

AWS IOT (EN)

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Generated on 04.06.2020 by Siegfried Müller

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Table of Contents

1	Prerequisite	5
2	1. Create your AWS Account	6
3	2. Create AWS IoT object	7
3.1	2.1. Create the object by "Register a thing"	7
3.2	2.2. Create a single thing	8
3.3	2.3. Define your thing name. Thing Names should be unique per device. Use mbNET in this example	8
3.4	2.4. Create your certificates	9
3.5	2.5. Download your certificates (1) and the root CA (2). After then activate (3) and your all set (4)1	0
3.6	2.6. Create your policy	2
4	3. Set MQTT Node in Node-RED1	8
4 4.1	3. Set MQTT Node in Node-RED 1 3.1 AWS endpoint settings 1	8 8
4 4.1 4.2	3. Set MQTT Node in Node-RED 1 3.1 AWS endpoint settings 1 3.2. MQTT Client-ID settings 1	8 8 9
4 4.1 4.2 4.3	3. Set MQTT Node in Node-RED 1 3.1 AWS endpoint settings 1 3.2. MQTT Client-ID settings 1 3.3. Import certificates 2	8 8 9 0
4 4.1 4.2 4.3 4.4	3. Set MQTT Node in Node-RED 1 3.1 AWS endpoint settings 1 3.2. MQTT Client-ID settings 1 3.3. Import certificates 2 3.4. check connection 2	8 8 9 0
4 4.1 4.2 4.3 4.4 5	3. Set MQTT Node in Node-RED13.1 AWS endpoint settings13.2. MQTT Client-ID settings13.3. Import certificates23.4. check connection24. Advanced: Create and use AWS Shadow2	8 8 9 0 2
 4.1 4.2 4.3 4.4 5 5.1 	3. Set MQTT Node in Node-RED13.1 AWS endpoint settings13.2. MQTT Client-ID settings13.3. Import certificates23.4. check connection24. Advanced: Create and use AWS Shadow24.1. Create our shadow document2	8 9 0 2 2
 4.1 4.2 4.3 4.4 5 5.1 5.2 	3. Set MQTT Node in Node-RED.13.1 AWS endpoint settings13.2. MQTT Client-ID settings13.3. Import certificates23.4. check connection24. Advanced: Create and use AWS Shadow24.1. Create our shadow document24.2. Edit policy2	8 9 0 2 2 3

AWS IoT (EN) - 2 / 26

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A standard MQTT client from Node-RED is used to establish the connection between mbEDGE (node-red) and AWS. The "AWS IoT" service is used on the AWS website. Here are the rough steps for implementation:

- 1. AWS account for the AWS IoT service
- 2. Create AWS IoT object
 - a. Create certificates (for establishing a connection for authentication)
 - b. Create a guideline (which device may use which functions such as publish or subscribe)
- 3. Create MQTT client in Node-RED
 - a. Enter AWS endpoint as MQTT server
 - b. Enter the MQTT client ID
 - c. Import certificates
- 4. Advanced: Create and use AWS Shadow

First of all we need a mbNET router and the mbEDGE option SD Card. Every mbNET router starting from Hardwareversion 3 is suitable.

AWS IoT (EN) - 3 / 26

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1 Prerequisite

You can either use the mbNET router as an classic router without using with the device management cloud mbCONNECT24 or with mbCONNECT24. In both ways your mbEDGE card must be enabled and the Node-RED flow editor must be accessible.

