



MTX-GTW II-R

SOFTWARE USER **MANUAL**



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BSP INSTALLATION

The following section explains how to install the MTX-GTW II-R BSP, based on an installation with Ubuntu 14.04 LTS.

● 1. Pre-requisites

Before installing the environment, we need to install the following packages:

- autoconf
- gawk
- dialog
- ncurses-dev
- bison
- flex
- quilt
- texinfo
- gettext
- g++
- libxml-parser-perl
- python-dev
- zip

To install in Ubuntu, we can use the following command:

```
sudo apt-get install autoconf gawk dialog ncurses-dev bison flex quilt texinfo gettext g++ libxml-parser-perl python-dev zip
```

● 2. Ptxdist Installation

Ptxdist installation package can be download in the following link:

<http://www.ptxdist.org/software/ptxdist/download/ptxdist-2013.12.0.tar.bz2>

Once downloaded, unzip the file in a temporary directory and execute the following instructions:

```
cd ptxdist-2013.12.0
./configure
make
sudo make install
```

● 3. Install Toolchain

There are two possibilities to download the toolchain:

3.1 Using apt-get (recommended)

The following steps illustrate how to obtain the toolchain directly from the pengutronix repository:

- Add repository

To add the repository we need to create the file “/etc/apt/sources.list.d/pengutronix.list” with the following content:

```
deb http://debian.pengutronix.de/debian/ sid main contrib
non-free
```

- Add pengutronix keychain:

Before being able to correctly access the pengutronix repository it's necessary to install the package pengutronix-archive-keyring:

```
sudo apt-get install pengutronix-archive-keyring
```

- Obtain Toolchain

Finally, to obtain the toolchain, we need to execute the following commands:

```
sudo apt-get update

sudo apt-get install oselas.toolchain-2013.12.2-arm-v5te-
linux-gnueabi
```

Once the process is over, the toolchain will be available in the directory /opt

3.2 Toolchain version source

This version can be obtained in the following link:

<http://www.pengutronix.de/oselas/toolchain/download/OSELAS.Toolchain-2013.12.2.tar.bz2>

To install it correctly we need to:

- Modify the /opt folder permits to be able to write in it (chmod 777 /opt)
- Unzip the downloaded file in a temporary directory
- Stand on the created directory and execute the following commands:

```
ptxdist select ptxconfigs/arm-v5te-linux-gnueabi_gcc-4.8.2_
glibc-2.18_binutils-2.24_kernel-3.12-sanitized.ptxconfig
ptxdist go
```

Once the process is over, the toolchain will be available inside the /opt directory.

NOTE: The length of this process will vary depending on the used PC. It can take up to several hours.

● 4. Obtain BSP

The BSP for MTX-GTW-R can be downloaded from the following link:

<ftp://ftp.matrix.es/mtxm2m/Gateways%20M2M/Software/BSP/MTX-GTW-R-BSP-REV.0100.tar.gz>

Once the download is over, it is recommended to unzip the file inside the folder /opt. On this document we will reference this path as <path_instalación_BSP> (In case this recommendation is followed: /opt/MTX-GTW-R-BSP-REV.0100/).

IMAGE CREATION

● 1. Create an Image

To create a complete image we must execute the following commands:

```
cd <path_instalacion_BSP>  
ptxdist go  
ptxdist images
```

The first command will launch the compilation of all the preselected utilities, including bootloader and kernel while the second command will gather the result of the compilation and will compact it in several easy to use files in the process of upgrading/recording on the equipment.

Once the process is over, the images will be available in the directory <path_instalacion_BSP>/platform-tqma28/images/

NOTE: If these steps regarding the BSP downloaded directly from the server are followed (without changes), the generated image will have the same configuration as the test image.

KERNEL CUSTOMIZATION

As well as creating complete images, ptxdist allows to configure each one of the members composing this image.

On this section we will explain the steps to customize the kernel using ptxdist.

