

Node-RED – SE Harmony Hub Node User Manual

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

About the Book



At a Glance

Document Scope

This document describes:

- installation and uninstallation of SE Harmony Hub node.
- configuration of the node.
- usage of the node.
- limitations.

Validity Note

This document has been updated with the release of SE Harmony Hub node V1.0.0.

Related Documents

Title of Documentation	Reference Number
Node-RED - SE Aveva Insight Node - User Manual	EIO0000004102
Harmony XB5R ZBRN1/ZBRN2 User Manual	EIO0000001177

You can download these technical publications and other technical information from our website at <https://spiceportal.schneider-electric.com/web/industrial-automation-products-campus/ecostruxure-plant-data-expert>. See launch book where all the marketing aspects are detailed on IAP Campus Portal.

Part I

Introduction

Introduction

Chapter 1

Overview

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
General Information	12
Installation of NSSM	20

General Information

IoT (Industrial Internet of Things)

IoT is a network of intelligent computers, devices, and objects that collect and share huge amounts of data. IIoT is the use of Internet of Things (IoT) technologies in manufacturing. With Industrial Internet of Things (IIoT), the device itself will be seamlessly wired to the business systems.

Operational Technology (OT) is a category of hardware and software that monitors and controls the physical devices. Due to increasing trend towards convergence of IT (Information Technology) and OT (Operational Technology), the plant managers in charge of operational technology are more efficient being remote.

Node-RED in EcoStruxure™

Node-RED is an IoT wiring tool to connect services through a user-friendly graphical interface. Schneider Electric has selected Node-RED as the technology to deliver basic connectivity through tested, validated and documented nodes.



Connected Products

The secondary sensing vision is to integrate an additional layer of non-intrusive sensors mostly for installed base machines. The aim is to transform standard brownfield asset into connected asset. It means adding an additional layer of sensors and transferring data from connected devices to the upper levels. Predictive maintenance, energy saving, MES or CMMS are the typical apps integrated with these kind of solution.

Edge Control

Edge control provides connectivity for OT and IT systems and data processing right next to the machines. Instead of sending data to the cloud for processing and waiting for the analytical results, edge control devices collect and process data next to the machines. Then, those devices push their data to the cloud, thus saving bandwidth and enabling increased responsiveness. Magelis iPC and Magelis Edge Box offer smart application design and engineering to leverage asset performance with end-to-end cybersecurity.

Schneider Electric provides nodes that are tested, validated, and supported to run with Node-RED on the Magelis iPC and Edge Box.

There are three main advantages of Schneider Electric nodes:

- **Scalability:** easy to add connected devices in a cyber-secure manner.
- **Time to market:** significant reduction in integration time to implement a use case solution ([see page 116](#)).
- **Expert support:** access to our strong L3 support team experts and the available technical documentation.

Apps, Analytics and Services

SE Harmony Hub node is a specific node created by Schneider to simplify the Node-RED flows for several typical use cases. This node helps ease the commissioning process to pair the products connected to their Harmony Hub gateway. The web page included with this node also provides the means to specify the data to be retrieved by the channel and to define the polling rate.

Magelis Edge Box

The new Magelis Edge Box meets IIoT challenges at the Edge Control level by enabling secured communication from connected products on the shop floor to the required software and applications on the top floor. The Edge box plugs itself on top of your current application, there is no need to stop or modify your control application (including 3rd party control devices).

Magelis Edge Box types are commercialized, as detailed in the following table:

Magelis Edge Box	Reference
Magelis HMIBSC	Reference HMIBSCEA53D1LOT HMIBSC with ARM, Linux
Magelis HMIBMI	Reference HMIBMIEA5DD110L HMIBMI with Intel Atom
Magelis HMIBMO	Reference HMIBMOMA5DD1E01: HMIBMO with Intel Atom

Magelis iPC

The Magelis iPC is a robust industrial device without a fan or even a hard drive, requiring no maintenance, and designed to run in the machine or plant field, even in harsh environments. New IIoT monitors for the Magelis iPC come tested, validated, and supported in two versions - agent and server.

Magelis iPC Box types are commercialized, as detailed in the following table:

Magelis iPC	Reference
Magelis HMIBMP	Reference HMIBMPHI74D4801 HMIBMP with 4 expansion slots, Intel Core I7
Magelis HMIBMU	Reference HMIBMUSI29D2801 HMIBMU with 2 expansion slots, Intel Celeron

Harmony Hub

The Harmony Hub converts radio frequency inputs to the Modbus TCP/IP and Serial protocol and acts as an equipment that collects data from wireless sensors (up to 60 sensors per Harmony Hub gateway). This offer allows for more flexibility and simplicity of installation thanks to the connected battery-free devices.



Harmony Hub ZBRN1

Sensors

The secondary sensor ecosystem in Schneider Electric is as described below. The Harmony Hub gateway supports the type of sensors listed below.

