

# MyStarNetwork PC Application User's Guide

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## 1. Introduction

### About MyStarNetwork Demonstration GUI

This help files describes the MyStarNetwork Demonstration application Graphical User Interface (GUI) front-end which displays wireless node network activity. The help file shows how to obtain and load the MyStarNetwork Demonstration embedded application images that work with the GUI and shows how to monitor the IEEE 802.15.4 PAN activity using the GUI.

### Installing MyStarNetwork Demonstration GUI

The MyStarNetwork Demonstration GUI is installed as part of the Kinetis IEEE® 802.15.4 MAC/PHY Software. See the *IEEE® 802.15.4 MAC/PHY Quick Start Guide* for more details related to software package installation.

After the successful installation of the Freescale IEEE® 802.15.4 MAC/PHY Software the MyStarNetwork Demonstration GUI can be found in the Connectivity Software installation folder (ConnSw\tools\MyStarNetworkDemo.exe).



## GUI Requirements

The MyStarNetwork Demonstration GUI has the following requirements:

- Windows XP, Windows Vista, Windows 7, Windows 8 or Windows 10 operating system
- User account privileges to load and open serial communication ports using the drivers provided for Freescale evaluation boards
- Microsoft .NET Framework 2.0 or later

## Embedded Applications Requirements

To use the MyStarNetwork Demonstration GUI, users need to have at least two boards running the IEEE 802.15.4 MyStarNetwork MAC application for Freescale connectivity platforms. One of the boards must have the MyStarNetwork Coordinator application already loaded. All the other boards need to run the MyStarNetwork End Device application.

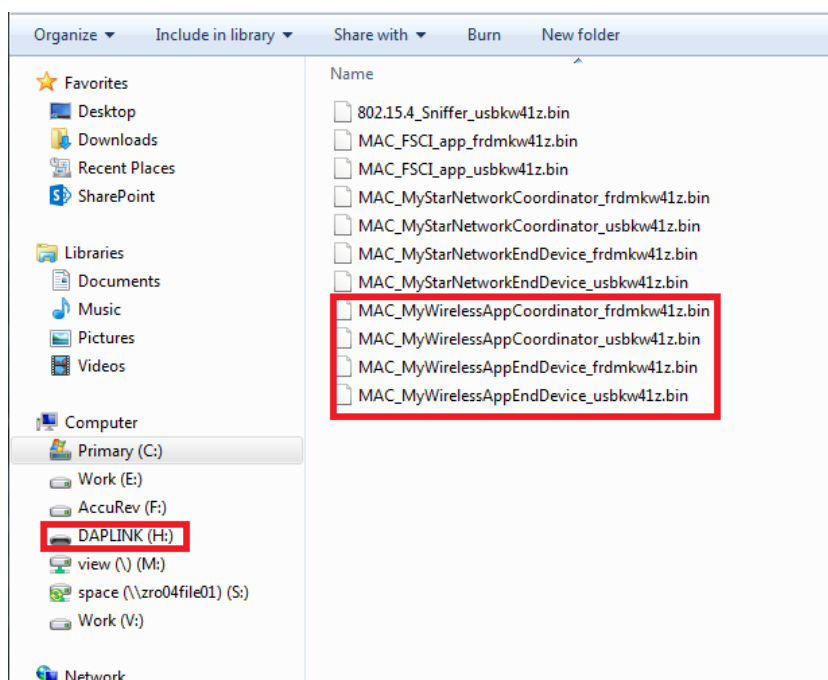
## 2. Restoring the MyStarNetwork Embedded Applications to a Board

If users reprogram their evaluation boards during development, the original MyStarNetwork Demonstration images can be restored to the boards by re-flashing the supplied binary images in .bin format for the applicable boards, or by rebuilding the IAR Embedded Workbench for ARM projects for the MyStarNetwork Demonstration (Coordinator) and MyStarNetwork Demonstration (End Device) configuration.