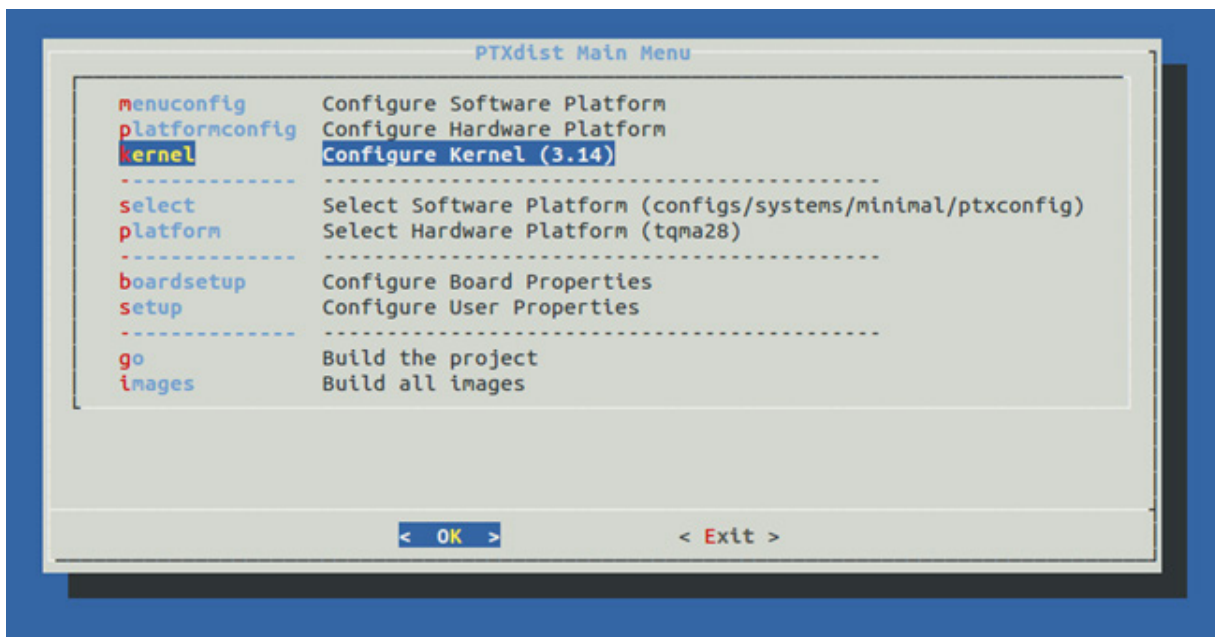
NOTE: The default configuration included in the BSP for the MTX-GTW-R includes all the needed drivers to interact with all the interfaces and devices included.

● 1. Access to the Kernel Configuration

To access the kernel configuration we need to execute the following command:

```
cd <path_instalacion_BSP>
ptxdist menu
```

When executed, the following screen will show:



We must select the option “kernel Configure Kernel (3.14)” that Will open a menu like the one generated by the menuconfig instruction.

NOTE: Before being able to perform customization actions on the kernel we need to generate a complete image. See Image Creation section.

ADD/DELETE UTILITIES

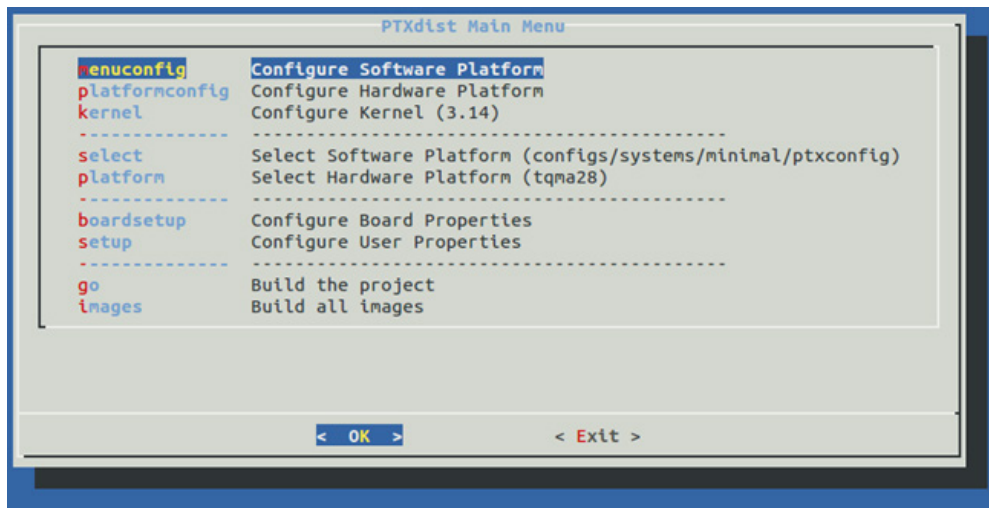
On this section we explain the steps to add or delete applications to the final image.