Sensor	Description
Temperature and Humidity sensor - CL110  A green rectangular device with a black base. It has a small circular button on the right side. The top surface features a 'CE' mark, the 'Easergy CL110' logo, and the part number 'PN. 130729'. The bottom surface has the 'Schneider Electric' logo and technical specifications: 'IC: 21245-130729' and 'FCCID: 2AHP8-130729'.	The Easergy CL110 is a battery-powered and wireless contact thermal and humidity sensor using the ZigBee Green Power 2.4 GHz protocol. The accuracy of the thermal measurement is $\pm 1^{\circ}\text{C}$ and the humidity measurement is around 2%.
ESST01  A white rectangular device with a black base. It has a QR code and a recycling symbol on the front. The text on it includes 'eliwell', 'EWSense Temp', 'ESST010B0810', 'EN12830.S.C.1,-30/+20°C', 'B65_1337', '8042', '25-17', and 'ID: 0xFFC00259'.	ESST01 sensors are wireless sensors with batteries measuring temperature values.
Energy meter - Power tag  A white rectangular device with a black base. It has a QR code and a recycling symbol on the front. The text on it includes 'Schneider Electric', 'PowerTag A9 F63', 'A9MEM1560', and various serial numbers and codes.	Power tag sensor is a compact, the smallest wireless energy sensor on the market, which ensures that it can be mounted to any existing board, as there is almost no room on the DIN rail. It reduces installation time by up to 90%, saves space, and reduces cable errors. Take advantage of full load control and quickly determine if the load is not working on the circuit breaker or on the PowerTag® load itself. Providing real-time energy and power measurements, this wireless power sensor gives you the ability to track your properties.

Sensor	Description
 <p>Energy Estimator - E-cube</p>	The E-Cube sensor is self-powered by the current going through the process. It tests and memorizes the energy consumption before submitting it to the Zigbee Gateway.

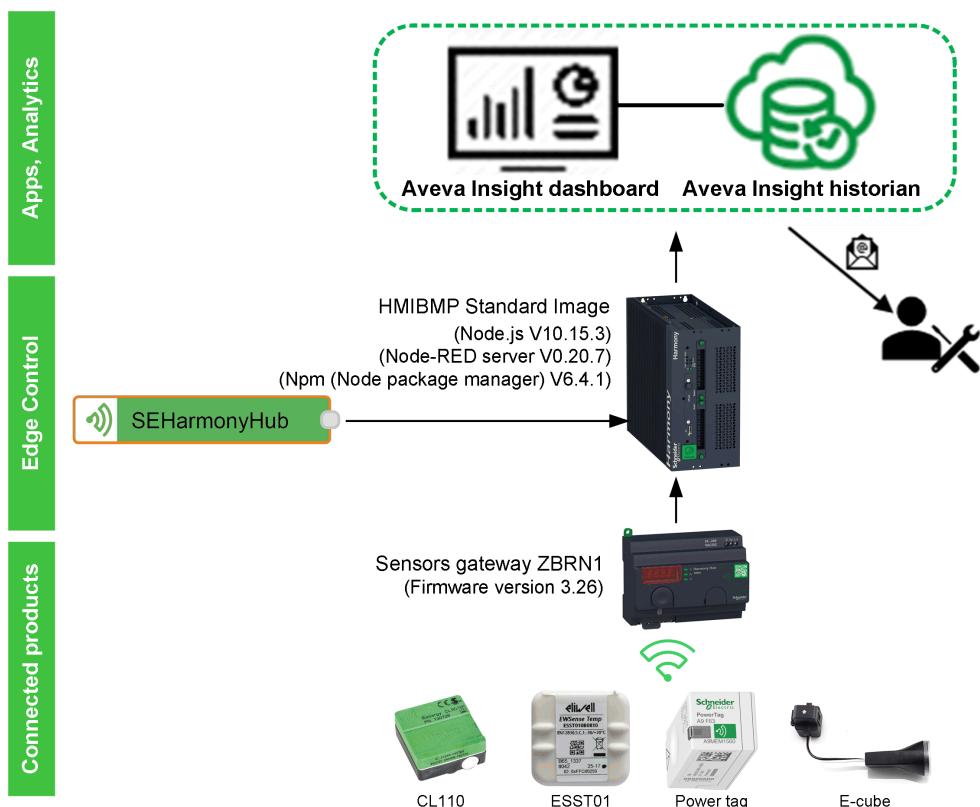
SE Harmony Hub Node Integration in Ecostruxure™ Architecture

Harmony Hub gateway collects physical signals from secondary sensor ecosystem.

SE Harmony Hub node is a data collection node that connects to the Harmony Hub gateway, collects data that may be eventually published to any data publishing node.



The following figure shows integration of SE Harmony Hub node in Ecostruxure™:



Key Points for SE Harmony Hub Node

- You can pair up to 60 sensors with the Harmony Hub gateway ([see page 14](#)).
- Poll rate allowed is minimum of 5 seconds to maximum of 24 hours.
- SPS sensors are not supported. However, the user can pair from the HMI gateway and the user can still see it on the web page, but the values are not available.

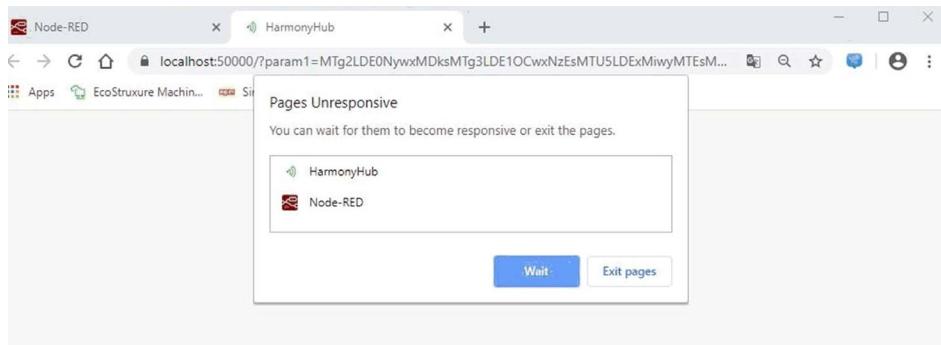
Best Practices for Node-RED

1. Running Node-RED as a service on Windows using NSSM ([see page 20](#)).
2. Use Browsers Wisely

When more web pages are accessed in the browser, Node-RED server may not be responsive to the program. Remove unused web pages in the browser to prevent this.

