

TEKTELIC Communications Inc. 7657 10th Street NE Calgary, Alberta Canada, T2E 8X2

AZURE IOT CENTRAL MANUAL

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General Information

Azure does not have native integration with LoRaWAN. The Azure IoT Central Device Bridge must be implemented to connect a LoRaWAN network server APIs, dealing with uplinks and downlinks, to the Azure IoT APIs.

To use the Integration between the Azure IoT Central and the Tektelic Network Server, you will need the following:

- 1. Setup the Azure IoT Central Device Bridge:
 - 1.1. An Azure account. You can create a free Azure account.
 - 1.2. An Azure IoT Central application to connect the devices.
 - 1.3. A docker-image of the Azure IoT Central Device Bridge to deploy it in the Azure Portal.
 - 1.4. A device template at the created Azure IoT Central application
- 2. Setup the integration on the Tektelic Network Server:
 - 2.1. A data-converter for the devices these are used in integration.
 - 2.2. Create an Azure IoT Central integration instance.

1 Setup the Azure IoT Device Bridge

1.1 Create an Azure Account

*** Notice, that this step is necessary only if you have no Azure IoT account yet and/or want to get the free account to verify the Azure IoT Central integration. ***

Open the next link <u>https://azure.microsoft.com/en-us/free/iot/</u> and select "**Start Free**" button. In the opened window login with your Microsoft Account or create a new one. After that fill the mandatory fields in the "**Your Profile**" section and click "**Next**" button (*Figure 1-1*).

Your profile	^		
Country/Region 0	•	Create your Azure free account	
Choose the location that matches your billing address. You cannot change this selection ta your country is not listed, the offen is not available in your region. Learn More	iter. If	Popular services free for 12 months	
rist name		25+ services always free	
Niddle name (Optional)		\$200 credit to use in your first 30 days	
Last name		No automatic charges	
Email address 😗		After your credit is over, we'll ask you if you want to continue with pay-as-you-go. If you do, you'll only pay if you use more than the free amounts of services.	
Phone			
		1	
I subject to the <u>Multiment apprenting</u> and <u>Jumpy apprenting</u> . I vote to receive information tips, and offset from Microsoft about Azure and other Microsoft products and services, and for Microsoft to Jhan en yinformation with select Partners so Lan receive relevant information about the products and services.			
Next	\$		
Identity verification by phone	~		

Figure 1-1: Your profile

On the next page verify your phone number and verify yourself by credit card after that (*Figures 1-2 and 1-3*).

Microsoft Azure				serj.bezugly@gmail.com Sign out
	Your profile	~		
	Identity verification by phone	^	Create your Azure free account	
	A text or phone call helps us make sure this is you. Country code Phone number	~	Popular services free for 12 months 25 + services always free 2200 credit to use in your first 30 days	
	Text me Call me We delivered a code to your pho Verification code	ne.	No automatic charges After your credit is over, we'll ask you if you want to continue with pay-as-you-go. If you do, you'll only pay if you use more than the free amounts of services.	
	Verify code I did not receive a code			
	Identity verification by card	~		
	Sign up			
	English v Privacy & Cookies	Trademarks	Legal Support Give us feedback © 2021 Microsoft	Chat with Sales

Figure 1-2: Phone verification

	We'll make a temporary authorization on this card, but you won't be charged unless you upgrade.	25+ services always free	*
And a state of the local division of the loc	We accept the following cards:	\$200 credit to use in your first 30 days	
	Cardholder Name		
		No automatic charges	
	Card number	After your credit is over, we'll ask you if you want to continue with pay-as-you-go. If you do, you'll only pay if you use more than the free amounts of services.	
	Expires		
	CVV		
	What is a CVV?		
	Address line 1		
		k	
	Address line 2 (Optional)		
	City		
	State (Optional)		
	Postal Code		
	Country/Region		
	Ukraine 🗸		Chat with Sales

Figure 1-3: Credit card verification

Click on the "**Sign Up**" button after that. A new free IoT account should be created. After that you should to create a subscription.

1.2 Create an Azure IoT Central Application

Navigate to the Azure IoT Central site and then sign in with the Microsoft account associated with your Azure subscription.