Performing the restore procedure described in the remainder of this section is not necessary if users have not overwritten their initial board images or if the boards are already programmed with the MyStarNetwork applications. To restore the MyStarNetwork applications to the boards, please follow the detailed instructions for the procedures summarized above:

### Re-flashing the Binary Image Using DAPLink MSD Bootloader

1. Navigate to ConnSw installation path (ConnSw\tools\binaries).
2. Plug in the board to a USB port of the PC containing the Freescale IEEE<sup>®</sup> 802.15.4 MAC/PHY Software.
3. A new drive called DAPLink should appear in the explorer.
4. Drag and drop the binary you want to restore in the DAPLink drive.



**Figure 1. MyStarNetwork binaries and DAPLink Drive**

5. Unplug and plug the board.

## Rebuilding the MyWirelessApp Project and Downloading it with IAR Embedded Workbench

1. Open the IAR workspace corresponding to the MyStarNetwork Coordinator or End Device applications from the connectivity software installation folder.
2. Make sure the debugger settings are configured to use the proper flash loader and probe.
3. Build and debug.
4. Disconnect the IAR debugger, power off the board, unplug the debugger probe and power on the board. You now should have the MyStarNetwork application flashed on the board.

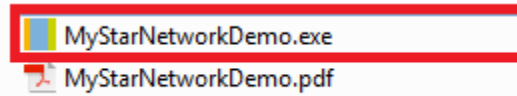
## 3. Running the MyStarNetwork Demonstration

### Starting the Demonstration and Creating the PAN

To start running the MyStarNetwork demonstration using the three evaluation boards, perform the following steps:

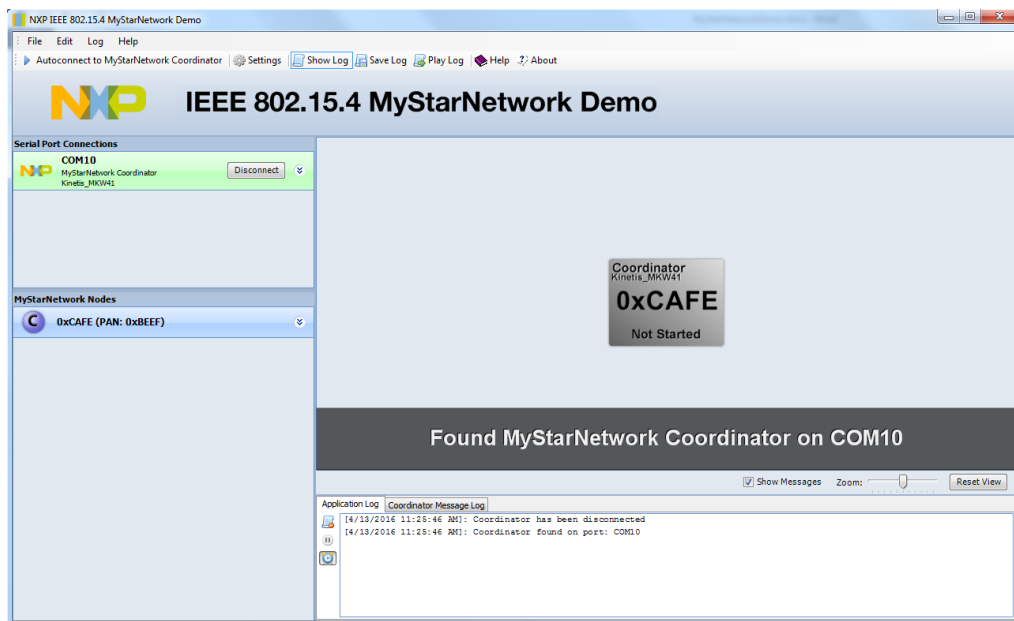
1. Install the batteries or plug a power supply into the Sensor Node and Low Power Node boards.
2. Connect the Network Node to the PC using a USB cable.

3. Power on the Coordinator board and follow the serial interface driver installation instructions as displayed in the Found New Hardware wizard on the PC.
4. Power on the End Device boards.
5. Navigate to the Connectivity Software installation folder and launch the MyStarNetwork Demonstration GUI (ConnSw\tools\ MyStarNetwork Demo\MyStarNetworkDemo.exe) as shown in Figure 2.



