net;SharedAccessKeyName=iothubowner;SharedAccessKey=aJboFnM6HRvTTPrLii/iuVmZ5+Id9W8XcruWiOFPD8=`. Below this, the 'Protocol Gateway HostName' field is empty. The 'Update' button is circled in red. The 'Shared Access Signature' section below shows the 'Key Name' as 'iothubowner', 'Key Value' as 'aJboFnM6HRvTTPrLii/iuVmZZ5+Id9W8XcruWiOFPD8=', 'Target' as 'LtrxDevice.azure-devices.net', and 'TTL (Days)' as '365'. A 'Generate SAS' button is also present.

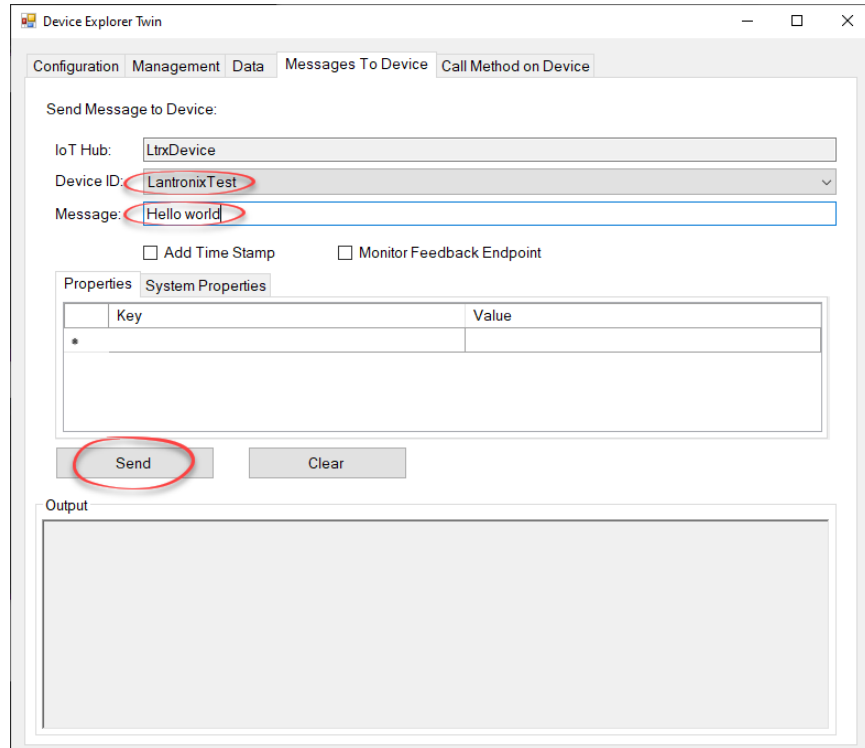
6. In the **Data** tab, select your device next to **Device ID** and click **Monitor**.



7. In TeraTerm, type some characters and hit **Enter**. The data will appear under **Event Hub Data** in Device Explorer.



8. In the **Messages To Device** tab, select your device next to **Device ID**, type some characters next to **Message**, and click **Send**. The data will appear in TeraTerm.



Adding a device using a self-signed X.509 certificate

To add a device:

STEP 1. Create a self-signed certificate

1. Open a Linux, CygWin, or MinGW terminal.
2. Generate an openssl private key.

```
$ openssl req -x509 -newkey rsa:4096 -nodes -keyout key.pem -out cert.pem -days 365
```

Generating a 4096 bit RSA private key

.....++

.....++

writing new private key to 'key.pem'

You are about to be asked to enter information that will be incorporated into your certificate request.

What you are about to enter is what is called a Distinguished Name or a DN.

There are quite a few fields but you can leave some blank

For some fields there will be a default value,

If you enter '.', the field will be left blank.

3. Generate a certificate signing request (CSR).

```
$ openssl req -new -key server.key -out server.csr
```

Enter pass phrase for server.key:

You are about to be asked to enter information that will be incorporated into your certificate request.

What you are about to enter is what is called a Distinguished Name or a DN.

There are quite a few fields but you can leave some blank

For some fields there will be a default value,

If you enter '.', the field will be left blank.

Country Name (2 letter code) [AU]:US

State or Province Name (full name) [Some-State]:CA

Locality Name (eg, city) []:Irvine

Organization Name (eg, company) [Internet Widgits Pty Ltd]:Lantronix

Organizational Unit Name (eg, section) []:Engineering

Common Name (e.g. server FQDN or YOUR name) []:<device IP address>

Email Address []:

Please enter the following 'extra' attributes

to be sent with your certificate request

A challenge password []:<secret>

An optional company name []:

4. Remove the passphrase from the key.

```
$ cp server.key server.key.org
```

```
$ openssl rsa -in server.key.org -out server.key
```

Enter pass phrase for server.key.org:

writing RSA key

5. Generate a self-signed certificate.

```
$ openssl x509 -req -days 365 -in server.csr -signkey server.key -out server.pem
```

Signature ok

subject=/C=US/ST=CA/L=Irvine/O=Lantronix/OU=Engineering/CN=<device IP address>

Getting Private key

STEP 2. Configure the xPico 200 series device via Web Manager or CLI

1. Create a new TLS Credential.

2. Set the **Private Key** to the contents of server.key, which can be opened with a text editor such as Notepad. Include both the beginning and ending lines as well:

-----BEGIN RSA PRIVATE KEY-----

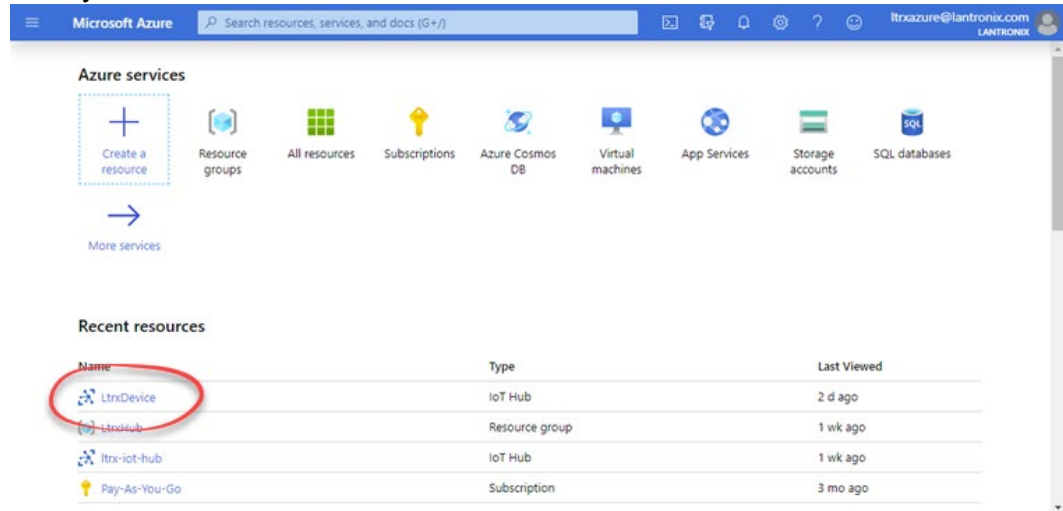
<Your base64 encoded private key will be in here.>
-----END RSA PRIVATE KEY-----

3. Set the **Certificate** to the contents of server.pem, which can be opened with a text editor such as Notepad. Include both the beginning and ending lines as well:

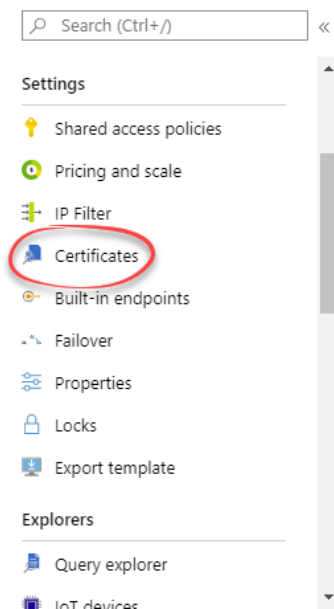
-----BEGIN CERTIFICATE-----
<Your base64 encoded certificate will be in here.>
-----END CERTIFICATE-----

STEP 3. Register the X.509 self-signed certificates to your IoT Hub

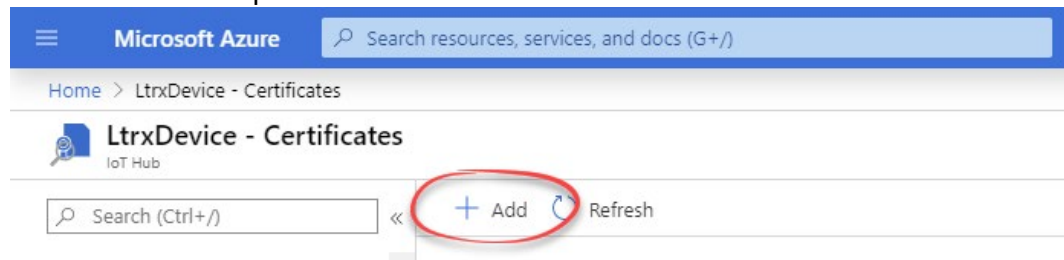
1. Log in to <https://portal.azure.com>.
2. Click **Home** if you are not already at the home page.
3. Click your **IoT Hub**.



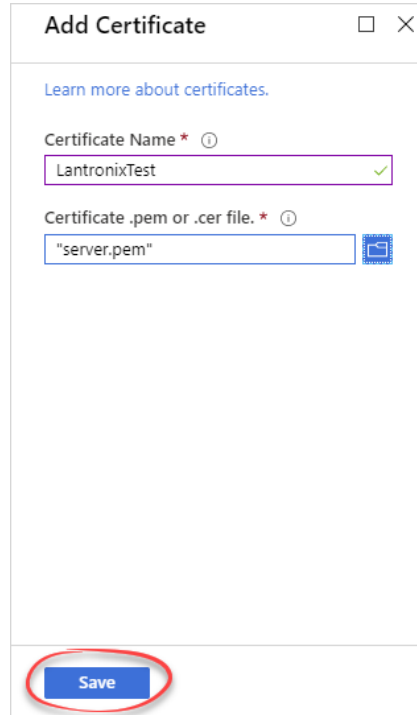
4. Click **Certificates** on the left.



5. Click **Add** at the top.

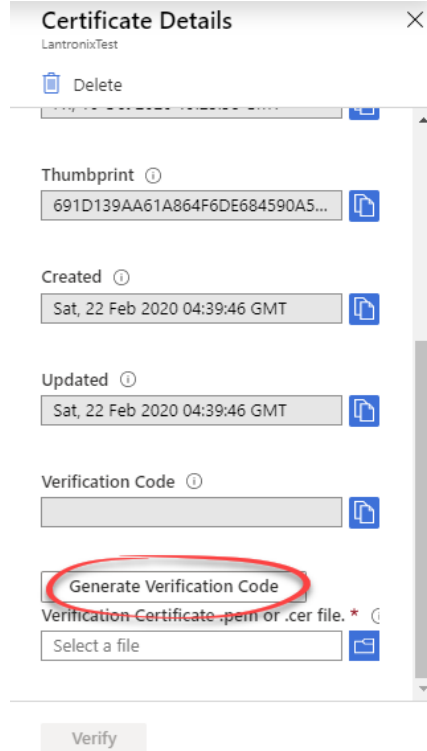


6. Enter a certificate name, select your **server.pem** file, and click **Save**.

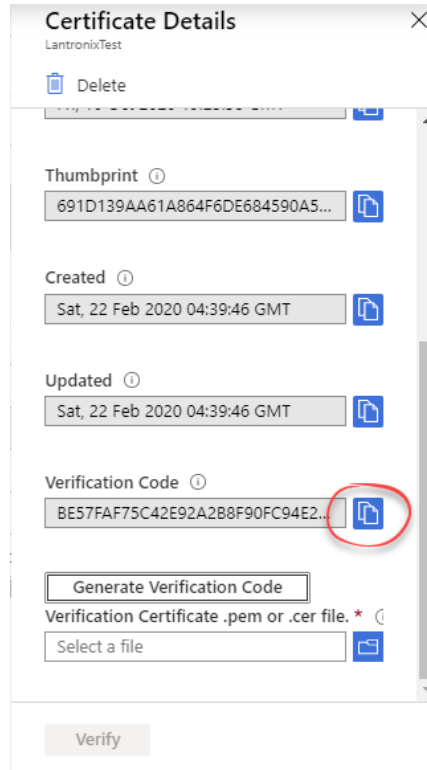


7. Click the certificate you created to open Certificate Details on the right.

8. Under **Verification Code**, click **Generate Verification Code** to generate a Verification Code.



9. Next to the Verification Code, click the **blue copy button** to copy the code.



10. In a Linux, CygWin, or MinGW terminal, create the verification key.
\$ openssl genrsa -out verification.key 2048
11. Create the verification certificate using the verification key.
\$ openssl req -new -key verification.key -out verification.csr
12. Specify the verification code copied previously when prompted.
13. Create the proof of possession certificate using the verification certificate.
\$ openssl x509 -req -in verification.csr -CA server.pem -CAkey server.key -CAcreateserial -out verificationCert.pem -days 1024 -sha256
14. In the Certificate Details panel in Azure Portal, upload **verificationCert.pem** and click **Verify**.

Certificate Details X

LantronixTest

Delete

Thumbprint ⓘ

691D139AA61A864F6DE684590A5...

Created ⓘ

Sat, 22 Feb 2020 04:39:46 GMT

Updated ⓘ

Sat, 22 Feb 2020 04:39:46 GMT

Verification Code ⓘ

BE57FAF75C42E92A2B8F90FC94E2...