In the opened window:

• Navigate to the Build page and select "Create app" in the Custom app tile (Figure 1-4).



Figure 1-4: Create a new application

- On the "New application" page, make sure that Custom application is selected under the Application template.
- Azure IoT Central automatically suggests an application name based on the application template you've selected. You may enter your own unique application name.
- Azure IoT Central also generates a unique **URL prefix** for you, based on the application name. You use this URL to access your application. Change this **URL prefix** to something more memorable if you'd like. This URL must be unique. (*Figure 1-5*)
- Select the **Pricing Plan**. (Figure 1-5)

TEKTELIC Communications Inc.

Azure IoT Central			8	? 👰
=	Build > New application			
බ Home	New application Custom			
🕅 Build	Answer a few quick questions and we'll get your app up and running.			
🖽 My apps	About your app			
	Application name * ①			
	and a second sec			
	URL* ①			
		.azureiotcentral.com		
	Application template * ①		We've got you covered	
		•		
	Pricing plan		Pricing	
	Try for 7 days with no commitment		No termination tees. Pay only for what you need, Get pricing details	N
	5 free devices			40
	○ Standard 0		Security	
	For devices sending a few messages per day		Keep control of your data with privacy features like role-based access	
	2 free devices 400 messages/mo		and integration with your Active Directory permissions.	1
	Standard 1		Scale	
	For devices sending a few messages per hour 2 free devices 5,000 messages/mo		You invest in your business. Microsoft invests in IoT. We're building and	
	Standard 2 (most nonular)		inventing every day - when you're ready to scale up, we'll be ready.	
	For devices sending messages every few minutes			
	2 free devices 30.000 messages/mo			
	Billing info			
	Figure 1-5	5: New	app window part 1	

- Select your subscription in the **Azure subscription** drop-down. (*Figure 1-6*)
- Select your closest location in the **Location** drop-down. (*Figure 1-6*)
- Review the **Terms and Conditions**, and select **Create** at the bottom of the page. After a few seconds, your IoT Central application is ready to use. (*Figure 1-6*)

Azure IoT Central				@ ? 🚑
=	Free Try for 7 days with no commitment Stee classes		No termination fees. Pay only for what you need. Get pricing details $\ensuremath{\mbox{Get}}$	
ഹ Home	a nee devices		Security	
Build Build Build	Standard 0 For devices sending a few messages per day from devices - 400 messages fem day		Protect your connected products with built-in, end-to-end IoT security. Keep control of your data with privacy features like role-based access and integration with your Active Directory permissions.	
03 - 9 - 9 -	Standard 1 Standard 1 Standard 1 Standard 1 Standard 1 Standard 1 Sof devices sending a few messages per hour Z free devices 5,000 messages/mo		Scale You invest in your business. Microsoft invests in IoT. We're building and inventing every day - when you're ready to scale up, we'll be ready.	
	Constantiant 2 (most popular) For devices sending messages every few minutes 2 free devices 30.000 messages/mo			
	Billing info			
	Directory * ③	~		G
	Azure subscription * Don't have a subscription? Creater	ate subscription □ [*]		
	Location * ①			
		~		
	By dicking "Create" you agree to the Subscription Agreement ^{C2} and Privacy Subsement ^{C2} and Privacy Subsement ^{C2} and Privacy Subsement ^{C2} and Privacy Subscription feet, payment, and data retention do not a "Standard" plans require an Azare subscription fact, and you acknowledge that this service is in under the terms regulate the your Azare Subscription ^{C2} .	. Provisions in the apply to "Free". censed to you		

Figure 1-6: New app window part 2

(For more information visit <u>https://docs.microsoft.com/uk-ua/azure/iot-central/core/quick-deploy-iot-central</u>)

1.3 Deploy the Azure IoT Central Device Bridge

1.3.1 Build the Docker Image and Push it

First of all, it is necessary to get the repository with Azure IoT Central Device Bridge from the GitHub repository <u>https://github.com/iot-for-all/iotc-device-bridge.</u>

When the Azure IoT Central Device Bridge repository is cloned, perform the following actions:

- Run the "**docker build**." command in the solution folder to build the Device Bridge image.
- Create a container registry in your Azure subscription that was created in the **section 1.1** of this guide. For example, use the <u>Azure portal</u>, the <u>Azure CLI</u>, or <u>Azure PowerShell</u>.
- Tag and push the image to an Azure Container Registry (ACR) (<u>https://docs.microsoft.com/en-us/azure/container-registry/container-registry-get-started-docker-cli</u>)

*** You should note the image name and the ACR credentials, which are necessary in the next steps. ***

1.3.2 Deploy the Image

Once the Device Bridge image is built and pushed to the registry it is necessary to deploy it. Open the Azure custom deployment page by the following

<u>https://portal.azure.com/#create/Microsoft.Template/uri/https%3A%2F%2Fraw.githubusercon</u> <u>tent.com%2Fiot-for-all%2Fiotc-device-bridge%2Fmain%2Fazuredeploy.json</u>.

The Custom Deployment page should be opened (Figure 1-7):

Microsoft Azure	P Search resources, services, and docs (G+/)	E		sbezuhlyi@tektelic.com
Home >				
Custom deployment Deploy from a custom template				×
Subscription *	Azure subscription 1			*
Resource group * ()	V			
	Create new			
Instance details				
Region * 🕕	West Europe V			
Bridge-name * 🕕				
lotc-dps-sas-key * 🛈				
lotc-id-scope * ①				
Api-key * 💿				
Sol-username * (i)				
Cal account 0				
se passion . O				
Log-analytics-workspace-id * 💿				
Log-analytics-workspace-key * 💿				
Bridge-image * 💿				
Acr-server * 🕕				
Acr-usemame * ()				
Acr-password * ③				
Review + create < Previous	Next : Review + create >			

Figure 1-7: Deployment setup

In the opened page fill the mandatory fields according to the following:

- In the **Bridge-name** parameter, enter the name for the new Bridge instance. This name will be part of the HTTPS endpoint for your instance, so it may only contain letters, numbers, and dashes.
- The IoTC SAS key and Id scope parameters can be found in the Azure IoT Central Application that was created in the section 1.2 of this guide. Go to your IoT Central application and navigate to the Administration > Device Connection area. Copy the ID Scope field (*Figure 1-8*) and paste it into the iotc-id-scope parameter in the template. In the same page, under Enrollment groups, open the SAS-IoT-Devices group (*Figure 1-9*). In the group page, copy either the Primary key or Secondary key and paste it in the Iotc-dps-sas-key parameter of the template (*Figure 1-10*).

SBETestAPP		∠ P Search					۲	?	۹
-	Administration <	Device connection							
Dashboards	Your application	We use the Azure IoT Hub Device Provisioning Servic	ce (DPS) to register and connect devices. Learn	n more 🖙					
② Devices	Users	ID scope ①							
Device groups	Roles	One00302CF3	la-seprove new devices ① C On						
🖧 Rules	Pricing	Auto-approve new devices ③							
Analytics	Device connection	On On							
🔁 Jobs	Device file upload								
App settings	API tokens	Enrollment groups							
Device templates	Customize your application	+ Create enrollment group							
Cg: Data export	Customize help	Name	Attestation type	Created	Group type	Certificate expiration			
Ro Administration	Application template export	SAS-IoT-Edge-Devices	Shared access signature (SAS)	6/16/2021	IoT Edge devices	N/A			
		SAS-IoT-Devices	Shared access signature (SAS)	6/16/2021	IoT devices	N/A			
		¢							

Figure 1-8: ID Scope

SBETestAPP								
🚍 Dashboards	Administration <	Device connection We use the Azure IoT Hub Device Provisioning Servi	ce (DPS) to register and connect devices. Learn	more 😅				
D Desthoards Image: Device groups Image: Device groups Image: Device groups Image: Device groups Image: Device templates Image: Device templates Image: Device templates	Vour application Uters Roles Precing Device file upticad API tolant Customize your application Customize help Application temptate export	We use the Acure IoT Hub Device Provisioning Sensi ID scope () DevicibiaCr33 Auto-approve new device: () On Enrollment groups + Craste enrollment group Name SUS-IoT-fage-Devices	er (IPPS) to register and connect devices, Learn to C Attention type Datent access signature (XXS)	Created 6/16/2021	Group type IoT tage devices	Certificate expiration N/A		
ER My apps		SAS-IoT-Devices	Shared access signature (SAS)	6/16/2021	IoT devices	N/A		
		E:						