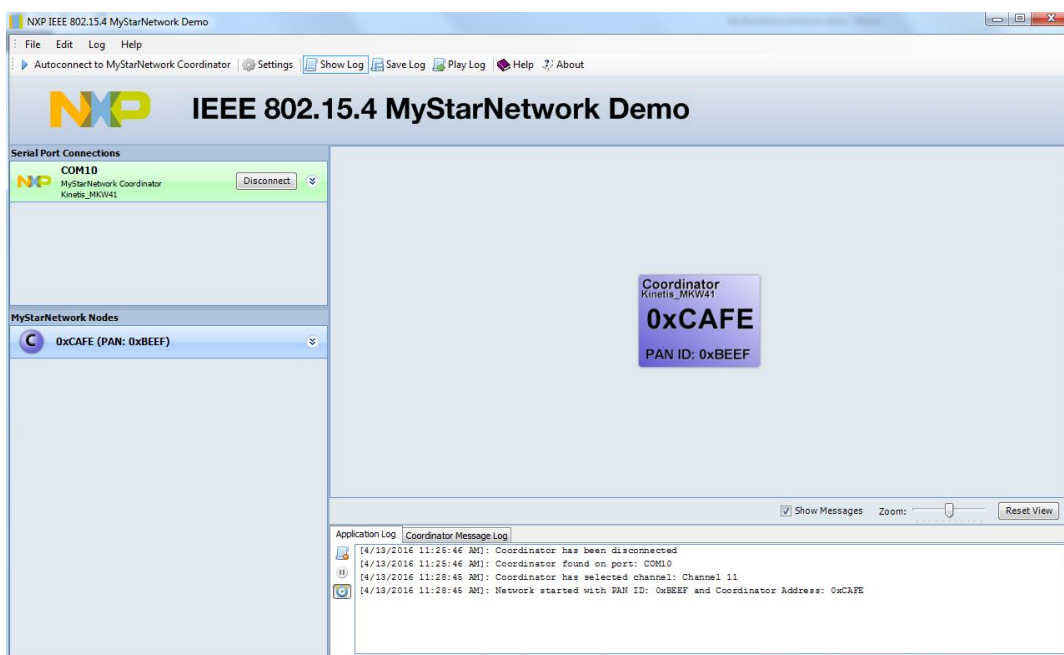
**Figure 2. MyStarNetworkDemo PC application icon**

6. The GUI starts and scans the serial port connections to auto detect the Network Node and the Application Log on the PC GUI displays which port the Coordinator was found as shown in Figure 3. If the Coordinator port is not found, repeat the auto scan by pressing the ‘Autoconnect to MyStarNetwork Coordinator’ button in the GUI toolbar. Ensure that no other application is keeping the Coordinator port open.



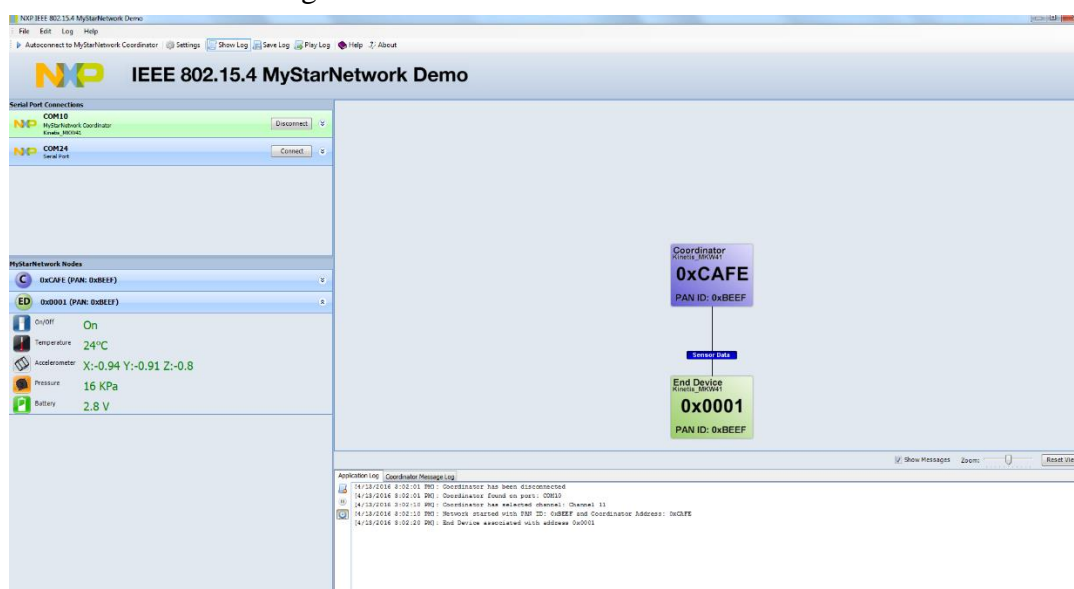
**Figure 3. MyStarNetwork Demonstration GUI Showing Detected Coordinator Port**