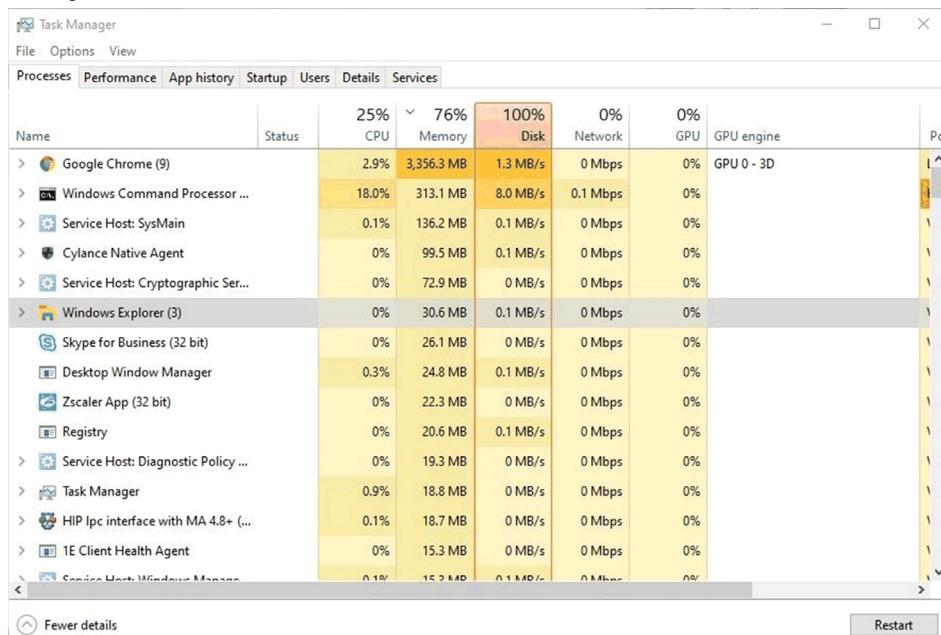
Overview

If Node-RED application is not responsive, you can see the below messages on your browser.



3. Stop Unused Services

Stop unused services that consume more memory displayed in **Task Manager**.



NOTE: Memory consumption can be observed by using **Task Manager**.

Limitations

The SE Harmony Hub node has the following limitations:

1. Operating system anything less than Windows 10 is not supported.
2. Node-RED application is supported in any browser with V8 engine or similar (for instance; Google chrome V73.0, Firefox V66.0). Refer README for future version support.
3. Node-RED web page is only available in English, irrespective of the system language.
4. SE Harmony Hub node will not work on Node.js® unstable versions and 6.x.x, 8.x.x and 12.x.x versions.
5. SE Harmony Hub node should work on Node.js V10.15.3 and Node-RED 0.20.7 version only. Refer README for future version support.
6. If the user removes the sensor using the HMI of Harmony Hub gateway, the pairing status of the sensor will continue to show as Paired on the web page, unless the node is re-deployed.
7. The SE Harmony Hub serial gateway with firmware version 3.26 is disconnected if the queue control delay is increased to 200 ms on the node configuration page.
8. If two nodes are connected to the same gateway, one node would not receive a response from the gateway because the node stays in the connected state and does not start the process. This is a limitation of the firmware.
9. When you launch a Node-RED server, it takes time to get started, in order to avoid this refer to **Commissioning of Node-RED procedure** (steps 11...14) ([see page 48](#)).
10. In SE Harmony Hub V1.0.0 node, the lowest poll rate possible is 5 seconds. If 35 or more sensors are paired, it is recommended to keep the poll rate to 10 seconds or higher to avoid data loss.
11. Harmony Hub web page application has minimum screen resolution supported for 1360 x 768 pixel and if you go below this resolution, scrollbar will appear.
12. When the user wants to do the offline installation, the internet should be disabled. It takes longer to install if the internet is enabled.
13. SE Harmony Hub V1.0.0 node, SPS (push button) is not supported. Refer README for future version support.
14. It is not possible to rename the sensors already paired, the user has to delete and add sensors.
15. During pairing of sensors with gateway below operations are not recommended:
 - Do not perform any deployment in the Node-RED environment.
 - Do not refresh Harmony Hub web page.