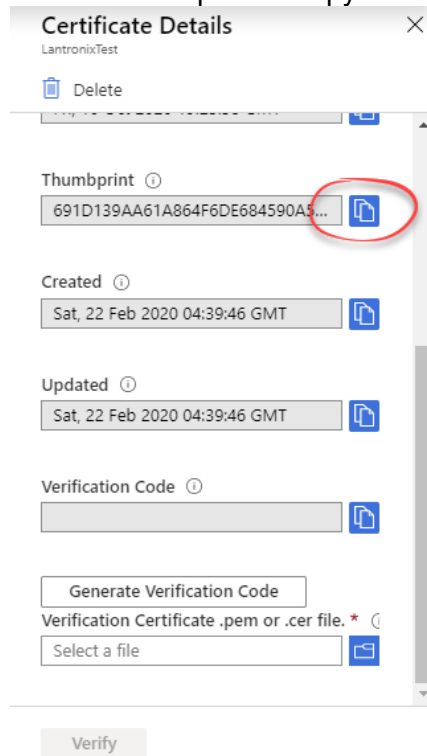
Generate Verification Code

Verification Certificate .pem or .cer file *

verificationCert.pem

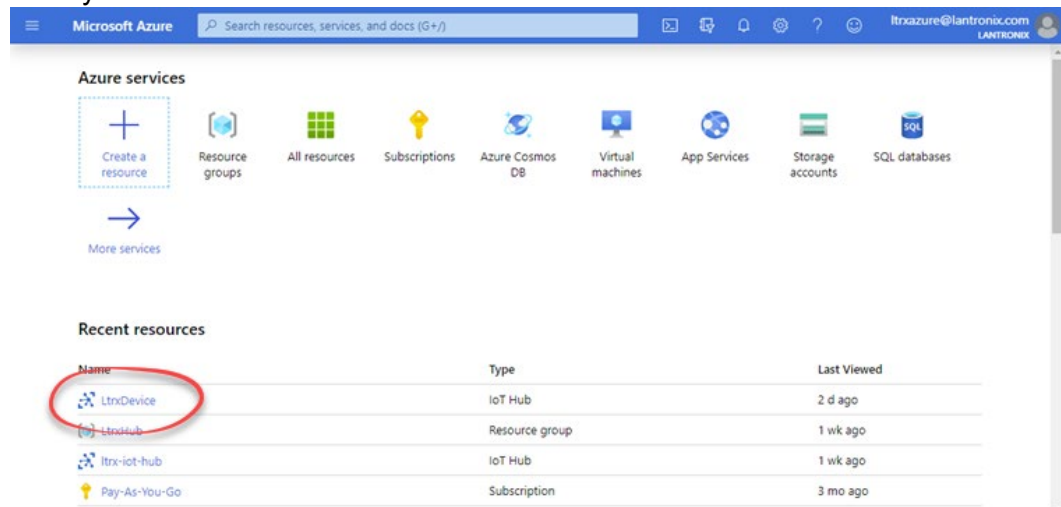
Verify

15. Click the certificate you created. In Certificate Details, click the **blue copy button** next to Thumbprint to copy the thumbprint.

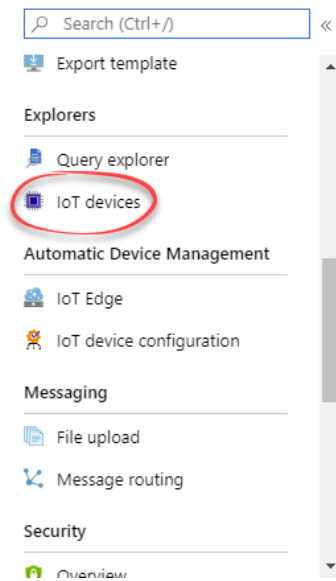


STEP 4. Create a device in your IoT Hub

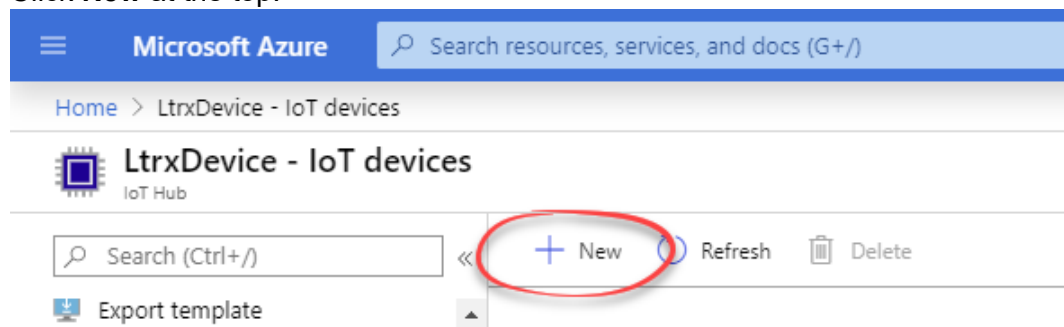
1. Click **Home** if you are not already at the home page.
2. Click your **IoT Hub**.



3. On the left, click **IoT devices**.



4. Click **New** at the top.



5. Enter a unique name for the device in **Device ID**. Under **Authentication type**, select **X.509 Self-Signed**. Paste the thumbprint you copied earlier under **Primary Thumbprint** and **Secondary Thumbprint**. Leave **Connect this device to an IoT hub** set to **Enable**. Click **Save**.

Home > LtrxDevice - IoT devices > Create a device

Create a device

Find Certified for Azure IoT devices in the Device Catalog

Device ID * ⓘ
LantronixTest ✓

Authentication type ⓘ
Symmetric key X.509 Self-Signed X.509 CA Signed

Primary Thumbprint * ⓘ
691D139AA61A864F6DE684590A5228166FD22B80 ✓

Secondary Thumbprint * ⓘ
691D139AA61A864F6DE684590A5228166FD22B80 ✓

Connect this device to an IoT hub ⓘ
Enable Disable

Parent device ⓘ
No parent device
[Set a parent device](#)

Save

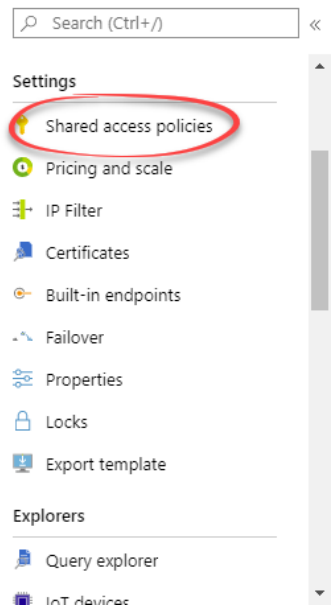
STEP 5. Configure the xPico 200 series device via Web Manager or CLI

1. Create a new TLS Credential.
2. Set the **Private Key** to the contents of server.key, which can be opened with a text editor such as Notepad.
3. Set the **Certificate** to the contents of server.pem, which can be opened with a text editor such as Notepad.
4. Set **Trusted Authority 1** to the contents of D-TRUST.PEM, **Trusted Authority 2** to the contents of DigiCert.pem, and **Trusted Authority 3** to the contents of baltimore-ca.pem.
5. Set the **Line 1 protocol** to Azure IoT.
6. Set the Azure Configuration as follows:
State: Enabled
Hub Name: The name of the IoT Hub in Azure
Device ID: The Device ID set in Azure when the device was created

Security: X.509
Credential Name: <the name of the TLS credential>
MQTT Local Port: <Random>

STEP 6. Obtain the connection string

- 1. In Azure Portal, click **Home**.
- 2. Click your **IoT Hub**.
- 3. Click **Shared access policies** on the left.



- 4. Under **Policy**, click **iothubowner**.