7. The Coordinator icon in the GUI displays the node short address 0xCAFE and the ‘Not Started’ message. The node has not yet initialized the IEEE 802.15.4 PAN. To initialize the PAN, press any of the switches or TSI buttons supported by the application on the Coordinator board or right-click on the Coordinator icon in the GUI and choose Start PAN Coordinator from the pop-up menu.
8. As the Coordinator forms the PAN, it performs an energy detection scan on all 802.15.4 RF channels and chooses a channel on which to start. The channel selected is the one that has the minimum energy level present at that point in time. The channel selected by the Coordinator is displayed in the GUI application log.
9. As the Coordinator is initialized, the icon is no longer greyed out and the PAN ID is displayed on the icon as shown in Figure 4.



**Figure 4. Coordinator has formed the PAN 0xBEEF on Channel 16**

10. Press any of the switches or TSI buttons supported by the application on the End Device board to join the first IEEE 802.15.4 End Device to the network. When the End Device joins, the GUI displays a new icon for the End Device as shown in Figure 5. In a few seconds, the device begins to send sensor data messages to the Coordinator.



**Figure 5. End Device Associated and Sending Data**

11. Press any key on the second End Device board to join the second IEEE 802.15.4 End Device to the network. When the device joins, another icon is displayed by the GUI which now shows the nodes in a star topology as shown in Figure 6.

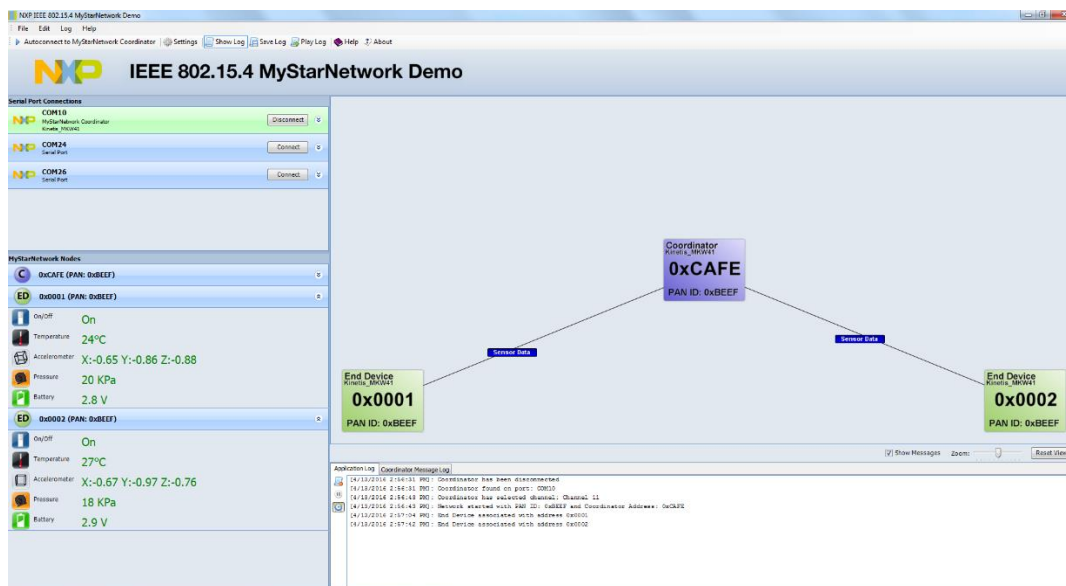


Figure 6. Coordinator with Two End Devices Associated and Sending Data

## Monitoring Sensor Data Reports

The end devices are sending board sensor data to the Coordinator. Data sent from the boards is displayed on the MyStarNetwork Nodes panel on the bottom left side of the GUI as shown in Figure 7.