Installation of NSSM

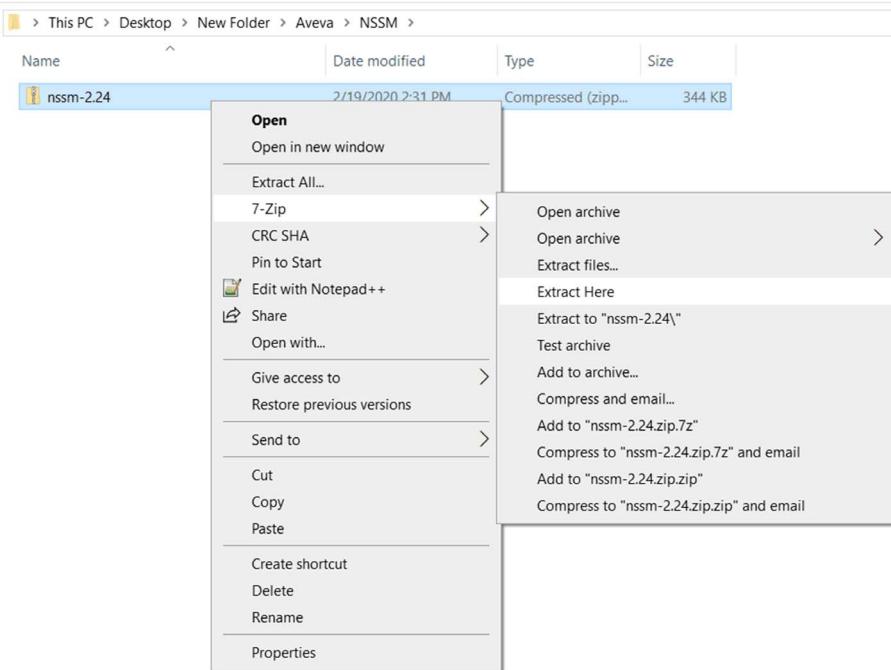
Running Node-RED as a service on Windows Using NSSM

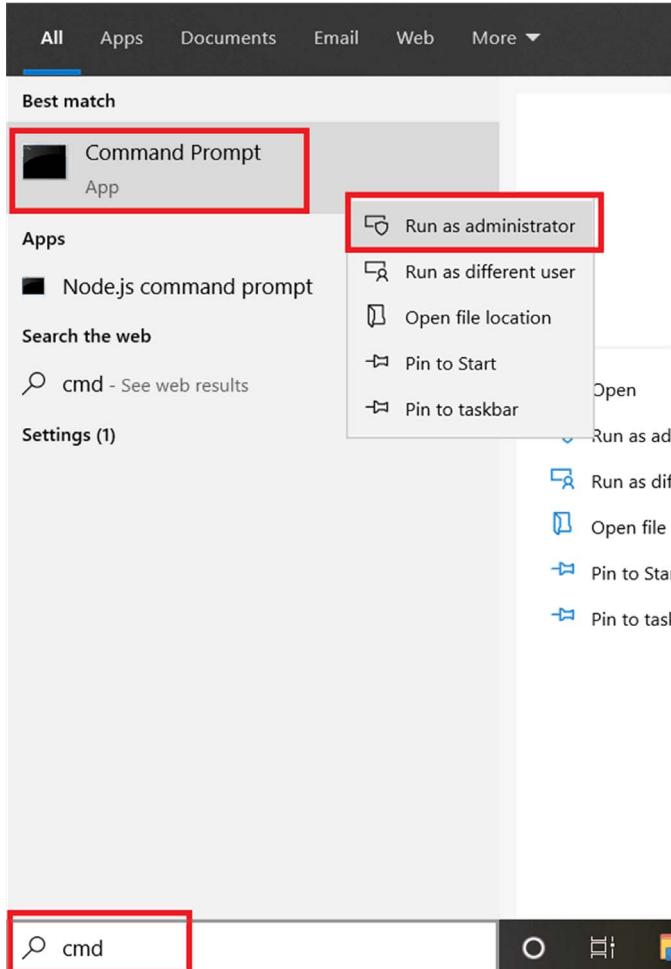
You need to install NSSM (Non-Sucking Service Manager) to open Node-RED server directly from the web page.

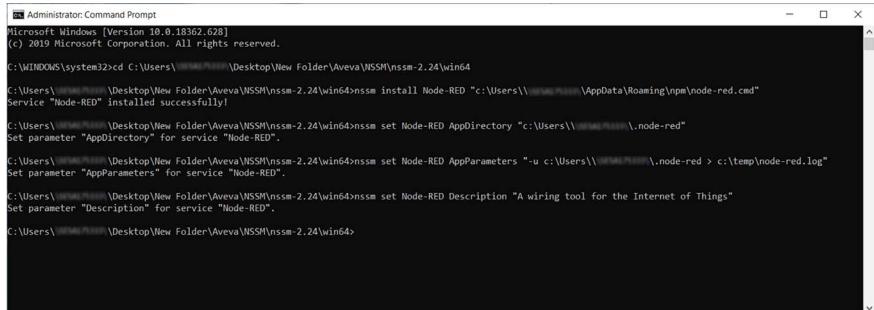
NOTE: Installation of NSSM is applicable for Windows platform only.

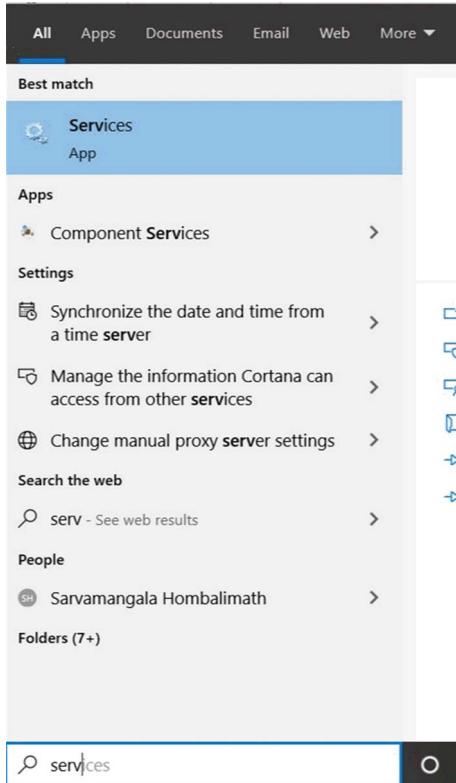
The following procedure shows the installation of NSSM:

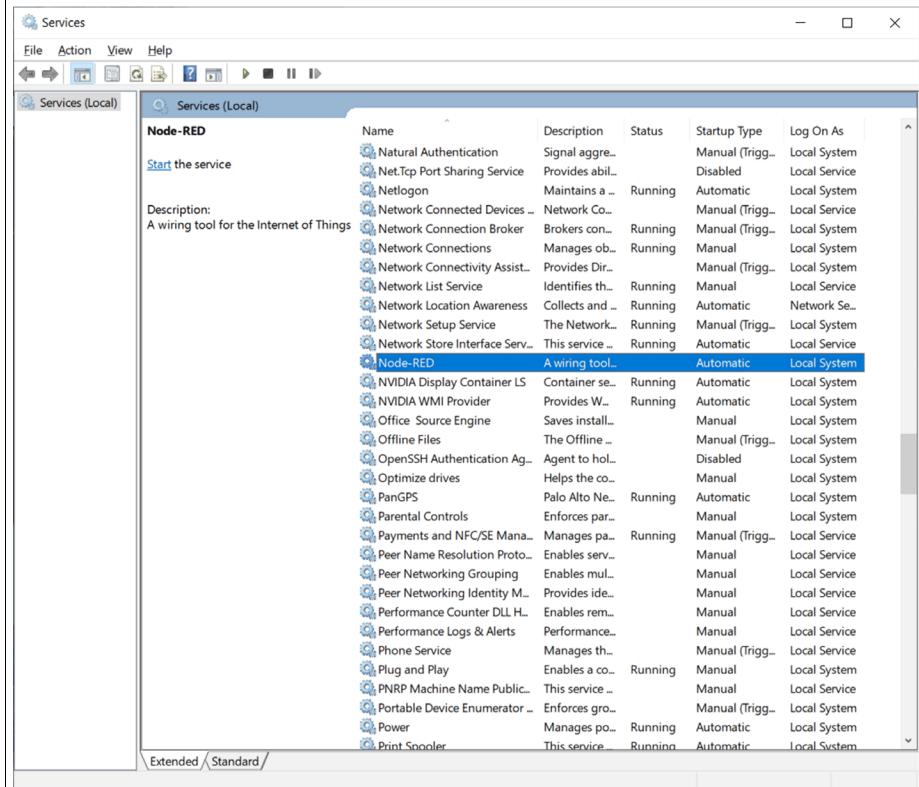
Step	Action
1	<p>Download the <code>nssm-2.24.zip</code> file from the link given below: https://nssm.cc/download</p> <p>NOTE: Make sure unzip software is available in your device, if not available, download it from the given link: https://www.7-zip.org/download.html</p>
2	<p>Click <code>nssm 2.24</code> link.</p>

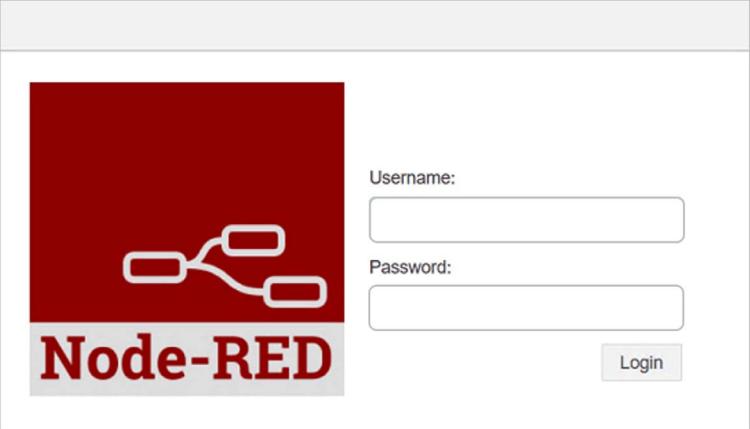
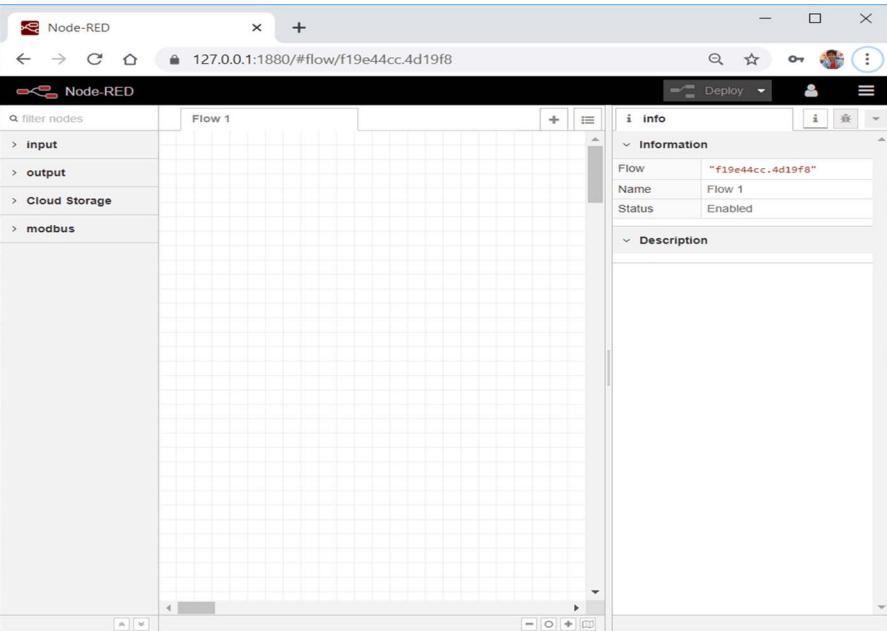
Step	Action
3	<p>Right-click the downloaded <code>nssm-2.24.zip</code> file and select 7-Zip → Extract Here.</p>  <p>Result: The selected file is unzipped.</p>