Search to filter items...	
Policy	Permissions
iothubowner	registry write, service connect, device connect
service	service connect
device	device connect
registryRead	registry read
registryReadWrite	registry write

5. On the right, click the copy button next to **Connection string – primary key**

iothubowner
LtnDevice

Save Discard Regenerate keys Delete

Access policy name
iothubowner

Permissions

- ☒ Registry read ⓘ
- ☒ Registry write ⓘ
- ☒ Service connect ⓘ
- ☒ Device connect ⓘ

Shared access keys

Primary key ⓘ

Secondary key ⓘ

Connection string—primary key ⓘ

Connection string—secondary key ⓘ

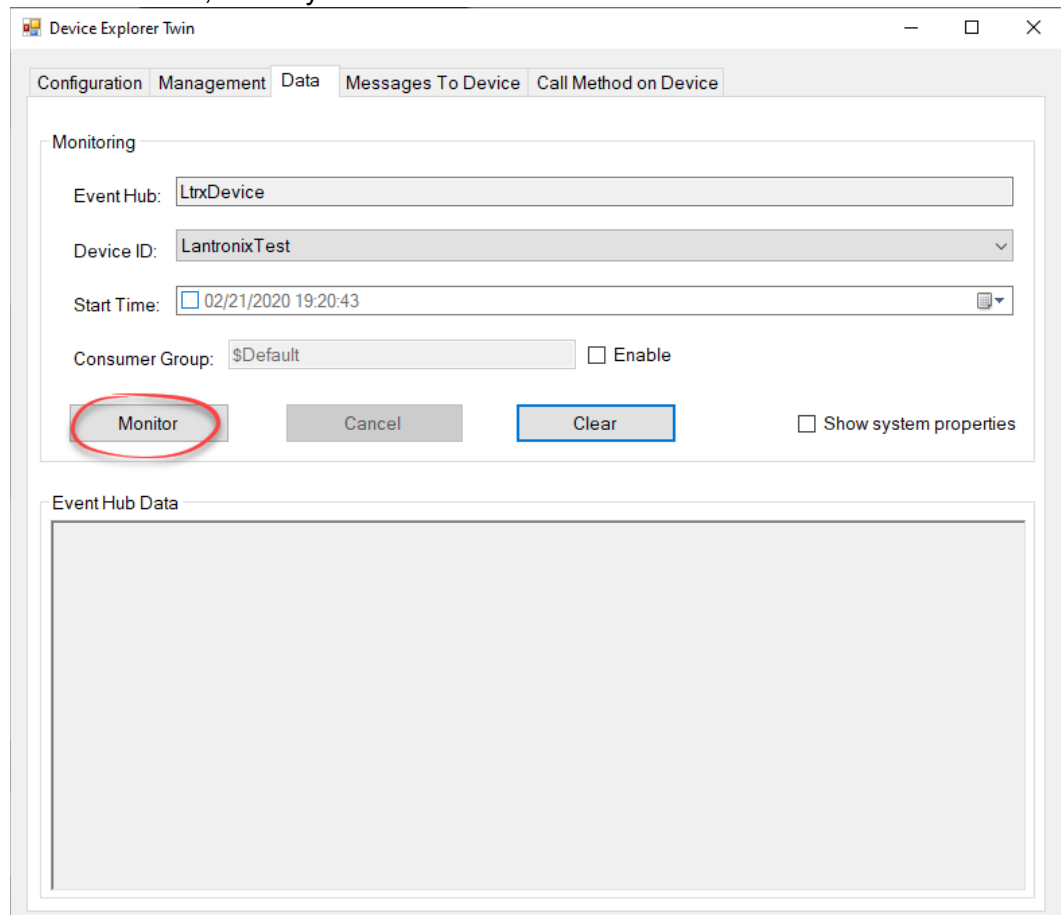
STEP 7. Test the integration

1. Using TeraTerm, connect to the xPico 200 series device via serial connection on line 1.
2. Click **Setup > Terminal**.
3. Under **New-line**, set **Receive** and **Transmit** to **LF** and click **OK**.
4. Open **Device Explorer**.

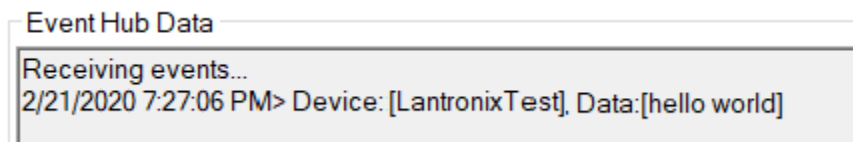
5. Under **IoT Hub Connection String**, paste the connection string you obtained earlier and click **Update**.

The screenshot shows the 'Device Explorer Twin' application window. The 'Configuration' tab is selected, displaying the 'Connection Information' section. The 'IoT Hub Connection String' field contains the text: `HostName=LtrxDevice.azure-devices.net;SharedAccessKeyName=iothubowner;SharedAccessKey=aJboFnM6HRvTTPrLii/iuVmZZ5+Id9W8XcruWiOFPD8=`. A red arrow points to this text. Below this, the 'Protocol Gateway HostName' field is empty. The 'Update' button is circled in red. The 'Shared Access Signature' section below contains fields for 'Key Name' (iothubowner), 'Key Value' (aJboFnM6HRvTTPrLii/iuVmZZ5+Id9W8XcruWiOFPD8=), 'Target' (LtrxDevice.azure-devices.net), and 'TTL (Days)' (365). A 'Generate SAS' button is also present.

6. In the **Data** tab, select your device next to **Device ID** and click **Monitor**.



7. In TeraTerm, type some characters and hit **Enter**. The data will appear under **Event Hub Data** in Device Explorer.



8. In the **Messages To Device** tab, select your device next to **Device ID**, type some characters next to **Message**, and click **Send**. The data will appear in TeraTerm.

Device Explorer Twin

Configuration Management Data Messages To Device Call Method on Device

Send Message to Device:

IoT Hub: LtrxDevice

Device ID: LantronixTest

Message: Hello world

☐ Add Time Stamp ☐ Monitor Feedback Endpoint

Properties System Properties

Key	Value
*	

Send Clear

Output

Adding a device using a CA-signed X.509 certificate

To add a device:

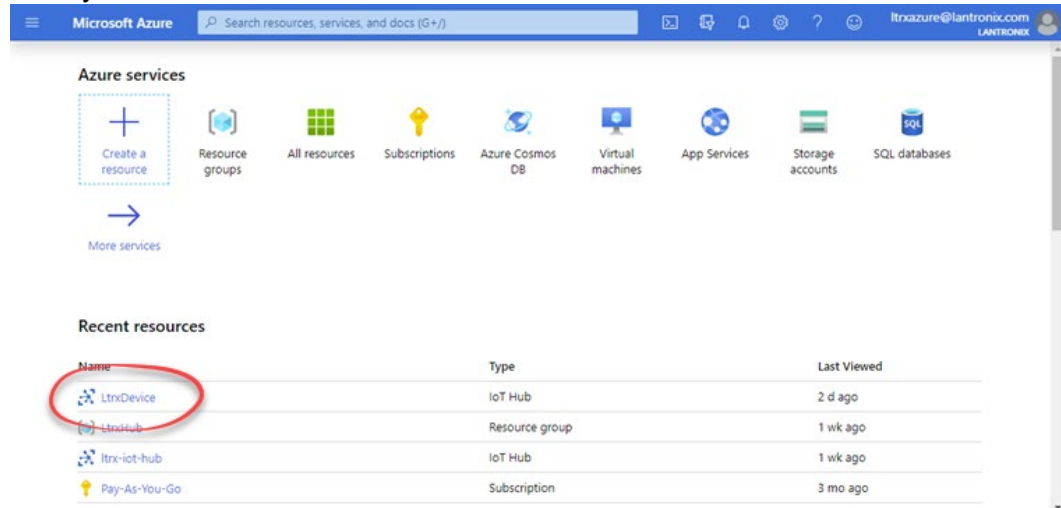
STEP 1. Generate the root and intermediate certificates