● 1. Access to Utilities Configuration

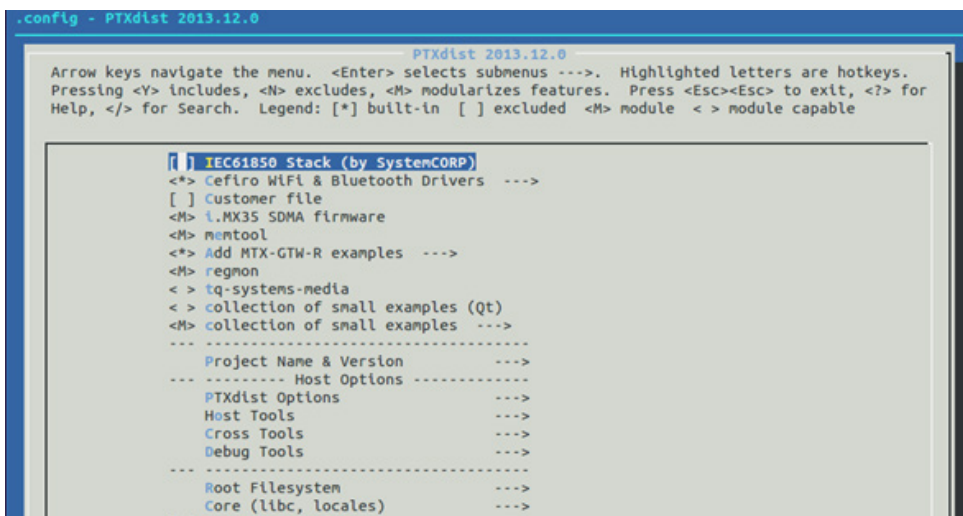
To access utilities configuration we must execute the following command:

```
cd <path_instalacion_BSP>
ptxdist menu
```

When executed, the following screen will show:

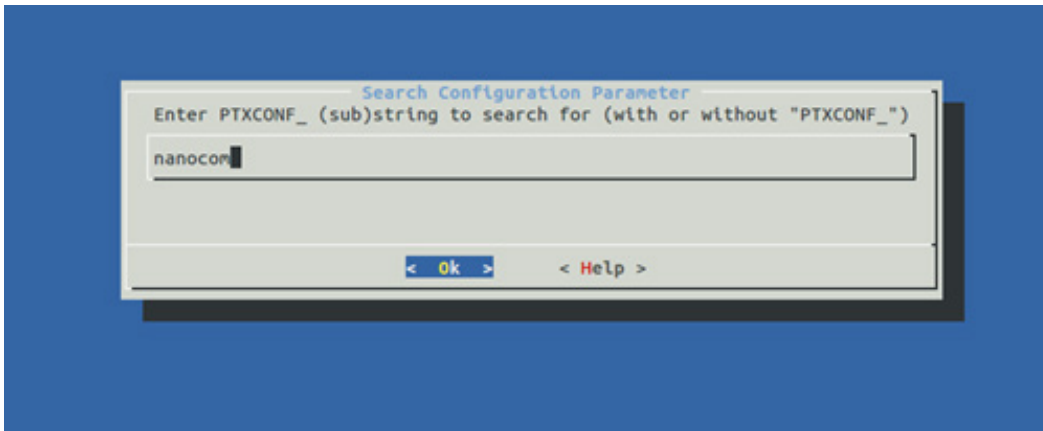


We need to select the option “menuconfig Configure Software Platform” that will open the following menu:

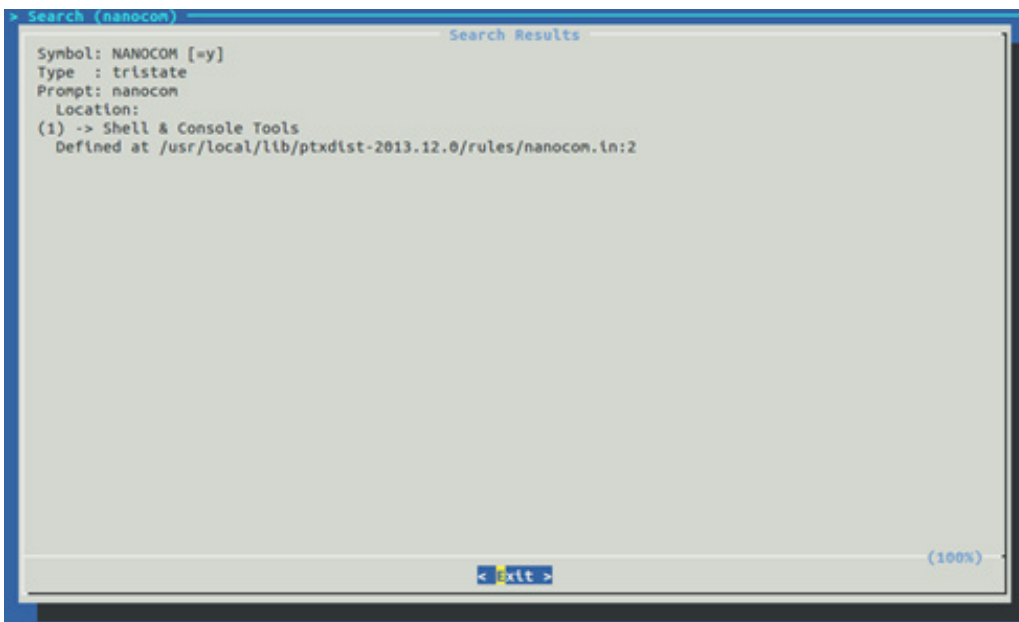


On this menú we will find all the utilities that by default can be included in the final image, distributed along the different sections.

NOTE: To find a specific utility, press key “/” and enter its name. For instance, to find the utility “nanocom”:



When we press OK, we will see all the related results:



The section Location indicates the path to select it or remove it.

INTERFACE ACCESS

● 1. Serial Ports

MTX-GTW II-R has 4 serial ports, 3 of them accesible externally via M8 connectors and an additional port. The correspondence of the serial ports from the OS is as shown in the following table:

UART	FUNCTIONALITY	CONNECTOR	PINS
ttyAPP0	RS485	CON1	5,6
ttyAPP1	RS232	CON2	5,6
ttyAPP3	RS232	CON3	1,2,5,6
ttyAPP4	TTL	Internal	-

Example of use: in the test image it is included the application nanocom, that allows the connection and testing of the UARTs in an easy way. For example, to interact with the RS485 port of connector 1.

The different options that need to be communicated to the command are:

```
-b Bit rate, the bit rate to use, valid options are 300,
1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

-p Parity setting, n for none, e for even or o for odd. Must
be the same as the remote system

-s Stop bits, the number of stop bits (1 or 2)

-d Data bits, the nuimber of data bits (7 or 8)

-f Flow control setting, h for hardware (rts/cts), s for
software (Xon/xoff) or n for none.

-e Echo setting

l Local echo, echos what you type if you can't see it
r Remote echo, if system can't see text or enable local echo
n No echoing
```

Since the port we want to use is an RS485 (using rts signal to activáte/deactivate the transmisión/reception) we need to specify it in the parameter -f with the value h:

```
nanocom /dev/ttyAPP0 -b 115200 -p n -s 1 -d 8 -f h -e n
```

● 2. CAN Ports

MTX-GTW II-R has two CAN 2.0B ports available in the M8 connectors according to the following table:

PIN	CON1	CON2
1	CAN0_P	CAN1_P
2	CAN0_N	CAN1_N

To configure them, the default image includes the tools “ifconfig” and “ip” as well as the testing utilities “candump” and “cansend”.

The following example configures both channels with a 100K bitrate:

```
#Can interfaces configuration:
ip link set can0 type can bitrate 100000
ip link set can1 type can bitrate 100000

#Can0 interfaces activation:
ifconfig can0 up
ifconfig can1 up
```

Once configured, we can use the utilities “candump” and “cansend” to receive and transmit data respectively.

```
#Example of reception of all the packages in the CAN0
interface:
candump can0

#Example of sending a package with ID 128 and content
0102030405:
cansend can0 -i 128 01 02 03 04 05
```

● 3. LED and DIP Switch

The following table specifies the different resources accesible via sysfs:

RESOURCE	GPIO	SYSFS
LED	GPIO3_6	102
Input (CONF 2)	GPIO0_24	24

Example with LED:

```
# Asking for the resource:
echo 102 > /sys/class/gpio/export

# Turn on LED:
echo low > /sys/class/gpio/gpio102/direction

# Turn off LED:
echo high > /sys/class/gpio/gpio102/direction

# Free the resource:
echo 102 > /sys/class/gpio/unexport
```