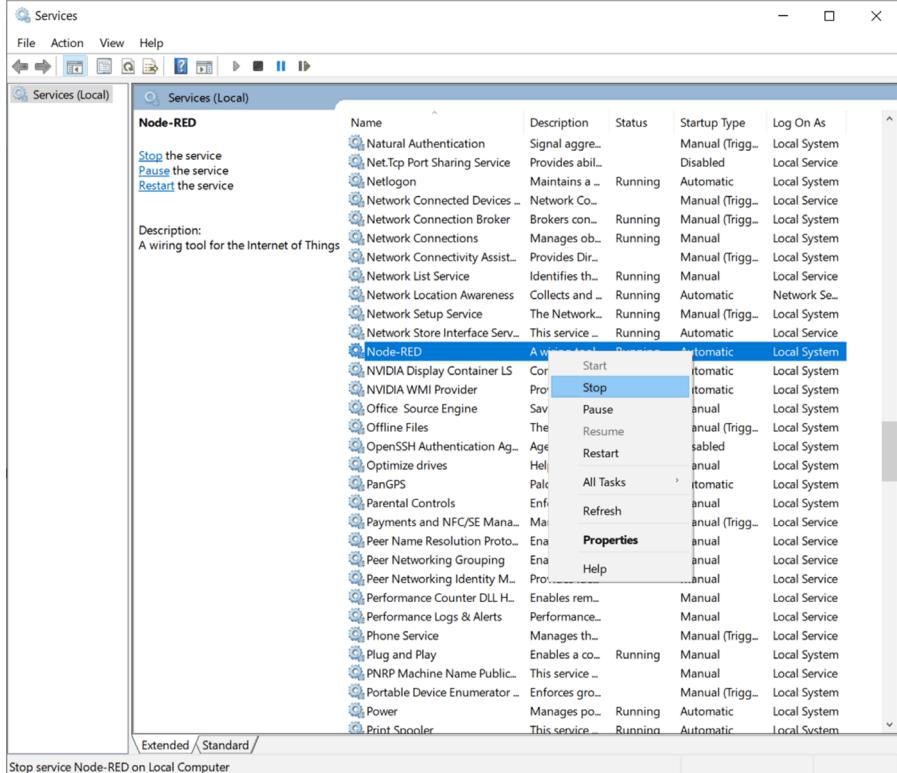
Step	Action
4	<p>Type cmd in search bar and right-click Command Prompt → Run as administrator.</p>  <p>Result: Command Prompt opens.</p>
5	<p>Copy the location of the folder you downloaded. For example: C:\Users\SESAXXXXX\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64</p> <p>NOTE: Use your device name in the text above instead of SESAXXXXX.</p>

Step	Action
6	<p>Navigate to the location where NSSM is installed. Paste in the command prompt adding cd. For example: <code>cd C:\Users\SESAXXXXX\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64</code></p>
7	<p>Type <code>nssm install Node-RED "c:\Users\SESAXXXXX\AppData\Roaming\npm\node-red.cmd"</code> and press Enter Result: Service “Node-RED” installed successfully.</p>
8	<p>Type <code>nssm set Node-RED AppDirectory "c:\Users\SESAXXXXX\.node-red"</code> and press Enter. Result: Set parameter “AppDirectory” for service “Node-RED”.</p>
9	<p>Type <code>nssm set Node-RED AppParameters "-u c:\Users\SESAXXXXX\.node-red > c:\temp\node-red.log"</code> and press Enter. Result: Set parameter “AppParameters” for service “Node-RED”.</p>
10	<p>Type <code>nssm set Node-RED Description "A wiring tool for the Internet of Things"</code> and press Enter. Result: Set parameter “Description” for service “Node-RED”.</p>  <pre> Administrator: Command Prompt Microsoft Windows [Version 10.0.18362.628] (c) 2019 Microsoft Corporation. All rights reserved. C:\WINDOWS\system32>cd C:\Users\...[REDACTED]\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64 C:\Users\...[REDACTED]\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64>nssm install Node-RED "c:\Users\...[REDACTED]\AppData\Roaming\npm\node-red.cmd" Service "Node-RED" installed successfully! C:\Users\...[REDACTED]\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64>nssm set Node-RED AppDirectory "c:\Users\...[REDACTED]\.node-red" Set parameter "AppDirectory" for service "Node-RED". C:\Users\...[REDACTED]\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64>nssm set Node-RED AppParameters "-u c:\Users\...[REDACTED]\.node-red > c:\temp\node-red.log" Set parameter "AppParameters" for service "Node-RED". C:\Users\...[REDACTED]\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64>nssm set Node-RED Description "A wiring tool for the Internet of Things" Set parameter "Description" for service "Node-RED". C:\Users\...[REDACTED]\Desktop\New Folder\Aveva\NSSM\nssm-2.24\win64> </pre>