Figure 7. Sensor data received from the end devices

The End Devices report five sensor items:

- On/off switch toggle state
- Temperature
- 3-axis acceleration
- Pressure

- Battery voltage

The data reported by the end devices changes randomly but the application can be adapted to read real data from the development boards inputs.

All association and sensor data information that the GUI displays is obtained from the Network Node which sends the packets it receives over the air from the end devices via the USB connection. In order to view the raw data packets sent through the USB from the Network Node, users can change to the “Coordinator Message Log” tab as shown in Figure 8.

Application Log	Coordinator Message Log
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1C Accelerometer:56,4C,4F, Pressure:11 Battery level:1E	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:19 Accelerometer:59,49,51, Pressure:11 Battery level:1D	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:17 Accelerometer:59,40,52, Pressure:13 Battery level:1F	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:1A Accelerometer:51,4E,54, Pressure:13 Battery level:1E	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:18 Accelerometer:51,45,48, Pressure:15 Battery level:1C	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1B Accelerometer:54,42,4A, Pressure:15 Battery level:1F	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:19 Accelerometer:54,4A,4B, Pressure:17 Battery level:1D	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1C Accelerometer:57,47,4D, Pressure:17 Battery level:1C	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:1A Accelerometer:57,4F,4E, Pressure:12 Battery level:1E	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:17 Accelerometer:4F,4C,50, Pressure:12 Battery level:1D	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1B Accelerometer:4F,43,51, Pressure:14 Battery level:1F	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:18 Accelerometer:52,40,53, Pressure:14 Battery level:1E	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1C Accelerometer:52,48,54, Pressure:16 Battery level:1C	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:19 Accelerometer:55,46,49, Pressure:16 Battery level:1F	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:17 Accelerometer:55,4D,4A, Pressure:11 Battery level:1D	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:1A Accelerometer:58,4A,4C, Pressure:11 Battery level:1C	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:18 Accelerometer:58,41,4D, Pressure:13 Battery level:1E	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1B Accelerometer:50,4F,4F, Pressure:13 Battery level:1D	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:19 Accelerometer:50,46,50, Pressure:15 Battery level:1F	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1C Accelerometer:53,43,52, Pressure:15 Battery level:1E	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:1A Accelerometer:53,4B,53, Pressure:17 Battery level:1C	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:17 Accelerometer:56,48,48, Pressure:17 Battery level:1F	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1B Accelerometer:56,50,49, Pressure:12 Battery level:1D	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:18 Accelerometer:59,4D,4B, Pressure:12 Battery level:1C	
Device address: 0001 Ctrl info:0F On/Off:01 Temperature:1C Accelerometer:59,44,4C, Pressure:14 Battery level:1E	
Device address: 0001 Ctrl info:0F On/Off:00 Temperature:19 Accelerometer:51,41,4E, Pressure:14 Battery level:1D	

Figure 8. Coordinator Message Log shows UART Communication with the Coordinator

At the end of the demonstration, users can reset or power off the end devices. After a 15 second timeout the devices are grayed out by the GUI and the status is set to inactive as shown in Figure 9. After 15 more seconds, the devices are removed from the display.