1. Download all files from <https://github.com/Azure/azure-iot-sdk-c/tree/master/tools/CACertificates>.
2. Open a Linux, CygWin, or MinGW terminal.
3. Go to the directory storing the files that you downloaded.
4. Set certGen.sh as an executable.
chmod +x certGen.sh
5. Create the root and intermediate certificates using the following command:
./certGen.sh create_root_and_intermediate

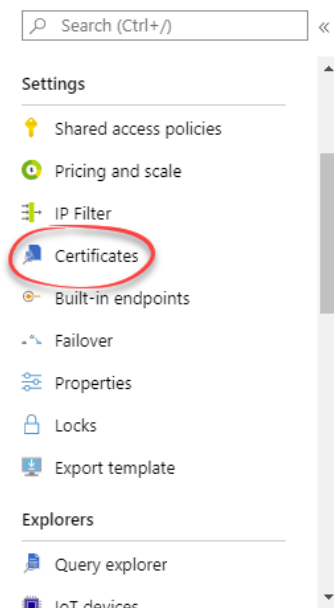
STEP 2. Register the certificates to your IoT Hub

1. Log in to <https://portal.azure.com>.

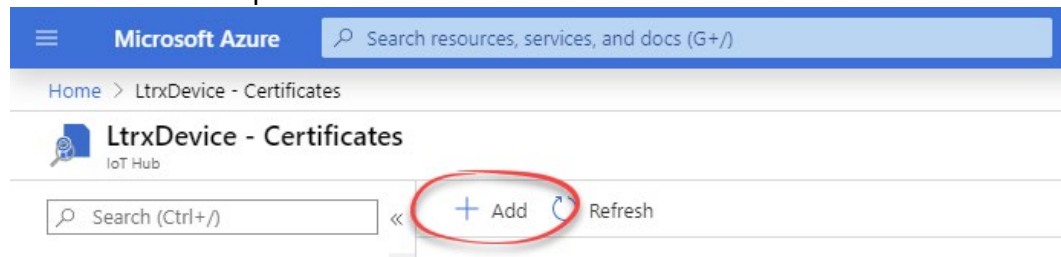
2. Click **Home** if you are not already at the home page.
3. Click your **IoT Hub**.



4. Click **Certificates** on the left.



5. Click **Add** at the top.



6. Enter a certificate name, select your **azure-iot-test-only.root.ca.cert.pem** file, and click **Save**.

Add Certificate □ ×

[Learn more about certificates.](#)

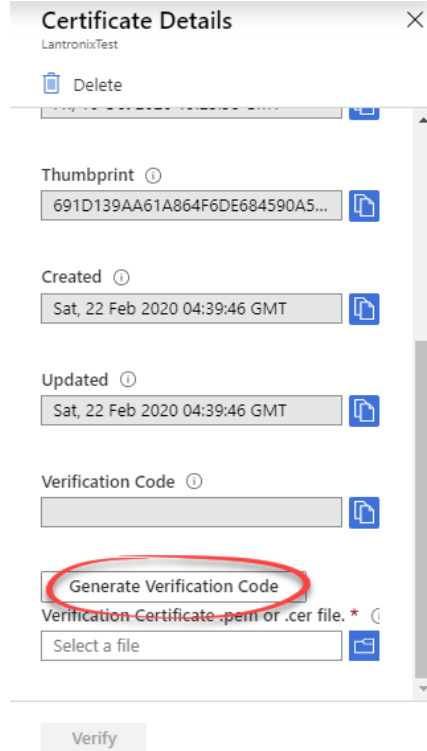
Certificate Name * ⓘ
LantronixTest ✓

Certificate .pem or .cer file. * ⓘ
"azure-iot-test-only.root.ca.cert.pem" 📎

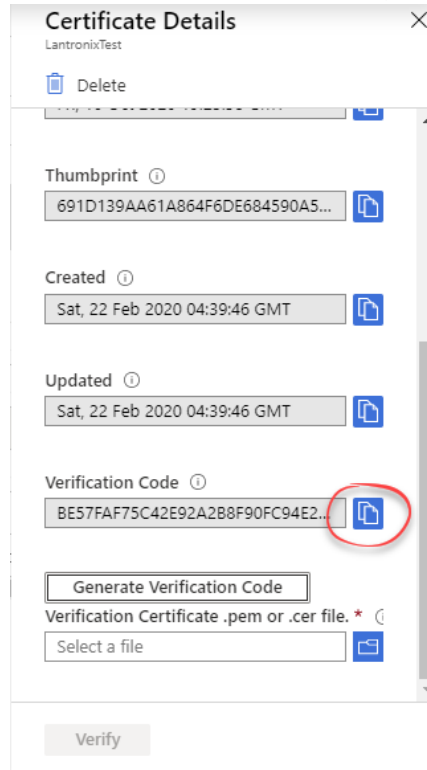
Save

7. Click the certificate you created to open Certificate Details on the right.

8. Under **Verification Code**, click **Generate Verification Code** to generate a Verification Code.



9. Next to the Verification Code, click the **blue copy button** to copy the code.



10. From the terminal used earlier, generate the verification certificate.
./certGen.sh create_verification_certificate <Verification Code copied in the previous step>
11. In the Certificate Details panel in Azure Portal, upload **verification-code.cert.pem** and click **Verify**.

Certificate Details X

LantronixTest

Delete

Subject ⓘ

ENG

Expiry ⓘ

Fri, 16 Oct 2020 19:25:58 GMT

Thumbprint ⓘ

691D139AA61A864F6DE684590A5...