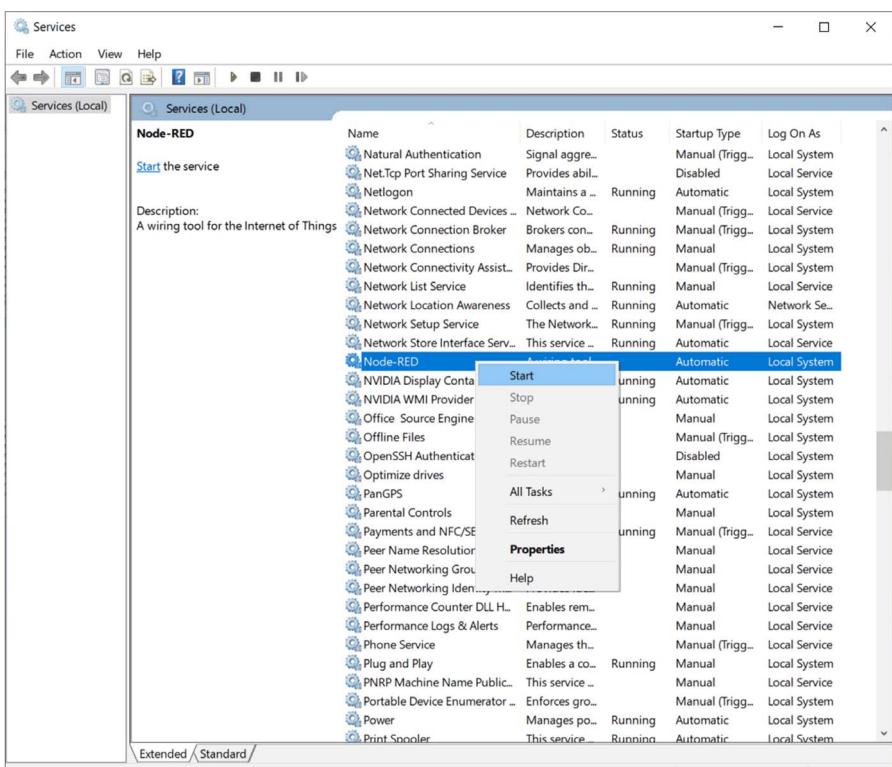
Step	Action
11	Type Services in search bar and click Services.  <p>The screenshot shows a Windows search interface. At the top, there is a dark bar with tabs for 'All', 'Apps', 'Documents', 'Email', 'Web', and 'More'. Below this is a search bar containing the text 'services'. A blue highlight box surrounds the word 'Services' in the search results. The results are listed under 'Best match' and include: 'Services' (App), 'Component Services', 'Settings', 'Synchronize the date and time from a time server', 'Manage the information Cortana can access from other services', 'Change manual proxy server settings', 'Search the web', 'serv - See web results', 'People', 'Sarvamangala Hombalimath', and 'Folders (7+)'. To the right of each result item is a small blue arrow icon.</p> <p>Result: Services window appears.</p>

Step	Action																																																																																																																																																																												
12	 <p>The screenshot shows the Windows Services (Local) window. A tooltip for the Node-RED service indicates it is a "wiring tool for the Internet of Things". The service is listed with the following details:</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Description</th> <th>Status</th> <th>Startup Type</th> <th>Log On As</th> </tr> </thead> <tbody> <tr> <td>Node-RED</td> <td>A wiring tool...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Natural Authentication</td> <td>Signal aggreg...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local System</td> </tr> <tr> <td>Net.Tcp Port Sharing Service</td> <td>Provides abil...</td> <td>Disabled</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Netlogon</td> <td>Maintains a ...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Network Connected Devices ...</td> <td>Network Co...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local Service</td> </tr> <tr> <td>Network Connection Broker</td> <td>Brokers con...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local System</td> </tr> <tr> <td>Network Connections</td> <td>Manages ob...</td> <td>Running</td> <td>Manual</td> <td>Local System</td> </tr> <tr> <td>Network Connectivity Assist...</td> <td>Provides Dir...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local System</td> </tr> <tr> <td>Network List Service</td> <td>Identifies th...</td> <td>Running</td> <td>Manual</td> <td>Local Service</td> </tr> <tr> <td>Network Location Awareness</td> <td>Collects and...</td> <td>Running</td> <td>Automatic</td> <td>Network Se...</td> </tr> <tr> <td>Network Setup Service</td> <td>The Network...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local System</td> </tr> <tr> <td>Network Store Interface Serv...</td> <td>This service ...</td> <td>Running</td> <td>Automatic</td> <td>Local Service</td> </tr> <tr> <td>Node-RED</td> <td>A wiring tool...</td> <td>Automatic</td> <td>Local System</td> <td></td> </tr> <tr> <td>NVIDIA Display Container LS</td> <td>Container se...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>NVIDIA WMI Provider</td> <td>Provides W...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Office Source Engine</td> <td>Saves install...</td> <td>Manual</td> <td>Local System</td> <td></td> </tr> <tr> <td>Offline Files</td> <td>The Offline ...</td> <td>Manual (Trigg...</td> <td>Local System</td> <td></td> </tr> <tr> <td>OpenSSH Authentication Ag...</td> <td>Agent to hol...</td> <td>Disabled</td> <td>Local System</td> <td></td> </tr> <tr> <td>Optimize drives</td> <td>Helps the co...</td> <td>Manual</td> <td>Local System</td> <td></td> </tr> <tr> <td>PanGPS</td> <td>Palo Alto Ne...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Parental Controls</td> <td>Enforces par...</td> <td>Manual</td> <td>Local System</td> <td></td> </tr> <tr> <td>Payments and NFC/SE Mana...</td> <td>Manages pa...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local Service</td> </tr> <tr> <td>Peer Name Resolution Proto...</td> <td>Enables serv...</td> <td>Manual</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Peer Networking Grouping</td> <td>Enables mul...</td> <td>Manual</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Peer Networking Identity M...</td> <td>Provides ide...</td> <td>Manual</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Performance Counter DLL H...</td> <td>Enables rem...</td> <td>Manual</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Performance Logs & Alerts</td> <td>Performance...</td> <td>Manual</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Phone Service</td> <td>Manages th...</td> <td>Manual (Trigg...</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Plug and Play</td> <td>Enables a co...</td> <td>Running</td> <td>Manual</td> <td>Local System</td> </tr> <tr> <td>PNRP Machine Name Public...</td> <td>This service ...</td> <td>Manual</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Portable Device Enumerator ...</td> <td>Enforces gro...</td> <td>Manual (Trigg...</td> <td>Local System</td> <td></td> </tr> <tr> <td>Power</td> <td>Manages po...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> <td></td> </tr> <tr> <td>Print Spooler</td> <td>This service ...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> <td></td> </tr> </tbody> </table>	Name	Description	Status	Startup Type	Log On As	Node-RED	A wiring tool...	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14	<p>Type the https://127.0.0.1:1880/ in a supported browser. Type the Username and Password in related fields and click Login.</p> 
15	<p>Result: Node-RED factory editor appears.</p> 