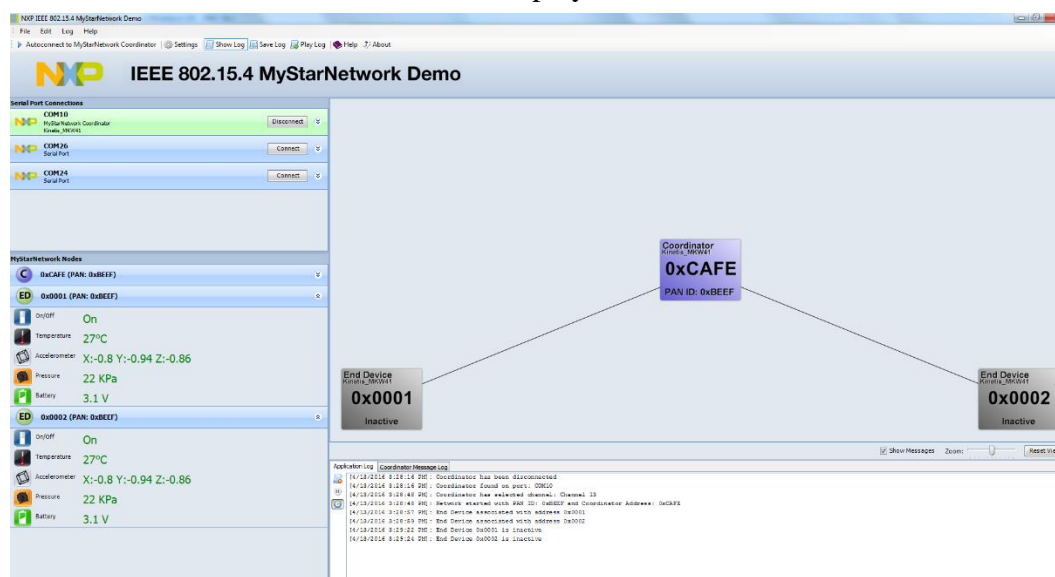


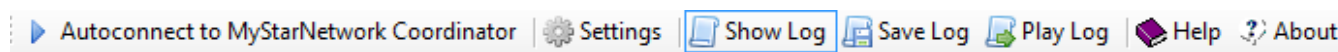
Figure 9. Inactive Disconnected Devices



## 4. MyStarNetwork Demonstration GUI User Interface Overview

The MyStarNetwork Demonstration GUI main window is made up of the Toolbar and Serial Port Connections Panel.

### Application Toolbar



**Figure 10. MyStarNetwork Demonstration Toolbar**

The application toolbar contains the following options which are also available from the drop-down menus:

**Autoconnect to MyStarNetwork Coordinator:** The option should be used if users change the USB port of the Coordinator while the application is running. The new port will be detected by the GUI if it is not already opened

**Settings:** Launches the MyStarNetwork Demonstration Settings dialog where configuration settings of the GUI can be changed. These are detailed in section **MyStarNetwork Settings Dialog**.

**Show Log:** Toggle button which hides or shows the Log tabs at the bottom right of the application window

**Save Log:** The current session Coordinator messages are saved to a log file

**Play Log:** A log file saved previously is played even if the boards are not connected; this option is recommended to be used without a live Coordinator port connected

**Help:** displays the online help for the application

**About:** Displays version and copyright information

### Serial Port Connections Panel

Each time users connect Freescale evaluation boards to the PC using a USB connection, a virtual COM port is created. The ports will appear in the list once the boards are powered on and connected. If the background color of the board list item is blue, and the button text displays 'Connect', the board communication port is available but it is not opened.

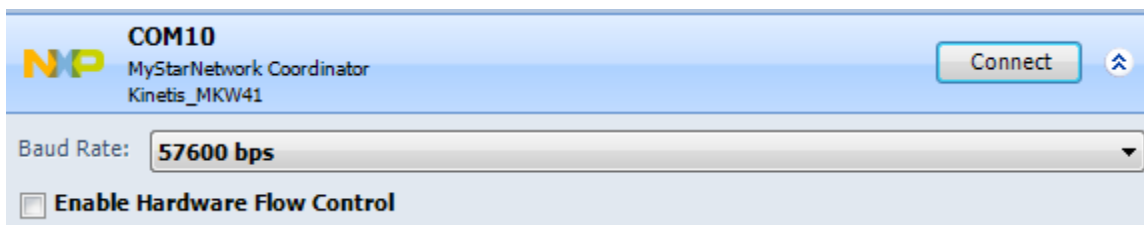




**Figure 11. Serial Port Connections Panel**

The Coordinator port is usually opened automatically by the application when it scans to find the Coordinator. Users can use the Connect button to manually connect to the Coordinator. To manually connect to the Coordinator port, do the following:

1. Click on the expand button to the right of the 'Connect' button. This expands the port setting control.



**Figure 12. Expanded Port Setting Controls**

2. Choose a baud rate and flow control (enabled or disabled).
3. Click the Connect button.

If the connection is successful, the port list item is displayed in green and the button text changes to 'Disconnect'. If the connection fails, the list entry is displayed in red and an error message is displayed below the port name.