Created ⓘ

Sat, 22 Feb 2020 04:39:46 GMT

Updated ⓘ

Sat, 22 Feb 2020 04:41:44 GMT

Verification Code ⓘ

Generate Verification Code

Verification Certificate .pem or .cer file. * ⓘ

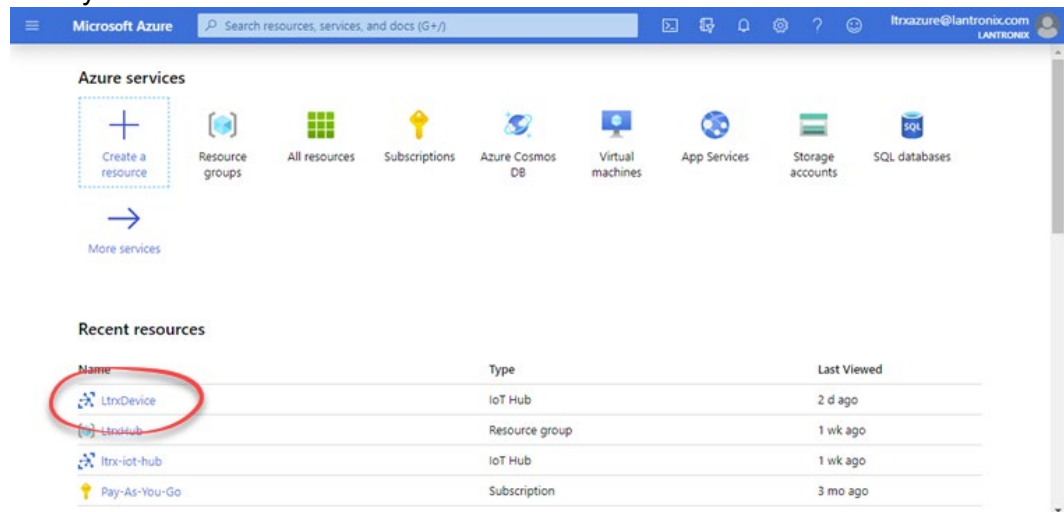
verification-code.cert.pem

Verify

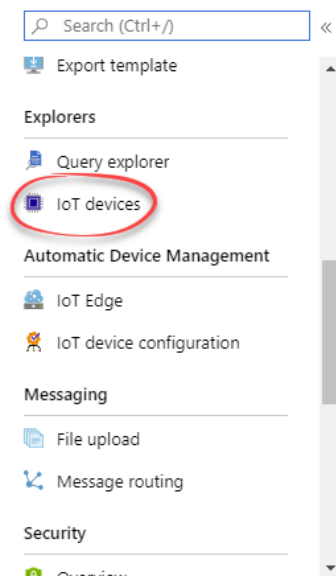
STEP 3. Create a device in your IoT Hub

1. Click **Home** if you are not already at the home page.

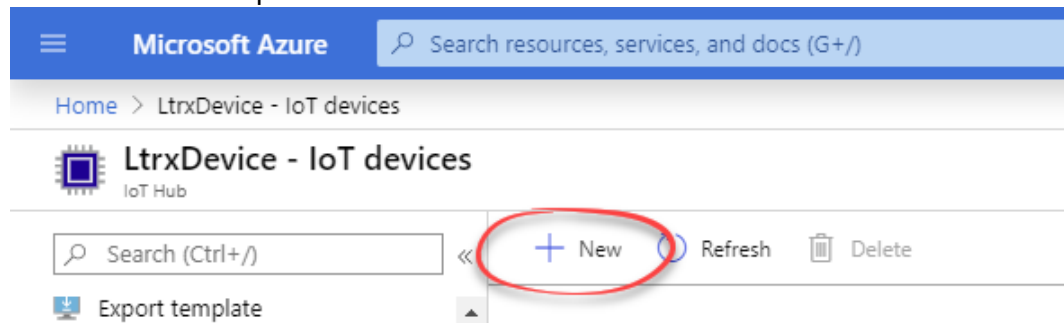
2. Click your **IoT Hub**.



3. On the left, click **IoT devices**.



4. Click **New** at the top.



5. Enter a unique name for the device in **Device ID**. Under **Authentication type**, select **X.509 CA Signed**. Click **Save**.

The screenshot shows the 'Create a device' interface. At the top, there's a header 'Create a device' with a close button. Below it is a banner with an information icon and the text 'Find Certified for Azure IoT devices in the Device Catalog'. The main form has several sections: 'Device ID' with a text input containing 'LantronixTest' and a green checkmark; 'Authentication type' with three radio buttons: 'Symmetric key', 'X.509 Self-Signed', and 'X.509 CA Signed' (which is selected); 'Connect this device to an IoT hub' with 'Enable' and 'Disable' buttons; and 'Parent device' with the text 'No parent device' and a link 'Set a parent device'. At the bottom, there is a blue 'Save' button.

6. From the terminal used earlier, generate the device certificate (new-device.key.pem and device.cert.pem).
./certGen.sh create_device_certificate <Device ID>

STEP 4. Configure the xPico 200 series device via Web Manager or CLI

1. Create a new TLS Credential.
2. Set the **Private Key** to the contents of new-device.key.pem, which can be opened with a text editor such as Notepad.
3. Set the **Certificate** to the contents of new-device.cert.pem, which can be opened with a text editor such as Notepad.
4. Set **Higher Authority 1** to the contents of azure-iot-test-only.root.ca.cert.pem.
5. Set **Trusted Authority 1** to the contents of D-TRUST.PEM, **Trusted Authority 2** to the contents of DigiCert.pem, and **Trusted Authority 3** to the contents of baltimore-ca.pem.
6. Set the **Line 1 protocol** to Azure IoT.
7. Set the Azure Configuration as follows:
State: Enabled
Hub Name: The name of the IoT Hub in Azure
Device ID: The Device ID set in Azure when the device was created

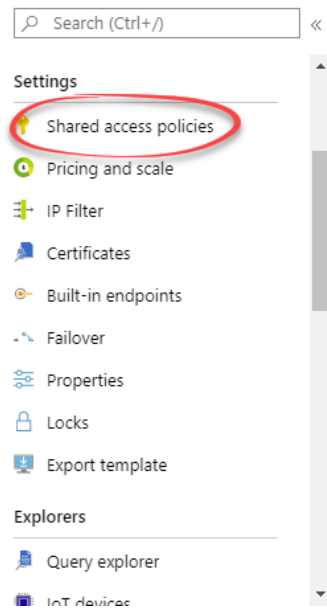
Security: X.509

Credential Name: <the name of the TLS credential>

MQTT Local Port: <Random>

STEP 5. Obtain the connection string

1. In Azure Portal, click **Home**.
2. Click your **IoT Hub**.
3. Click **Shared access policies** on the left.



4. Under **Policy**, click **iothubowner**.

Search to filter items...	
Policy	Permissions
iothubowner	registry write, service connect, device connect
service	service connect
device	device connect
registryRead	registry read
registryReadWrite	registry write

5. On the right, click the copy button next to **Connection string – primary key**

iothubowner
LtnDevice

Save Discard Regenerate keys Delete

Access policy name
iothubowner

Permissions

- ☒ Registry read ⓘ
- ☒ Registry write ⓘ
- ☒ Service connect ⓘ
- ☒ Device connect ⓘ

Shared access keys

Primary key ⓘ

Secondary key ⓘ

Connection string—primary key ⓘ

Connection string—secondary key ⓘ

STEP 6. Test the integration

1. Using TeraTerm, connect to the xPico 200 series device via serial connection on line 1.
2. Click **Setup > Terminal**.
3. Under **New-line**, set **Receive** and **Transmit** to **LF** and click **OK**.
4. Open **Device Explorer**.

5. Under **IoT Hub Connection String**, paste the connection string you obtained earlier and click **Update**.

The screenshot shows the 'Device Explorer Twin' application window. The 'Configuration' tab is selected, and the 'IoT Hub Connection String' field is highlighted with a red arrow. The connection string is: `HostName=LtrxDevice.azure-devices.net;SharedAccessKeyName=iothubowner;SharedAccessKey=aJboFnM6HRvTTPrLii/iuVmZZ5+Id9W8XcruWiOFPD8=`. Below this, the 'Protocol Gateway HostName' field is empty. The 'Update' button is circled in red. The 'Shared Access Signature' section shows the 'Key Name' as 'iothubowner', 'Key Value' as 'aJboFnM6HRvTTPrLii/iuVmZZ5+Id9W8XcruWiOFPD8=', 'Target' as 'LtrxDevice.azure-devices.net', and 'TTL (Days)' as '365'. A 'Generate SAS' button is also present.