AWS IoT (EN) - 5 / 26

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2 1. Create your AWS Account

aws	English v
	Create an AWS account
AWS Accounts Include 12 Months of Free Tier Access Including use of Amazon EC2, Amazon S3, and Amazon DynamoDB Visit aws.amazon.com/free for full offer terms	Email address Password Confirm password WVS account name Sign in to an existing AWS account

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3 2. Create AWS IoT object

3.1 2.1. Create the object by "Register a thing"



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3.2 2.2. Create a single thing

Creating AWS IoT things	(
An IoT thing is a representation and record of your phyisical device in t device needs a thing record in order to work with AWS IoT. Learn more	he cloud. Any physical
Register a single AWS IoT thing Create a thing in your registry	Create a single thing
Bulk register many AWS IoT things Create things in your registry for a large number of devices already using AWS IoT, or register devices so they are ready to connect to AWS IoT.	Create many things
Cancel	Create a single thing

3.3 2.3. Define your thing name. Thing Names should be unique per device. Use mbNET in this example.

create a thing Add your device to the thing registry	STEP ?
This step creates an entry in the thing registry and a thing shadow for your device. Name mbNET	

scroll down to "next" and leave all other empty or nothing.

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AWS IoT (EN) - 8 / 26



Cancel	Back	Next		
		7		
	· · · · · · · · · · · · · · · · · · ·			

Important

Thing Names should be unique per device. The Thing Name should also correspond with the Client ID, which must be unique.

3.4 2.4. Create your certificates



AWS IoT (EN) - 9 / 26

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3.5 2.5. Download your certificates (1) and the root CA (2). After then activate (3) and your all set (4).

Certificate crea	ted!	
Download these files and public keys cannot be retr In order to connect a dev	save them in a safe place. Certificat ieved after you close this page. vice, you need to download the fol l	es can be retrieved at any time, but the private and
A certificate for this thing	d0377249f5.cert.pem	Download 1
A public key	d0377249f5.public.key	Download
A private key	d0377249f5.private.key	Download
You also need to downlo A root CA for AWS IoTDo Activate	ad a root CA for AWS IoT: wnload	2 4
Cancel		Done Attach a policy

If you are done, you should see the thing "mbNET" like this.

AWS IoT (EN) - 10 / 26

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AWS IOT	Things	
Monitor	Search things Q	
Onboard		
Manage	mbNET	
Things	NOTIFE	
Types		
Thing groups		
Billing Groups		
Jobs		
Tunnels		

AWS IoT (EN) - 11 / 26

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3.6 2.6. Create your policy



Define a name and add your policy statements

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←	
Create a policy	
	U
Create a policy to define a set of authorized actions. You can authorize actions on one or m topics, topic filters). To learn more about IoT policies go to the AWS IoT Policies documenta	nore resources (things, ation page.
Name	
mbNET_allow_ALL	
Add statements	
Policy statements define the types of actions that can be performed by a resource.	Advanced mode
Action	
Action	

We want to differ between "Connect", "Publish/Receive" and "Subscribe". The policy handles the access to your things and topics.

In our Example we allow all to connect and access to topic "mymbNETTopic". If you want to allow all, the use the wildcard "*" instead of the topic name.

Add "iot:Connect" to the "Action" field and "Add statement". Replace the word "replaceWithAClientId" in the field "Resource ARN" with "\${iot:Connection.Thing.ThingName}"

Advanced mod

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Add "iot:Publish, iot:Receive" to the "Action" field and "Add statement". Replace the word "replaceWithATopic" in the field "Resource ARN" with "mymbNETTopic"

iot:Publish, iot:Rece	ive	-	
Resource ARN			
arn:aws:iot:us-west	-2:827491435302:topic/n	nymbNETTopic 🔶	
Effect			
_			

👍 Warning

If you want to access all topics, replace "replaceWithATopic" with "*". But use this only for testing purpouses, NOT for production use.

Add "iot:Subscribe" to the "Action" field and "Add statement". Replace the word "replaceWithATopicFilter" in the field "Resource ARN" with "mymbNETTopic"

iot:Subscribe	
esource ARN	
arn:aws:iot:us-west-2:827491435302:topicfilter/mymbNETTopic	
ffect	
Allow Deny	Remove

👍 Warning

If you want to access all topics, replace "replaceWithATopic" with "*". But use this only for testing purpouses, NOT for production use.

When you are finished, click on "Create" at the bottom of the website.