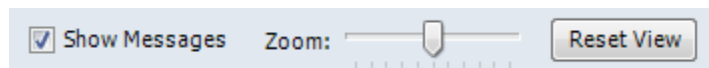
**Figure 13. Successful vs unsuccessful port connection**

Once a port is connected, the messages it sends over the UART are displayed in the Coordinator Message Log. This information is useful for debugging purposes. To close the communication port, click 'Disconnect' while a port is connected.

## MyStarNetwork Main Panel

The MyStarNetwork main panel displays icons of the devices in a star topology as they connect to the Coordinator. Click on a node icon for it to be displayed in close up and so that sensor data can be viewed on the End Device icons.

- Users can drag and drop in the panel to move the viewpoint origin of the display.
- Users can increase or decrease the size of the node icons by using the Zoom slider at the bottom of the panel or by using the mouse scroll wheel.



**Figure 14. Main Panel Controls**

Check or uncheck the 'Show Messages' check box to show or hide 'Sensor data' messages sent from the end devices to the Coordinator.

Click Reset View to bring the node icon size and viewpoint origin to their initial positions.

## **MyStarNetwork Nodes Panel**

The MyStarNetwork Nodes shown in Figure 7 displays a list of the nodes with the Coordinator at the top followed by the end-devices connected to it. Sensor information sent from each end-device is also shown in this panel and updated each time a sensor data report is sent from the end devices to the Coordinator. Use the expand/contract arrow on the right of the device to show or hide the sensor information for the end devices. Use the Settings option in the application toolbar to change the measuring units of the temperature and pressure sensor reports.

## **MyStarNetwork Log Panel**

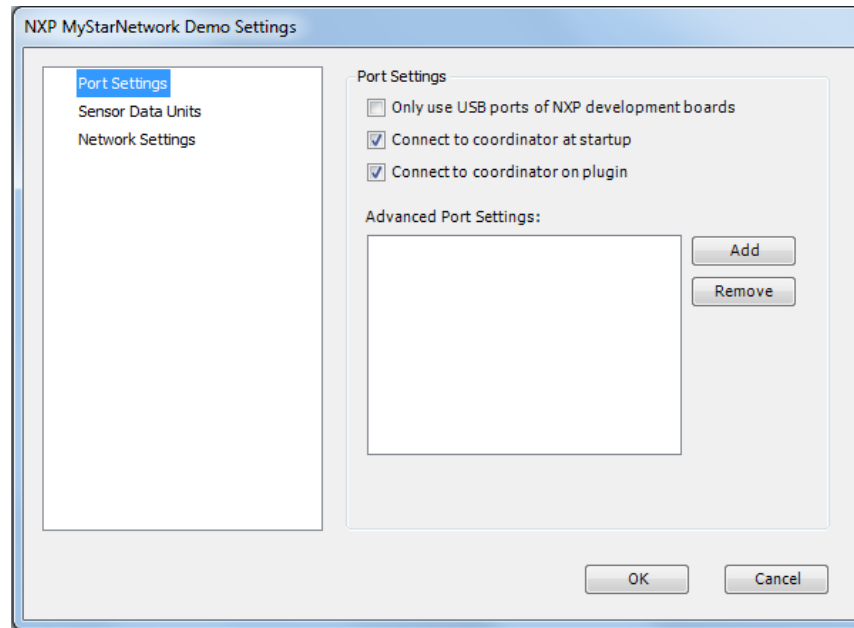
The log panel contains two log displays, one for the application status messages and another which records the raw data sent from the Coordinator node over the UART. Use the buttons on the left of the panel to clear the log, pause message recording and show/hide message timestamps.

## **MyStarNetwork Settings Dialog**

The settings dialog allows users to configure the way the MyStarNetwork Demonstration GUI works. There are three different configuration sections:

### **Port Settings**

The port settings window lets users configure how the virtual COM ports are managed by the application.



**Figure 15. Port Settings**

The settings that can be performed are:

Use only USB ports of NXP development boards if checked, ports such as COM1 which are not detectable as development board USB ports are not used by the application even if they are active in the system.

Connect to Coordinator at startup if checked, the application will scan the active ports at startup, opening each one and sending an identification command to the port using default baud rate of 57600bps. If the response is received from the port that a coordinator is connected, the port is kept open, otherwise it is closed

Connect to Coordinator on plug-in if checked, the application will try and connect to the Coordinator as soon as a board is plugged in.

