



Pushing Performance



People | Power | Partnership

HARTING MICA Wireless User Guide

2. Edition 2018

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This Guide refers to Base Version 3, Interface Version and Container Version 1.1.0_b1.



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1 Overview

MICA® Wireless brings a full suite of wireless connectivity to the award-winning HARTING Modular Industry Computing Architecture. It lets you collect and process data directly at the machine or plant and forward relevant information to MES and ERP systems wirelessly.

This guide describes the basic MICA Wireless; depending on the MICA variant you have, there may be an additional function board installed in the device. For any functionality specific to the function board, please refer to the documentation for your MICA variant.

2 Components and Connectors

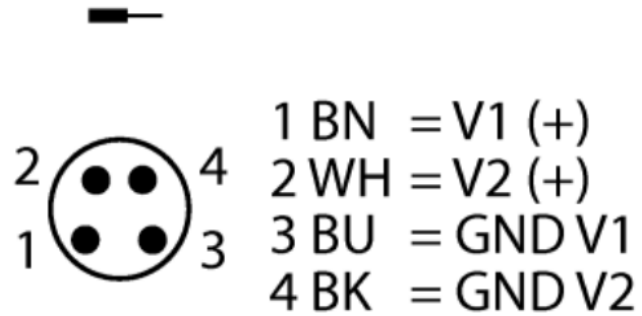


The order of connectors is as shown in the picture above (from left to right)

- M8 24 V Power connector
- Reverse SMA for Wi-Fi (802.11.a/b/g/n, 2.4GHz and 5GHz)
- Reverse SMA for GNSS
- Reverse SMA for GSM / UMTS

3 Connecting MICA Wireless to Power

If you received a power supply, connect the cable to the M8 connector. If you received an open ended power cable, the pin layout is:



Pins 1 and 2 as well as pins 3 and 4 are connected with each other internally.

4 Antenna Selection and Installation

When installing antennas, make sure that you use the appropriate antennas and adapters. The connections on the MICA are reverse SMA. If you are using SMA antennas, the connectors will physically fit, but will not connect correctly electronically.

Since the MICA Wireless only comes with one antenna for each technology, the strength of the connection can depend highly on the relative orientation of the antennas on the MICA and other wireless devices the MICA connects to. If you experience weak connections or frequently dropped connections, check the relative alignment, or chose a different antenna with a more appropriate characteristic.

Note: if you experience weak connections or frequently dropped connections, please check that the antennas are installed and connected correctly first. Then try adjusting the relative alignment of the antennas on the MICA and other wireless devices or access points in your wireless network.



5 Initial Configuration

When the MICA Wireless is initially connected to power, it starts in *Access Point mode* with IP address 10.10.10.10 and WPA2 enabled.

The SSID and WPA2 password are listed on the type shield on the bottom of the MICA. Use these to connect to the MICA from your PC or tablet and to perform the initial configuration.

6 WiFi Client and Access Point Mode

The MICA Wireless is initially configured to start in *Access Point* mode. When you switch the MICA to *Client mode*, it will restart and try to connect to the specified wireless access point. If the MICA is unable to connect to an access point within 1 minute, it will restart in *Access Point mode* to make sure it stays available for configuration.

If you are preconfiguring the MICA to deploy later, you can disable this fallback mechanism by disconnecting the MICA from power after switching to *Client Mode*. The countdown to the fallback mechanism then starts when the MICA restarts.

7 WLAN Settings

7.1 Access Point Mode Configuration

To use the MICA Wireless as an access point:

1. Navigate to Settings → Network
2. Set the correct Country Code for your region
3. Set the operation mode to Access Point
4. Choose the Standard you want the access point to use
5. Optionally, select a specific channel
6. Select the desired security mode
7. Enter the SSID and the network key (PSK). Make sure to remember the access key since you will need it to connect any Wi-Fi client to the MICA.
8. Choose a DHCP lease range. This is the range of IP addresses the access point will issue to connected clients



The screenshot displays the web interface for configuring the MICA Wireless device. The page is titled "Network" and features a "WLAN Settings" section. The settings are as follows:

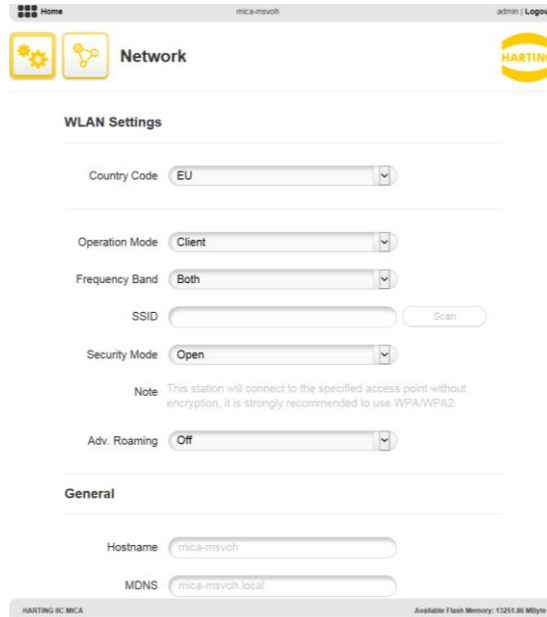
- Country Code: EU
- Operation Mode: Access Point
- Standard: 802.11 b/g/n (2.4 GHz)
- Channel: auto
- Security Mode: WPA/WPA2 Pre-shared Key
- SSID: mica-msvoh
- PSK: mica-msvoh
- DHCP Lease Range: 10.10.10.20 - 10.10.10.254

Below the WLAN Settings is a "General" section with the following setting:

- Hostname: mica-msvoh

At the bottom of the page, the text "HARTING IC MICA" and "Available Flash Memory: 13251.96 MByte" is visible.

7.2 Client Mode Configuration



The screenshot shows the 'Network' configuration page for a HARTING MICA device. The page is titled 'Network' and has a 'Home' button on the left and 'admin | Logout' on the right. The main content is divided into two sections: 'WLAN Settings' and 'General'.

WLAN Settings:

- Country Code: EU (dropdown menu)
- Operation Mode: Client (dropdown menu)
- Frequency Band: Both (dropdown menu)
- SSID: (text input field) with a 'Scan' button to the right.
- Security Mode: Open (dropdown menu)
- Note: This station will connect to the specified access point without encryption, it is strongly recommended to use WPA/WPA2.
- Adv. Roaming: Off (dropdown menu)

General:

- Hostname: mica-mvoh (text input field)
- MDNS: mica-mvoh.local (text input field)

At the bottom of the page, it says 'HARTING IC MICA' on the left and 'Available Flash Memory: 13251.88 MByte' on the right.

To configure the MICA in *client mode*.

1. Navigate to Settings → Network
2. Set the correct Country Code for your region
3. Set the Operation Mode to Client
4. Choose a frequency band
5. Enter the SSID of the access point or scan for available access points. You can also scan for available access points by clicking the Scan button.
6. Select the appropriate security mode supported by the chosen access point
7. Choose the desired roaming mode (see section 7.3).

When you switch the MICA to Client mode, it will restart and try to connect to the specified wireless access point. If the MICA is unable to connect to an access point within 1 minute, it will restart in Access Point mode to make sure it stays available for configuration.

7.3 Advanced Roaming

Starting with Firmware 3, the MICA Wireless supports two roaming modes between two or more access points with the same SSID and authentication.

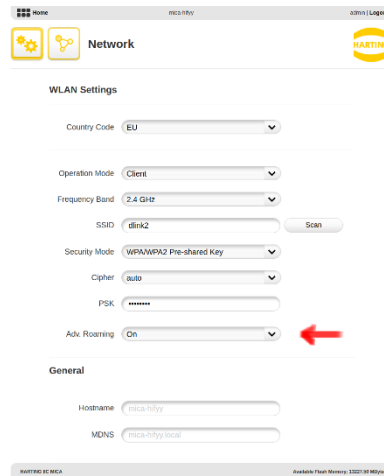
Normal Roaming

- The default roaming behavior is to switch the AP only if the connection to the old AP is lost. This saves energy, but can cause low bandwidth and higher latency at larger distances to the access point.