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AWS IoT (EN) - 14 / 26





Select your thing

		•••
Manage		
Things		
Types		
Thing groups		
Billing Groups		
Jobs	•	
Tunnels		
Greengrass		

Select your certificate

AWS IoT (EN) - 15 / 26

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Things > mbNET		
THING mbNET NO TYPE		
Details	Certificates	
Security	Create certificate	View other options
Thing groups		view other options
Billing Groups		
Shadow	d0377249f5910b	 046ef
Interact		
Activity		

Attach your policy to your certificate

ings > mbNET > d CERTIFICATE d0377249	0377249f5910b46ef95 0f5910b46ef95fa11dbf46cee0d2d2d1723c0938c	d450e727b396ef4f0
ACTIVE		Actions -
		Activate
Details	Policies	Deactivate
		Revoke
Policies	There are no policies attached to this certificate.	Accept transfer
Things		Reject transfer
		Revoke transfer
Non-compliance		Start transfer
		Attach policy
		Attach thing
		Download

AWS IoT (EN) - 16 / 26

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Attach policies to certificate(s)			
Policies will be attached to the following certificate(s): d0377249f5910b46ef95fa11dbf46cee0d2d2d1723c0938d450e72	27b396ef4f0		
Choose one or more policies	Choose one or more policies		
Q Search policies			
mbNET_allow_ALL	View		
1 policy selected	Cancel		
1 policy selected	Cancel Attach		

AWS IOT (EN) - 17 / 26

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4 3. Set MQTT Node in Node-RED

Flow 1	
(□⇒	timestamp
Edit mqtt out no	de
Delete	Cancel Done
Properties	
Server 🔇	AWS-IoT
📰 Торіс	mymbNETTopic
🛞 QoS	▼ [®] Retain
Name	Name

4.1 3.1 AWS endpoint settings

AWS Node-RED

AWS IoT (EN) - 18 / 26

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Select AWS cons	ole \rightarrow Settings at AWS IoT	Edit your MQTT node settings and use the Endpoint from your AWS Endpoint setting for the MQTT server setting.
AWS 10T	Settings	Edit matt out onde s. Edit matt broken node
Montor Droboard Manage Greengrass Secure Defend	Custom endpoint This insure cancer endpoint that allows you to connect to AMS ioT. Es is also an Important property to insert when using an MQTT client or th Your endpoint is provisioned and ready to use. You can now start to j Endpoint a195dn801th)f-at5.10t.us-west-2.anazonaus.com	Delete Cancel Updat
Art Test	Logs You can enable AWS lot to log helpful information to GloudWatch Log- broker and the rules engine, AWS LoT logs process events which can be Role Level of verbosity Disabled	Name AWS-IoT Conjection Security Messages
Software Settings	EVENT-based messages AWS IoT can send event-based messages to pre-determined MQTT topi	 Server al9sdn8b1thyf-ats.iot.us-west-2.ama Port 8883 ✓ Enable secure (SSL/TLS) connection TLS Configuration AWS-mbNET ✓
		Client ID mbNET Keep alive time (s) 60 Use clean session Use legacy MQTT 3.1 support

4.2 3.2. MQTT Client-ID settings

AWS		Node-RED
The Things Name i	s your Client-ID for the MQTT node.	Edit mqtt out node > Edit mqtt-broker node Delete Cancel Update
🖗 AWS IOT	Things	Properties AWS-IoT
Monitor	Search things Q	Connection Security Messages © Server al9sdn8b1thyt-ats.iot.us-west-2.ama Port 8883 © Envie secure (SSL/TLS) connection Fort 8883
Manage Things	mbNET	TLS outpuration AW3-mbNET Client ID mbNET
Types Thing groups Billing Groups		Use legacy MQTT 3.1 support
Jobs Tunnels		
Greengrass Secure		
Defend		

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4.3 3.3. Import certificates

your Computer	Node-RED
Name	Edit mqtt out node > Edit mqtt-broker node > Edit tls-config node
🖉 d0377249f5-certificate.pem	Delete Cancel Update
🕢 d0377249f5-private.pem.key	© Properties
d0377249f5-public.pem.key root_CA.pem	Use key and certificates from local files
	Certificate
	Private Key 1 Upload d0377249f5-private.pem 💌
	Passphrase private key passphrase (optional)
	CA Certificate
	✓ Verify server certificate
	Server Name for use with SNI
	1

4.4 3.4. check connection

Change to AWS Test page and use the topic "mymbNETTopic" and subscribe.