**Advanced Port Settings** The list helps to do port pre-configuration; every time a port with the name appearing in the list is active in the system, the configuration specified in the list is used instead of the default one.

## Sensor Data Units

The Sensor Data Units section allows user to set the temperature and pressure display units.

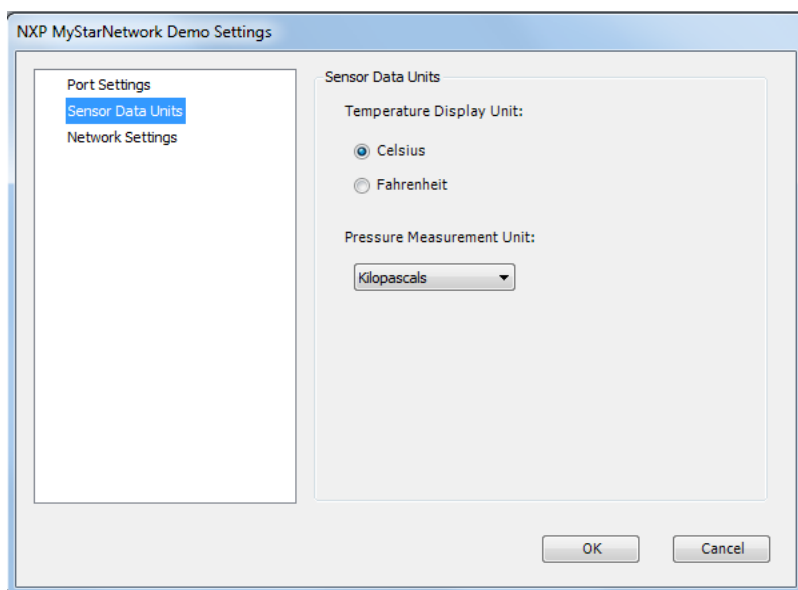


Figure 16. Sensor Data Units

Temperature: -Degrees Celsius or degrees Fahrenheit.

Pressure: -Kilo Pascals, PSI, Atmospheres, Torrs or Bars.

## Network Settings

The network settings section lets user configure time-outs for end devices.

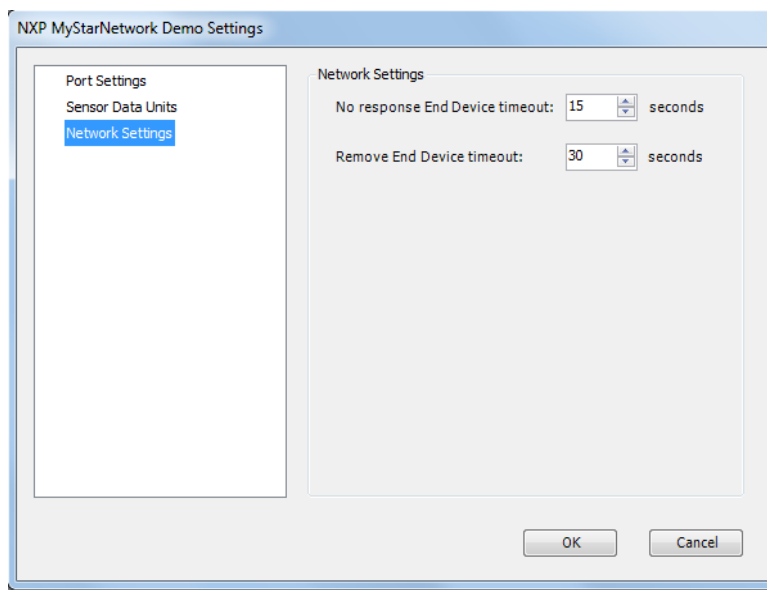


Figure 17. Network Setting

No response End Device timeout if no sensor report has been received from an End Device for this period, the End Device is grayed out and put in an inactive state

Remove End Device timeout if no sensor report has been received from an End Device for this period, the End Device will be removed from the GUI.

## 5. Revision history

Table 1. Revision history

Revision number	Date	Substantive changes
0	04/2016	Initial release

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