Advanced Roaming

- MICA checks for new access points every 5 seconds and switches the to a new access point if the signal strength drops below -40dBm.

Advanced roaming can be activated in the Client network settings.



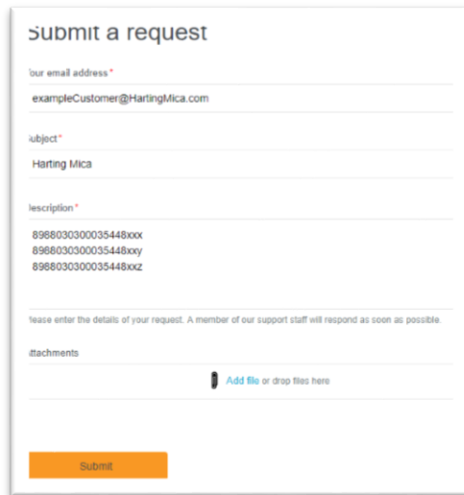
While advanced roaming is active, it is recommended not to launch scans for additional access points.

8 LTE Configuration

MICA Wireless ships with an Emnify eSIM. To commission the eSIM and set up your account, check with your system administrator, or follow the instructions in the *EMnify Set-Up Guide* available at www.emnify.com to sign up for the Emnify User Interface.

If you were invited to the Emnify User Interface by an existing organization, you should have received an email with an activation link. Please open the link within 48 hours and choose a password for your account. You will then be able to log in with your email address and chosen password.

After signing up, please create a support ticket with the ICC-IDs of the MICAs you want to use on a mobile network. Emnify will activate your account typically within 24 hours.

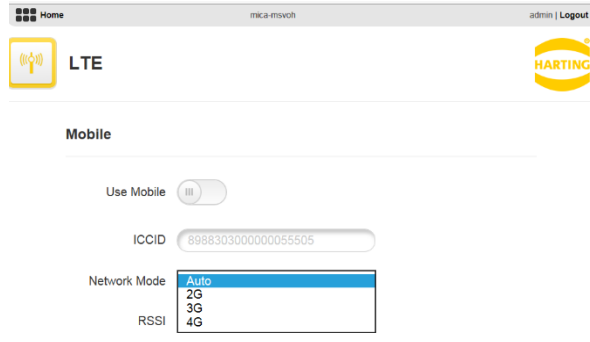


Notes

- Enter the same email address you used to log-in to the Emnify User Interface.
- Enter the 19-digit ICCID, listed on the MICA type shield or in the LTE container running on your MICA.
- If you want to get a higher volume of SIMs assigned you can enter an ICCID range or attach a list with all ICCIDs to the ticket.

9 The LTE Container

MICA Wireless ships with a container which handles the mobile and the GNSS (GPS, Galileo, GLONASS) module. To start using the module, start the mobile container—called LTE in the default installation—by clicking Start Module, and choose the desired network mode.



To start using the mobile network, move the Use Mobile slider to right. If you have not commissioned your eSIM, you will receive an error message.

The Received Signal Strength Indicator (RSSI) is a measurement of the power present in a received radio signal. If you have trouble keeping a stable connection you can use the RSSI to check if changes to the antenna position and orientation improve reception.