SBETestAPP		,Ø Search	۲	?	۹
=	Administration <	🗟 Save 🔋 Delete			
Dashboards	Your application	SAS-IOI-DEVICES Use enrollment groups to connect specific types of devices using credentials that you choose. Learn more 🗂			
② Devices	Users				
La Device groups	Roles	Name * SA5-IoT-Devices			
50 Rules	Pricing				
Analytics	Device connection	0ne00302CF3			
🖧 Jobs	Device file upload	Automatically connect devices in this group ①			
App settings	API tokens	O n			
Device templates	Customize your application	Group type () (a) Init devices			
Ca Data export	Customize help	O loT tdge devices			
g_0^0 Administration	Application template export	Attestation type () Shared access signature (SAS)			
		₽			
		Shared access signature (SAS) Devices use Shared Access Signature (SAS) security tokens to connect to IoT Central: Use the signature (SAS) Devices use Shared Access Signature (SAS) For your individual device(Lammone CF Phrazy key © ubSaTur3Sum995mC7Mee2x684/2W/71cig+652664(7+H00 Secondary key © dbsTur6Scb44.givADAZScp84M82(q)			
H My apps					

Figure 1-10: Primary and Secondary Keys

- In the **Api-key** parameter, define a strong (and preferably randomly generated) API key. This key will be used to protect the HTTP API and must be included in the **x-api-key** header of every request to the Bridge
- In the **Sql-username** and **Sql-password** parameters, enter an admin login and password for the Azure SQL instance that will be provisioned by the solution (it is used for caching and storing device info). The password must follow the <u>SQL Server password policy</u>.
- By default, the Bridge will publish logs to a Log Analytics workspace of your choice. If you do not already have a Log Analytics workspace created in your resource group, you can create one by following these <u>instructions</u>. In the Log-analytics-workspace-id and Log-analytics-workspace-key parameters, provide the credentials of your workspace (instructions to obtain the credentials of your Log Analytics workspace can be found <u>here</u>).
- Go to the Azure Portal and open the ACR with Docker image that you have already pushed in the section 1.3.1. Open the "Access Keys" tab (Figure 1-11). In the Acr-server, Acr-username, and Acr-password parameters provide the credentials of your ACR instance "Access Keys" tab.

E Microsoft Azure	${\cal P}$ Search resources, services, and docs (G+/)		Þ.	6 D 🖗	? R	sbezuhlyi@tektelic.com
Home >						
Container registry						×
Search (Ctrl+/) « Registry name		Ø				
Gverview		Ø				
Activity log	Enabled					
Access control (IAM)		0				
♦ Tags						
🚳 Quick start Name	Password	Regenerate				
Events password		0				
Settings password2	0	0				
📍 Access keys						
Encryption						
😮 Identity						
🐨 Networking						
Security	R					
🔒 Locks						
Services						
Repositories						
& Webhooks						
Replications						
👕 Tasks						
Repository permissions						
• Tokens (Preview)						
🕸 Scope maps (Preview)						
Policies						
Content trust						

Figure 1-11: Access Keys tab

After providing all necessary parameters, click the **Review+create** button. The deployment may take a few minutes. Once finished, you can find the newly provisioned resources in the target resource group.

1.4 Add a Device Template to the Azure IoT Central Application

To add a device template to the Azure IoT Central Application it is necessary to have the JSON file with template model match the Azure IoT Central <u>requirement</u>.

*** Notice, that you are always able to get the templates for Tektelic sensors through Tektelic support portal. ***

Navigate to your IoT Central Application and click on the "**Device Template"** tab (*Figure 1-12*). After that click on the "New" button to create a new device template.

SBETestAPP		€ Search		o ? 📢
=	Device templates			
Dashboards				Sort by Last undated V
(Device groups	test	Has pending changes	I Never published	
sta Rules	Smar Room Sensor	No pending changes	🖽 Published 6 days ago	
🗠 Analytics				
🗅 Jobs				
App settings	_{			
C Device templates				
Ca Data export				
Xe Automation				
		Ν		
		LAT.		
🖽 My apps				

Figure 1-12: Device template tab

After that in the opened page select the **"IoT Device"** in the **"Create a custom device template"** section and click on the **"Next: Customize"** button (*Figure 1-13*).