● 4. Control Modem (miniPCle card)

Along USB lines to access the different devices that can be integrated in the compatible miniPCle cards, the device has 2 control lines that allow controlling their power input (for instance, to make a hard reset or deactivate them):

SIGNAL	GPIO	SYSFS
PERST#	GPIO0_4	4
WDISABLE#	GPIO0_5	5

● 5. RTC and Battery Level

The utility “isBatteryLow” allows to know the current status of the RTC battery. The possible values sent back by the utility are:

```
<isBatteryLow>1</isBatteryLow> Battery with voltage level  
below threshold  
  
<isBatteryLow>0</isBatteryLow> Battery with voltage correct  
level
```

RECOVERY PROCESS

The following document describes the recovery process of MTX-GTW II-R devices. The same process can be done to install a new image created with the BSP obtained.

● 1. Download and Installation of the Freescale MFG Tool

- First we must download the MFG tool from the Freescale website (it's free but you need to register):

http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MCIMX28EVKJ&fsp=1&tab=Design_Tools_Tab

NOTE: Expand "Programmers" tab and download the file IMX_MFG_TOOL. If you have any issues contact with iotsupport@mtx2m.com

- Unzip the downloaded file

2. Download the Default Image

- Download the device default image that can be found in the following link:
<ftp://ftp.matrix.es/mtx2m/Gateways%20M2M/MTX-GTW-R/Images/MTX-GTW-R.rar>
- Unzip its contents in the folder Profiles of the Freescale MFG utility

● 3. Features of the Default Image

The default image has the following features:

Ethernet Configuration

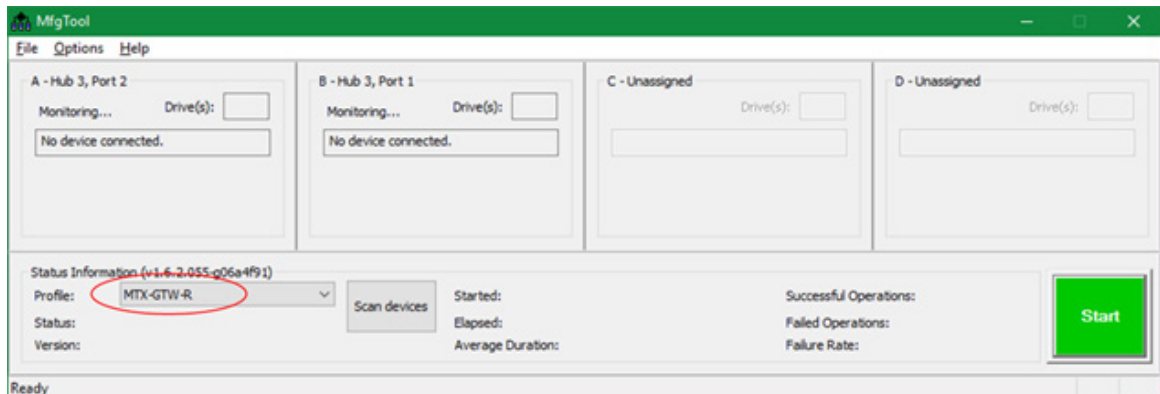
- ETH1 and ETH2 configured in switch mode
 - Static mode
 - IP 192.168.1.2 Netmask 255.255.255.0

Available services

- SSH (root user and password)
- Example utilities for UART, battery level control

● 4. Configure MFG Tool

- Open MFG utility and select the profile “MTX-GTW II-R”



- Select Options-> Configuration->eMMC only

● 5. Configuring the Device in Recovery Mode

Dip-Switch contact 1 allows the device to turn on in recovery mode.

SIP SWITCH	OFF	ON
1	Normal mode	Rescue mode

● 6. Start Software Charge

- Connect USB cable between PC and MTX
- Connect the MTX device to a power outlet

NOTE: If this is the first time following these steps, the PC will show the detection and installation of the HID USB driver.

- Inside MFT utility we will see a message saying there's a compatible device (“HID compatible device found”)
- Click on the Start button and wait until the installation finishes (don't disconnect USB cable or power chord until the process is over)
- Once the process is over, disconnect the power chord and the USB cable and reset switch

● 7. Finalization

When the device is powered again, it will turn on with the updated image.