10 Using LTE Communications

You can connect your mobile container using the web UI or the RPC interface:

```
https://<mica-name>/<container-name>/rpc/
```

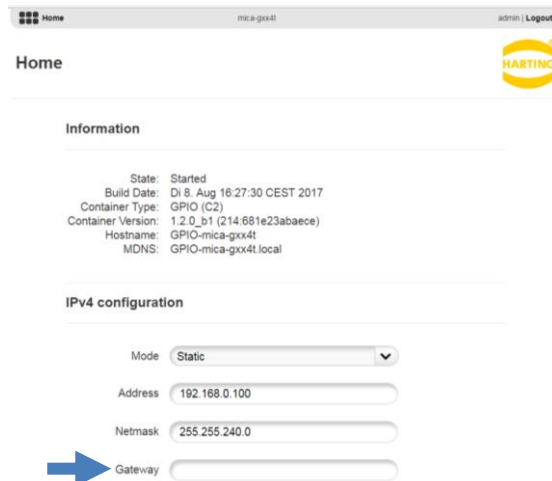
For more information on the RPC interface, you can append the container URL in your browser with /api, for example

```
https://<mica-name>/<container-name>/api
```

to view the container documentation.

You can now use this mobile connection from within other containers by adding the mobile container as default gateway by selecting the mobile container as the default IPv4 gateway in the Container Settings. To access the Settings, right-click on the container and select Settings.

Then add the mobile container as Gateway to the IPv4 Settings.



You can also log into the container with admin rights over ssh and setting the default gateway manually.

```
route del default
```

```
route add default gw <lte-container-ip>
```

For more information on working with additional network interfaces, see the application note Additional Network Interfaces in the Technical Resources section of www.harting-mica.com.

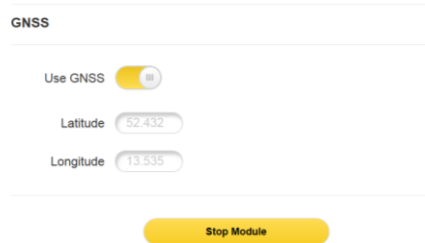


11 Accessing the LTE Container through Emnify VPN

To access the LTE container remotely from a mobile network (for example if you have WiFi access available), you need to use an OpenVPN connection via your Emnify account. To do this, login with your user account under www.emnify.com, go to Tokens, IPs & VPN Setup and follow the instructions.

12 Using Location Services

To activate Location Services, connect a GNSS antenna to the MICA and turn on the GNSS module in the mobile container (see 9) by moving the Use GNSS slider to the right. Note that it can take up to 20 minutes for the module to achieve a position lock when activated for the first time or after moving the MICA Wireless a large distance.



Position information can be requested from the Wireless Container either via the container UI or by using RPC calls.

The JSON RPC need to be requested from

```
https://<mica-name>/< container-name>/rpc/
```

It is necessary to have GNSS enabled before getting GNSS position information. When GNSS is enabled for the first time, it can take up to 20 minutes for the MICA to lock on to a sufficient number of satellites to calculate its position. If you cannot receive a GNSS position, check that GNSS is enabled, that an appropriate antenna is connected, and that the antenna has an unobstructed view of the sky.

To request GNSS data using RPC¹, enable the interface

```
{
  "method" : "set_config",
  "params" : { "auth_token" : auth_token, { "gnss": True } }
}
```

and request the latitude and longitude.

```
{
  "method" : "get_state",
  "params" : { "auth_token" : auth_token }
}
```

¹ The ID and JSON information is being left out for readability. Please see the *MICA Programming Guide* for an overview of the MICA JSON RPC API.



The response will look like the following.

```
{  
  "result" : {  
    "rssi"      : rssi,  
    "gnss_position" : [ latitude, longitude ]  
  }  
}
```

13 Further Documentation

Documentation on programming your MICA or developing custom hardware is available from <http://www.harting-mica.com/>. If you need further assistance, please contact your HARTING partner, or email micasupport@harting.com.

14 Appendix

14.1 LED modes

14.1.1 System status

LED color	Mode	Status
Green	On	Operating normally
Green	Flashing	Initialization
Red	On	Boot process

14.1.2 Mobile network status

LED color	Mode	Status
Red	200ms on / 1800ms off	Looking for network
Red	1800ms on / 200ms off	Idle
Red	125ms on / 125ms off	Transferring data
Red	Off	Module disabled

14.1.3 WiFi status

LED color	Mode	Status
Orange	on	WiFi eabled
Orange	Off	WiFi disabled
Red	125ms on / 125ms off	Transferring data
Red	Off	Module disabled