🏠 AWS IOT	MQTT client ⑦	Connected as iotconsole-1588608133881-2 🝷
Monitor	Subscriptions	
Manage Greengrass Secure Defend	Subscribe to a topic Publish to a topic	Subscribe Devices publish MQTT messages on topics. You can use this client to subscribe to a topic and receive these messages. Subscription topic mymbNETTopic Subscribe to topic
Act Test		Max message capture ⑦ 100 €

Every Inject on "timestamp" will send a message to AWS and you can see it at the MQTT client test page.

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AWS IoT (EN) - 20 / 26



AWS IOT	MQTT client 💿	Connected as iotconsole-1588608133881-
Monitor	Subscriptions	mymbNETTopic Export Clear Pause
Onboard Manage	Subscribe to a topic	Publish
Greengrass	Publish to a topic	Specify a topic and a message to publish with a QoS of 0.
Secure	mymbNETTopic 🗙	mymbNETTopic Publish to topic
Defend		1 { 2 "message": "Hello from AWS IOT console"
Act		3)
lest		
		mymbNETTopic May 4, 2020 6:03:42 PM +0200 Export Hide
		1588608219008
AWS IOT		
🗖 🖹 t	imestamp 👌 ——	mymbNETTopic
		Connected
		Connected

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5 4. Advanced: Create and use AWS Shadow

5.1 4.1. Create our shadow document

÷ [Things > mbNET]	
	THING MDNET NO TYPE		Actions -
	Details	Shadow ARN	
	Security Thing groups	A shadow ARN uniquely identifies the shadow for this thing. Learn more	
	Billing Groups	arn:aws:iot:us-west-2:827491435302:thing/mbNET	
	Shadow Interact	Shadow Document	Delet Edit
	Activity	Last update: Jan 1, 1970 1:00:00 AM +0100	_
	SOOL	Shadow state:	
	Violations	()	
	Defender metrics	Motodata	

Copy the Follwing code block into the shadow state:

Shadow Document		Delete Cancel Save
Last update: Jan 1, 1970 1:00:0	0 AM +0100	1
Shadow state:		•
<pre>1 & 2 "desired": { 3 "DOUT1": "low", 4 "DOUT2": "low" 5 }, 6 "reported": { 7 "Firmwareversion" 8 "DIN1": "low", 9 "DIN2": "low", 10 "DIN3": "low", 11 "DIN4": "low", 12 "DOUT1": "low", 13 "DOUT2": "low" 14 } 15 }</pre>	: "0",	

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Bankverbindung / Bank account

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USt-IDNr. / VAT-ID-No. DE 185259018 St-Nr. / Tax-No. 203/132/20444

AWS IoT (EN) - 22 / 26



Shadow Code				
1	{			
2	"desired": {			
3	"DOUT1": "low",			
4	"DOUT2": "low"			
5	},			
6	"reported": {			
7	"Firmwareversion": "0",			
8	"DIN1": "low",			
9	"DIN2": "low",			
10	"DIN3": "low",			
11	"DIN4": "low",			
12	"DOUT1": "low",			
13	"DOUT2": "low"			
14	}			
15	}			