SBETestAPP		,Ø Search	۲	?	
=	Device templates > Create new				
Destiboards Devices Devices Devices Devices Rules Analytics Dots App settings Device templates C Data export	Select type Review	Select type A device template is like a blueprint. It defines the characteristics and behaviors of devices that connect to your application. Create a custom device template Lot device Lot			
χ ² ₈ Administration	₽ I	uppet a copolity model or huld quasilities from costsh. Craste a template that factures Acure IoT Sign and gateway scenarios. Featured device templates Acure IoT Central O Acure IoT Central O Acure IoT Central O Import Import	ſ	Cancel	
🖽 My apps	l	riod Lubionize	L	Cancel	

Figure 1-13: Create new template part 1

In the next window specify the device template name and click on the **"Next: Review"** button *(Figure 1-14)*.





Review a new device template info and click on the **"Create"** button. A new device template should be added to your device template list. Click on it to open. After that click on the **"Import model"** link and specify the path to the JSON file with template model (*Figure 1-15*).



Figure 1-15: Upload the template JSON

After the JSON file would be applied the page with device template configuration should be opened. Click on the **"Publish"** button on this page (*Figure 1-16*).

SBETestAPP		€ Search	1			۲	? 🎣		
=	① This device template is published. Editing published	🕐 This device template is publiched. Stäting publiched capabilities may cause breaking thanges in derboards, jobs, rules, or data exports. Lam more 🖆							
Dashboards	🗇 Version 👗 Manage test device 👎 Publish 📫 Rename 👔 Delete								
② Devices	Device templates > Sm	templates > Smat Room Sensor > Model > TextellcHomeSensor							
La Device groups	Smart Room S	Sensor	sor						
	Application updated 6 days ago Interfaces published: 6 days ago								
\$2 Rules	∧ Model <								
Do Jobs	TektelicHomeSensor	TaktaicHamaSancar							
App settings	Cloud properties					Pu	Jistieu		
App securigs	Customize	Add capabilities specific to this device model. Lea	arn more 🖵						
Device templates	15.00	Capabilities							
Ca Data export	∧ views	Give your interface a display name and a friendly	name, choose a capability type and a semantic type	e, and then choose how your data will be measured	and displayed. Keep adding capabilities until you	've fully des	scribed		
R ^B Administration	Raw data	your interface.							
		Display name	Name *	Capability type * ()	Semantic type ①				
		Battery Voltage	battery_voltage	Telemetry \sim	Voltage v	· ×	\sim		
	6	And the Western Street	and both to constant	Televater	7		~		
		Ambient temperature	ambient_temperature	letemetry 0	iemperature 0		,		
		Relative Humidity	relative_humidity	Telemetry	Humidity	×	\sim		
		Acceleration Magnitude	impact_magnitude	Telemetry ~	Acceleration V	· ×	\sim		
		MCI Temporature	muu tamaaratura	Talamates	Tamparatura	l x	\sim		
		inco temperature	mud_temperature	(contrary)	remperature 0				
		Moisture	Moisture	Telemetry \checkmark	Event 🗸	×	\sim		
🗄 My apps									
		David Counter	const. count	Talamatar 🗸	None S.	< X.	\sim		

Figure 1-16: Publish the template

2 Setup the Azure IoT Device Bridge

For integration between Azure IoT Central and Tektelic Network Server, two things should be provided:

- The corresponding data-converter for the device model that is used in the integration. This converter should return a JSON object in a format that is acceptable for the device template created in **section 1.4**.
- The Azure IoT Central Integration instance should be created in the Tektelic Network Server

2.1 Create a Data Converter on the Network Server

Login to the Tektelic Network Server as a customer administrator. After success login click on the **"Data Converters"** tab to open the list of the data converters. In the opened page click on the **"+"** button the to create a new data-converter (*Figure 2-1*).