Device Explorer Twin

Configuration Management Data Messages To Device Call Method on Device

Connection Information

IoT Hub Connection String:

HostName=LtrxDevice.azure-devices.net;SharedAccessKeyName=iothubowner;SharedAccessKey=aJboFnM6HRvTTPrLii/iuVmZZ5+Id9W8XcruWiOFPD8=

Protocol Gateway HostName:

Update

Shared Access Signature

Key Name: iothubowner

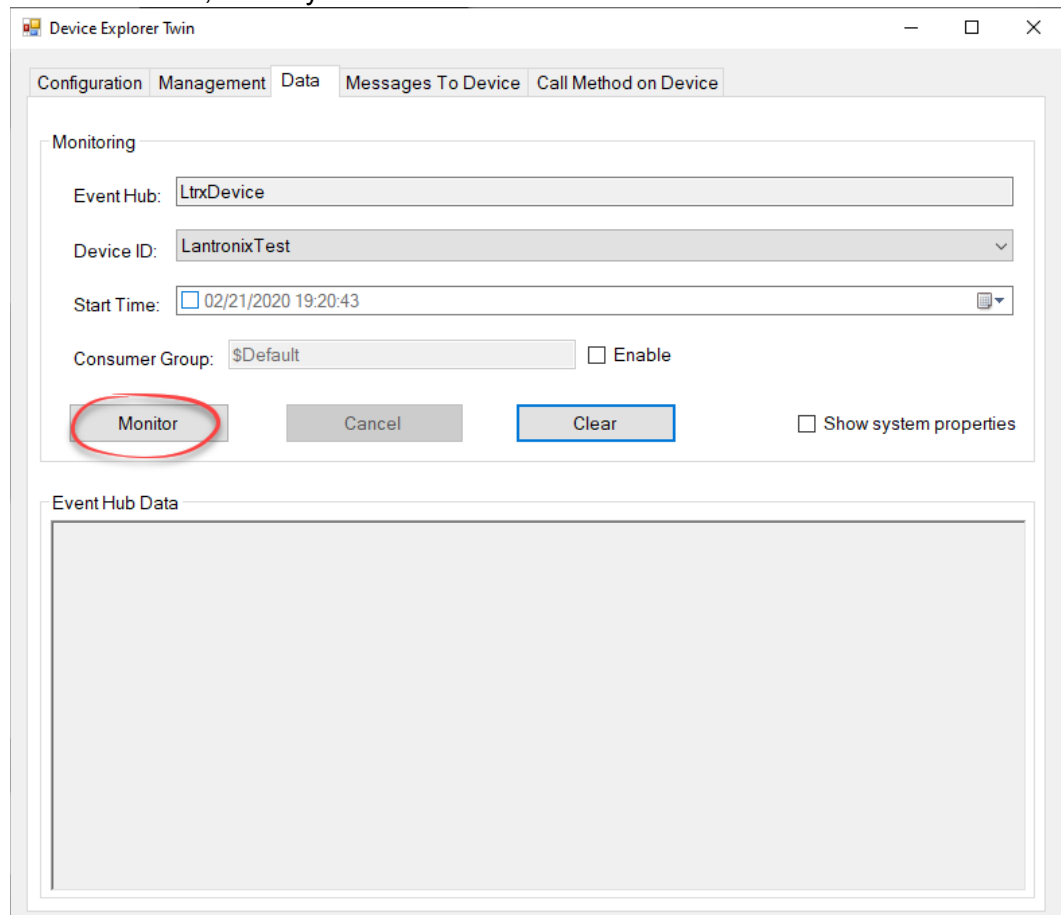
Key Value: aJboFnM6HRvTTPrLii/iuVmZZ5+Id9W8XcruWiOFPD8=

Target: LtrxDevice.azure-devices.net

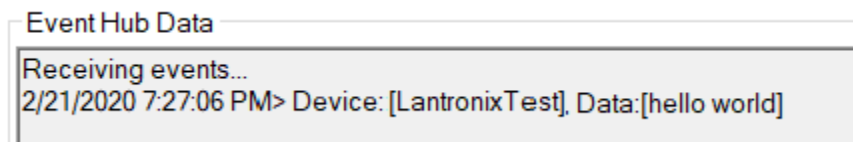
TTL (Days): 365

Generate SAS

6. In the **Data** tab, select your device next to **Device ID** and click **Monitor**.



7. In TeraTerm, type some characters and hit **Enter**. The data will appear under **Event Hub Data** in Device Explorer.



8. In the **Messages To Device** tab, select your device next to **Device ID**, type some characters next to **Message**, and click **Send**. The data will appear in TeraTerm.

Device Explorer Twin

Configuration Management Data Messages To Device Call Method on Device

Send Message to Device:

IoT Hub: LtrxDevice

Device ID: LantronixTest

Message: Hello world

☐ Add Time Stamp ☐ Monitor Feedback Endpoint

Properties System Properties

Key	Value
*	

Send Clear

Output

4 Calling Methods on an xPico 200 Series Device

You can call the following methods directly in Device Explorer. The line protocol on the device does not need to be set to Azure IoT to call methods.

- `ltrx_import_xml_config` – imports XML configuration or performs action
- `ltrx_trusted_import_xml_config` – imports XML configuration or performs action. Compared to `ltrx_import_xml_config`, `ltrx_trusted_import_xml_config` is intended for programmers who have already tested their XML. The XML header must be left out. It has less error checking than `ltrx_import_xml_config` and eliminates multiple passes. It does not need to cache the XML in flash memory and is faster. While `ltrx_import_xml_config` saves the configuration if successful, `ltrx_trusted_import_xml_config` does not, like a CLI command.
- `ltrx_read_xml_status` – reads XML status
- `ltrx_read_xml_config` – reads XML configuration

The following examples show how to use these methods. In all examples, the device must be added to an IoT Hub in Microsoft Azure, and Azure State must be Up.

Examples

`ltrx_import_xml_config`

Description: Import XML (configgroup: SPI)

1. Open Device Explorer and click the **Call Method on Device** tab.
2. Select your device next to **Device ID**.
3. Type `ltrx_import_xml_config` next to **Method name**.
4. Next to **Method payload**, copy and paste the below XML and then click **Call Method**.

```
{ "param": "  
<?xml version=\"1.0\" standalone=\"yes\"?>  
<!-- Automatically generated XML -->  
<!DOCTYPE configrecord [  
  <!ELEMENT configrecord (configgroup+)>  
  <!ELEMENT configgroup (configitem+)>  
  <!ELEMENT configitem (value+)>  
  <!ELEMENT value (#PCDATA)>  
  <!ATTLIST configrecord version CDATA #IMPLIED>  
  <!ATTLIST configgroup name CDATA #IMPLIED>  
  <!ATTLIST configgroup instance CDATA #IMPLIED>  
  <!ATTLIST configitem name CDATA #IMPLIED>  
  <!ATTLIST configitem instance CDATA #IMPLIED>  
  <!ATTLIST value name CDATA #IMPLIED>  
]
```

```

]>
<configrecord version = \"0.1.0.1\">
  <configgroup name = \"SPI\" instance = \"1\">
    <configitem name = \"State\">
      <value>disabled</value>
    </configitem>
  </configgroup>
</configrecord>
"}

```

5. Verify that the SPI configuration settings have imported successfully.

Device Explorer Twin

Configuration Management Data Messages To Device Call Method on Device

Call Method on Device

IoT Hub:

Device ID:

Method name:

Method payload:

```
<!ATTLIST value name CDATA #IMPLIED>
]>
<configrecord version = \"0.1.0.1\">
  <configgroup name = \"SPI\" instance = \"1\">
    <configitem name = \"State\">
      <value>disabled</value>
    </configitem>
  </configgroup>
</configrecord>
"
```

Timeout (seconds):

Return status:

Return payload:

```
{"messages":[{"severity":"informational","message":"XML import completed."}]}
```

ltrx_trusted_import_xml_config

Description: Trusted import XML (configgroup: SPI)

1. Open Device Explorer and click the **Call Method on Device** tab.
2. Select your device next to **Device ID**.
3. Type **ltrx_trusted_import_xml_config** next to **Method name**.
4. Next to **Method payload**, copy and paste the below XML and then click **Call Method**.

```
{"param": "  
<configrecord version = \"0.1.0.1\">  
  <configgroup name = \"SPI\" instance = \"1\">  
    <configitem name = \"State\">  
      <value>disabled</value>  
    </configitem>  
  </configgroup>  
</configrecord>  
"}}
```

5. Verify that the SPI configuration settings have imported successfully.

The screenshot shows the 'Device Explorer Twin' application window with the 'Call Method on Device' tab selected. The dialog contains the following fields and values:

- IoT Hub:** LtrxDevice
- Device ID:** LantronixTest
- Method name:** ltrx_trusted_import_xml_config
- Method payload:**

```
{"param": "<br><configrecord version = \"0.1.0.1\"><br>  <configgroup name = \"SPI\" instance = \"1\"><br>    <configitem name = \"State\"><br>      <value>disabled</value><br>    </configitem><br>  </configgroup><br></configrecord><br>"}}
```
- Timeout (seconds):** 60
- Call Method** button
- Cancel** button
- Return status:** 200
- Return payload:**

```
{"messages":[{"severity":"informational","message":"XML import completed."}]}
```

ltrx_read_xml_status

Description: Read XML status

1. Open Device Explorer and click the **Call Method on Device** tab.
2. Select your device next to **Device ID**.
3. Type **ltrx_read_xml_status** next to **Method name**.
4. Next to **Method payload**, copy and paste the below XML and then click **Call Method**.

```
{"param": "Access Point;Line"}
```
5. Verify that the Access Point and Line status have been returned successfully.

Device Explorer Twin

Configuration Management Data Messages To Device Call Method on Device

Call Method on Device

IoT Hub: LtrxDevice

Device ID: LantronixTest

Method name: ltrx_read_xml_status

Method payload: {"param": "Access Point;Line"}

Timeout (seconds): 60

Call Method Cancel

Return status: 500

Return payload: {"response": "<?xml version='1.0' standalone='yes'?'><!-- Automatically generated XML -->\n\n<!DOCTYPE statusrecord [\n <ELEMENT statusrecord (statusgroup+)>\n <ELEMENT statusgroup (statusitem+ statusgroup*)>\n <ELEMENT statusitem (value+)>\n <ELEMENT value (#PCDATA)>\n <ATTLIST statusrecord version CDATA #IMPLIED>\n <ATTLIST statusgroup name CDATA #IMPLIED>\n <ATTLIST statusgroup instance CDATA #IMPLIED>\n <ATTLIST statusitem name CDATA #IMPLIED>\n <ATTLIST statusitem instance CDATA #IMPLIED>\n <ATTLIST value name CDATA #IMPLIED>\n]>\n\n<statusrecord version = '0.1.0.1'>\n <statusgroup name = 'Access Point' instance = 'ap01'>\n <statusitem name = 'State'>\n <value>Up</value>\n </statusitem>\n <statusitem name = 'BSSID'>\n <value>02:80:a3:b7:87:d0</value>\n </statusitem>\n <statusitem name = 'SSID'>\n <value>xPico240 B787CF</value>\n </statusitem>\n <statusitem name = 'Encryption'>\n

ltrx_read_xml_config

Description: Read XML configuration

1. Open Device Explorer and click the **Call Method on Device** tab.
2. Select your device next to **Device ID**.
3. Type **ltrx_read_xml_config** next to **Method name**.
4. Next to **Method payload**, copy and paste the below XML and then click **Call Method**.

```
{"param": "Access Point;Line"}
```
5. Verify that the Access Point and Line configuration have been returned successfully.

Device Explorer Twin

Configuration Management Data Messages To Device **Call Method on Device**

Call Method on Device

IoT Hub:

Device ID:

Method name:

Method payload:

Timeout (seconds):

Return status:

Return payload:

```
{
  "response": "<?xml version='1.0' standalone='yes'>\n\n<!-- Automatically generated XML -->\n\n<!DOCTYPE configrecord [\n  <ELEMENT configrecord (configgroup+)>\n  <ELEMENT configgroup (configitem+)>\n  <ELEMENT configitem (value+)>\n  <ELEMENT value (#PCDATA)>\n  <ATTLIST configrecord version CDATA #IMPLIED>\n  <ATTLIST configgroup name CDATA #IMPLIED>\n  <ATTLIST configgroup instance CDATA #IMPLIED>\n  <ATTLIST configitem name CDATA #IMPLIED>\n  <ATTLIST configitem instance CDATA #IMPLIED>\n  <ATTLIST value name CDATA #IMPLIED>\n]\n\n<configrecord version = '0.1.0.1'\n  <configgroup name = 'Access Point' instance = 'ap0'\n    <configitem name = 'SSID'\n      <value></value>\n    </configitem>\n    <configitem name = 'Guest'\n      <value>Enabled</value>\n    </configitem>\n    <configitem name = 'Channel'\n      <value>&lt;Auto&gt;</value>\n    </configitem>\n  </configgroup>\n  <configitem name = 'Auto Channel Scan'
```

ltrx_trusted_import_xml_config

Description: Status Action

1. Open Device Explorer and click the **Call Method on Device** tab.
2. Select your device next to **Device ID**.
3. Type **ltrx_trusted_import_xml_config** next to **Method name**.
4. Next to **Method payload**, copy and paste the below XML and then click **Call Method**.

```
{ "param": "  
<configrecord version = \"0.1.0.1\">  
  <configgroup name = \"xml import control\">  
    <configitem name = \"action\">  
      <value name = \"group\">interface</value>  
      <value name = \"optional group  
instance\">wlan0</value>  
      <value name = \"optional item\"></value>  
      <value name = \"optional item instance\"></value>  
      <value name = \"name\">renew</value>  
    </configitem>  
  </configgroup>  
</configrecord>  
"}
```

5. Verify that the DHCP IP address has been renewed successfully.

Device Explorer Twin

Configuration Management Data Messages To Device **Call Method on Device**

Call Method on Device

IoT Hub: LtrxDevice

Device ID: LantronixTest

Method name: ltrx_trusted_import_xml_config

Method payload:

```
<value name = \"group\">interface</value>  
<value name = \"optional group instance\">wlan0</value>  
<value name = \"optional item\"></value>  
<value name = \"optional item instance\"></value>  
<value name = \"name\">renew</value>  
</configitem>  
</configgroup>  
</configrecord>  
"
```

Timeout (seconds): 60

Call Method Cancel

Return status: 200

Return payload:

```
{ "messages": [{"severity": "informational", "message": "Requesting DHCP lease renewal."},  
{"severity": "informational", "message": "XML import completed."}] }
```