5.2 4.2. Edit policy

Select your thing and then the certificate. Select then the policy and edit the policy

mbNET_al			
	Act		
Overview	Policy ARN		
Certificates			
/ersions	A policy ARN uniquely identifies this policy. Learn more		
iroups	arn:aws:iot:us-west-2:827491435302:policy/mbNET_allow_ALL		
Ion-compliance			
	Policy document		
	Policy document The policy document defines the privileges of the request. Learn more		
	Policy document The policy document defines the privileges of the request. Learn more Version 2 updated May 4, 2020 6:19:43 PM +0200 Edit policy docu		

Edit the policy as follows:

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AWS IoT (EN) - 23 / 26



```
Policy
```

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "iot:Connect",
      "Resource": "arn:aws:iot:us-west-2:827491435302:client/$
{iot:Connection.Thing.ThingName}"
   },
    {
      "Effect": "Allow",
      "Action": "iot:Publish",
      "Resource": [
        "arn:aws:iot:us-west-2:827491435302:topic/mymbNETTopic",
        "arn:aws:iot:us-west-2:827491435302:topic/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update"
      ٦
   },
    {
      "Effect": "Allow",
      "Action": "iot:Receive",
      "Resource": [
        "arn:aws:iot:us-west-2:827491435302:topic/mymbNETTopic",
        "arn:aws:iot:us-west-2:827491435302:topic/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update/delta"
      ]
   },
    {
      "Effect": "Allow",
      "Action": "iot:Subscribe".
      "Resource": [
        "arn:aws:iot:us-west-2:827491435302:topicfilter/mymbNETTopic",
        "arn:aws:iot:us-west-2:827491435302:topicfilter/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update/delta",
        "arn:aws:iot:us-west-2:827491435302:topicfilter/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update/get/accepted",
        "arn:aws:iot:us-west-2:827491435302:topicfilter/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update/get/rejected",
        "arn:aws:iot:us-west-2:827491435302:topicfilter/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update/documents",
        "arn:aws:iot:us-west-2:827491435302:topicfilter/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update/accepted",
        "arn:aws:iot:us-west-2:827491435302:topicfilter/$aws/things/$
{iot:Connection.Thing.ThingName}/shadow/update/rejected"
      }
 ]
}
```

AWS IoT (EN) - 24 / 26

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🔒 Attention

The name "arn:aws:iot:us-west-2:827491435302" could be different to your setting. Use the name of the resource from "iot:connect" segment.

5.3 4.3 Add the Node-RED Flow

This Node-RED Flow is an example on how to inreract between the mbNET router and AWS shadow. The "cloud" node communicates with the router to read and write the routers variables. In our case here we request to set/reset the digital Outputs 1 and/or 2 depending on the request from the AWS shadow. Whenever there is a change on this digital Outputs or Inputs we report to AWS shadow the status. The node "device" returns the status of the router interfaces and firmware version.



The flow can be downloaded here: https://helpdesk.mbconnectline.com/en/index.php? type=page&urlcode=872841&title=NR10V1-AWS-Connector

After activating the flow, you will see the firmwareversion of the mbNET in your AWS shadow:

AWS IOT (EN) - 25 / 26

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mbNET			
NO TYPE		Acti	ons 🝷
Details	Shadow ARN		
Security Thing groups	A shadow ARN uniquely identifies the shadow for this thing. Learn more		
Billing Groups	arn:aws:iot:us-west-2:827491435302:thing/mbNET		
Shadow			
Interact	Shadow Document	Delete	Edit
Activity	Last update: May 4, 2020 6:20:17 PM +0200		
Jobs	Shadow state:		
Violations Defender metrics	<pre>{ "desired": { "DOUT1": "low", "DOUT2": "low", }, "reported": { "Firmwareversion": "6.2.2", "DIN1": "low", "DIN2": "low", "DIN3": "low", "DIN4": "low", "DIN4": "low", "DOUT1": "low", "DOUT2": "low", } }</pre>		

You can set the DOUT1 or DOUT2 (digital output) of the mbNET to "low" or "high" state. If digital Inputs are connected to the DI1-4 it will be reported here.

AWS IoT (EN) - 26 / 26

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