	ţ Data converters				C Serhil Bezuhlyi Customer administrator
	Data converters				(α)
E GATEWAY GROUPS	Created Time	Name	Туре	Decoder black listed	Encoder black listed
	2021-06-17 11:07:00	Azure Smart Room Converter	Custom	No	No
	2021-05-11 15:44:00		Custom	No	No
APPLICATIONS	2021-01-26 14:09:15		Custom	No	No T
	2020-11-24 11:42:00			No	No
O GATEWAY LOGS	2020-11-24 11:42:00			No	No
🏠 ALARMS	2020-11-24 11:42:00			No	No
	2020-11-24 11:42:00			No	No
	2020-11-24 11:42:00	Tektelic Home Sensor	Tektelic Home Sensor	No	N0
	2020-11-24 11:42:00	Tektelic Industrial Sensor	Tektelic Industrial Sensor	No	No
				Page: 1 💌 Rows p	er page: 10 👻 1-10 of 11 🔀 🖒 🗲 刘

Figure 2-1: Data converters tab

After that in the **"Add Data Converter"** window specify the data-converter name and in the **"Type"** drop-down select the **"Custom"** option (*Figure 2-2*).



Figure 2-2: Add Data Converter

In the **"Decoder"** and **"Encoder"** fields you have to specify the program code that will be used to decode/encode the telemetry data from your sensor to your Azure IoT Central Application according to device template created in **section 1.4**. After that click on the **"Add"** button and a new data-converter would appear in the **"Data Converters"** list.

*** Notice, that you are always able to get the data-converters for Tektelic sensors Azure Integration through the Tektelic support portal. ***

2.2 Create an Azure IoT Central Integration

Login to the Tektelic Network Server as a customer administrator. After success login click on the **"Applications"** tab to open the list of the applications (*Figure 2-3*).

TEKTELIC Communications Inc.

	# Applications			Serhii Bezuhiyi Oustomer administrator
A HOME	Applications			+ Q
	Created Time	Name	Assigned to	
GATEWAYS	2021-06-17 10:44:09	SBE Application Contact Traser		8 9 a s i
LOD DEVICE MODILS	2021-06-17 10:43:32	SBE Application Industrial		ê 🖗 🖬 🌲 🛢
	2021-05-31 12:53:48	SBE Application Smart Room		ê 🖗 🖬 🌲 🖬
	2021-05-11 15:37:40			🖻 😌 🗔 🌲 🗉
SUB-CUSTOMERS	2021-03-25 18:56:19			8903
ੴ GATEWAYLOGS ∰ Alarms				
		Q	Page: 1 ¥ Rows per page: 10 ¥	1-5 of 5 K < > >

Figure 2-3: Applications tab

Click on the application for which the integration will be created and in the opened tab click on the **"Manage Integrations"** sub-tab to open the list of the related integrations (*Figure 2-4*).

TEKTELIC	III Applications	C Seria Bezahiyi European Seri
HOME	Applications	SBE APPLICATION SMART ROOM ×
GATEWAY GROUPS	Created Time 🔸	
GATEWAYS	2021-06-17 10:44:09	APPLICATION DETAILS ADVANCED NETWORK SETTINGS API LIMITS J ALARM RULES
LO DEVICE MODELS	2021-06-17 10:43:32	COPY APPLICATION ID
	2021-05-31 12:53:48	Name*
	2021-05-11 15:37:40	SBE Application Smart Room
	2021-03-25 18:56:19	Description
∰ GATEWAY LOGS		Send app payload encrypted When sheckel, it means that he devices payload that is pushed to Application Server(s) via MQTT will be encrypted using AppRey When unchecked, NS will decrypt payload before pushing to MQTT subscriptons. Send empty app payload When sheckel, it means that a LoBa pasket will be pushed to Application Server(s) via MQTT even if TRMPsyload is empty and if FPort is equal to 8 or FPort is abarent.
	þ.	

Figure 2-4: Application details tab

When the "Integrations" page is opened click on the "+" button to create a new integration (*Figure 2-5*).

Figure 2-5: Integrations tab

In the **"Add Integration"** window specify the Integration name and select the **"Azure IoT Central"** as integration type. After that additional fields should appear (*Figure 2-6*).

Id Integration	×
	*
Type *	
Azure IoT Central	
Data converter *	
IoT Central Device Bridge URL*	
Your Azure IoT Central Device Bridge HTTPS endpoint. Common format: https://[bridge- name].[region].azurecontainer.io. This endpoint can also be found by navigating to the Device Bridge container group deployed to your subscription > Properties > FQDN	l
https://[bridge-name].[region].azurecontainer.io	Ŀ
IoT Central Device Bridge API key *	
API key that was defined during Azure IoT Central Device Bridge deployment	
	1
IoT Central Device Model ID *	
An '@id' field from your lot Central Device template. Example: dtmi:tektelic:HomeSensor;1	-
ADD CANCEL	

Figure 2-6: Add Integration tab

Fill these fields according to the following:

- "Data converter" the data converter that was created in the section 2.1.
- "Iot Central Device Bridge URL" open the <u>Azure portal</u> and navigate to Container Instances. Select the container group which have been used for Device Bridge deployment. Click on the "Properties" tab and find here the "FQDN" field (Figure 2-6).

*** Notice, that HTTPS protocol should be specified in this field before the IoT Central Device Bridge URL. ***

Microsoft Azure	,P Search resources, senices, and docs (G+r)	l l	 D 4	₿ ?	R	Sbezuhlyi@tektelic.com
Home > iotc-container-groups-ubsr57	vaaxvqg					
iotc-container-grou	ips-ybsx57vaaxvqg Properties					×
₽ Search (Ctrl+/) «	OS type					
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Activity log	IP address					
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Containers						
1 Identity	DNS name label					
III Properties						
🛆 Locks	Ports					
Monitoring	443					
i Metrics	Restart policy					
Alerts	Always					
Automation	Container count					
🖧 Tasks (preview)	2					
😫 Export template	Resource ID					
Support + troubleshooting						N
Rew support request						
	Location					
	west Europe					
	Resource group					
	Cubirrintion name					
	anazaripenet here					

Figure 2-7: FQDN parameter in the container group

- "IoT Central Device Bridge API key" the Api-key parameter that was defined during the docker container deployment in the section 1.3.2.
- "IoT Central Device Model ID" An "@id" field from your IoT Central Device template JSON file, that was used for template creation in the section 1.4.

After filling in the mandatory fields, click on the "Add" button.

3 Setup the Azure IoT Device Bridge

3.1 Get Uplinks from the Sensors

When the sensor sends the first uplink to the Tektelic Network Server it should appear in the Azure IoT Central Application in the **"Devices"** tab (*Figure 3-1*).

-									
=	Devices <								
Dashboards	Filter templates	All devices							
② Devices	All devices								
Device groups	Smart Room Sensor	+ New ⇒ Migrate ■	Delete 5J Approve ⊘ Block → Export ← Import	Unblock @ Attach 1	io gateway		ωγ	ų	
∯e Rules		Device name	Device ID	Device status	Device template	Simulated			1
🖄 Analytics		647FDA00000042F8	647FDA00000042F8	Provisioned	Smart Room Sensor	No			
🕞 Jobs		647FDA0000003513	647FDA0000003513	Provisioned	Smart Room Sensor	No			
App settings		647FDA0000067C7	647FDA00000067C7	Provisioned	Smart Room Sensor	No			
Device templates		1505198915051990	1505198915051990	Provisioned	Smart Room Sensor	No			
C Data event									
eg batalexport									
Ré Administration									
🖽 My apps									

Figure 3-1: List of the devices in the Azure IoT Central Application

Click on the device and open **"Raw data"** to see the list of uplinks that device has send to the Network Server (*Figure 3-2*).

100 C			,∕⊃ Search			@ ? 🥠
	Devices > Smart R 647FDA000	oom Sensor > 647FDA0000003513 10003513			S Connect 🚫 Block 🐵 Attach to gate	⊠) Rename 🖉 Edit template 🔋 Delete
② Devices	Command Raw o	data			Last data received	6/23/2021, 3:32:31 PM Status: Provisioned
E Device groups						Ö 🗰 🖬 🗸
∯o Rules	Timestamp ↓	Message type	Event creation time	acceleration	Acceleration Magnitude	Ambient Light State
Analytics	() ∨ 6/23/2021, 3:32:31 PM	Telemetry				
Da Jobs	<pre>ambient_temperature": 26.4,</pre>	1				
App settings	"relative_humidity": 46.5, "battery_voltage": 2.95,					
Device templates Data export Administration	"_unnodeleddata": { "raw": "[3,103,1,8,4,104,9 "port": 10 }, _eventtype": "Telemetry", "_timestamp": "2021-06-23T12:3	93,0,255,1,39]", 92:31.1832"				
26 /united	○ > 6/23/2021. 3:31:31 PM	Telemetry				
	○ > 6/23/2021. 3:30:31 PM	Telemetry				
	○ > 6/23/2021. 3:29:31 PM	Telemetry				
	○ > 6/23/2021, 3:28:31 PM	Telemetry				
	() > 6/23/2021, 3:27:31 PM	Telemetry				
	(i) > 6/23/2021, 3:26:31 PM	Telemetry				
	() > 6/23/2021, 3:25:31 PM	Telemetry				
	O > 6/23/2021. 3:24:31 PM	Telemetry				
H My apps	○ > 6/23/2021. 3:23:31 PM	Telemetry				



3.2 Send Downlinks to the Sensors

Open the **"Devices"** tab in the Azure IoT Central Application and click on the device you want to send downlink. In the **"Command"** tab fill the **"Port"** and **"Data"** in Base64 format" fields and click on the "Run" button. The correspond command should be added to the queue after that and the correspond downlink should be displayed in the "Downlink Queue" tab of the connected device in the Tektelic Network Server (*Figure 3-7*).

100-00	,∕⊃ Search	© ? 🚱
	Devices > Smart Room Sensor > 64776A000003513 6477FDA0000003513	∮ Connect 🛇 Block 🕲 Attach to gate 🕸 Rename 🖉 Edit template 📋 Delete
② Devices	Command Raw data	Last data received: 6/23/2021, 3:35:31 PM Status: Provisioned
Li Device groups	TektelicHomeSensor / Send Dowmlink 🔘	① Command history
∯ Rules	✓ Payload	
🖉 Analytics	V Parameters	
App settings	100	
 ☑ Device templates ☑ Data export ∞ Administration 	Data in Bass64 format IA==	
	Run 3 Your command has been added to the queue. Please check the command history to view status.	
	Ν	
	10"	
Ha My apps		

Figure 3-3: command tab

TEKTELIC	💒 Customers > [👩 Devices						::	Serhii Bezuhlyi Customer administrate	or 🚦
A HOME LUSERS	Devices		SMART RC	DOM SENSOR 1						×
GATEWAY GROUPS	Created Time	Name	MOVE TO APPLICATIO	ON DELETE						0
GATEWAYS	2021-06-29 14:31:10	Smart room sensor 1	DEVICE DETAILS	ADVANCED NETWORK SETTINGS	API LIMITS	ACTIVATION	REAL-TIME PACKETS	DOWNLINK QUEUE	_	
ᅻ DATA CONVERTERS	2021-06-29 10:13:36 Industrial sensor 1 Note that the gauge land updated automatically. Press the button to get the actual downlink queue									
	2021-06-29 10:12:22 Smart room sensor 2 UPDATE DOWNLINK QUEUE									
	Clear all pending downlink messages									
SUB-CUSTOMERS	ULEAR DUNINEINA QUOP									
GATEWAY LOGS	Post a new downlink (Base-64 format) to the device queue									
			Message ID	Port			Confirmed		Data	
			63c5b991-878a-4086	-bdc7-3ab4d4b2b00d 100			false		IA==	
				là.						



It is possible to send downlinks and get uplinks to the device via Azure IoT Hub via REST API. See the official Azure documentation to get more information about it (<u>https://docs.microsoft.com/en-us/rest/api/iotcentral/1.0/devices</u>).

3.3 Delete the Device

Select the device you want to remove and click on the "Delete" button. Confirm the deletion. ***

Notice, before deletion device should be unsubscribed from the Azure IoT Central application via device bridge.

Perform the next request to your device bridge instance that was deployed on the section 1.3: DELETE Device_bridge_uri/devices/{deviceId}/DeviceBound/sub