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16	<p>When you install/uninstall any node in your system, Stop using Node-RED in Services.</p>  <table border="1"> <thead> <tr> <th>Name</th> <th>Description</th> <th>Status</th> <th>Startup Type</th> <th>Log On As</th> </tr> </thead> <tbody> <tr> <td>Node-RED</td> <td>A wiring tool for the Internet of Things</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Natural Authentication</td> <td>Signal agre...</td> <td>Manual (Trigg...</td> <td>Local System</td> <td></td> </tr> <tr> <td>Net.Tcp Port Sharing Service</td> <td>Provides abil...</td> <td>Disabled</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Nelogon</td> <td>Maintains a ...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Network Connected Devices</td> <td>Network Co...</td> <td>Manual (Trigg...</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Network Connection Broker</td> <td>Brokers con...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local System</td> </tr> <tr> <td>Network Connections</td> <td>Manages ob...</td> <td>Running</td> <td>Manual</td> <td>Local System</td> </tr> <tr> <td>Network Connectivity Assist...</td> <td>Provides Dir...</td> <td>Manual (Trigg...</td> <td>Local System</td> <td></td> </tr> <tr> <td>Network List Service</td> <td>Identifies th...</td> <td>Running</td> <td>Manual</td> <td>Local Service</td> </tr> <tr> <td>Network Location Awareness</td> <td>Collects and ...</td> <td>Running</td> <td>Automatic</td> <td>Network Se...</td> </tr> <tr> <td>Network Setup Service</td> <td>The Network...</td> <td>Running</td> <td>Manual (Trigg...</td> <td>Local System</td> </tr> <tr> <td>Network Store Interface Serv...</td> <td>This service ...</td> <td>Running</td> <td>Automatic</td> <td>Local Service</td> </tr> <tr> <td>Node-RED</td> <td>A wiring tool ...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>NVIDIA Display Container LS</td> <td>Cor...</td> <td>Start</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>NVIDIA WMI Provider</td> <td>Prov...</td> <td>Stop</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Office Source Engine</td> <td>Sav...</td> <td>Pause</td> <td>Manual</td> <td>Local System</td> </tr> <tr> <td>Offline Files</td> <td>The...</td> <td>Resume</td> <td>Manual (Trigg...</td> <td>Local System</td> </tr> <tr> <td>OpenSSH Authentication Ag...</td> <td>Age...</td> <td>Restart</td> <td>Enabled</td> <td>Local System</td> </tr> <tr> <td>Optimize drives</td> <td>Hel...</td> <td></td> <td>Manual</td> <td>Local System</td> </tr> <tr> <td>PanGPS</td> <td>Palc...</td> <td>All Tasks</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Parental Controls</td> <td>Enf...</td> <td>Refresh</td> <td>Manual</td> <td>Local System</td> </tr> <tr> <td>Payments and NFC/SE Mana...</td> <td>Mail...</td> <td>Properties</td> <td>Manual (Trigg...</td> <td>Local Service</td> </tr> <tr> <td>Peer Name Resolution Proto...</td> <td>Ena...</td> <td></td> <td>Manual</td> <td>Local Service</td> </tr> <tr> <td>Peer Networking Grouping</td> <td>Ena...</td> <td>Help</td> <td>Manual</td> <td>Local Service</td> </tr> <tr> <td>Peer Networking Identity M...</td> <td>Pro...</td> <td></td> <td>Manual</td> <td>Local Service</td> </tr> <tr> <td>Performance Counter DLL H...</td> <td>Enables rem...</td> <td></td> <td>Manual</td> <td>Local Service</td> </tr> <tr> <td>Performance Logs & Alerts</td> <td>Perfor...</td> <td></td> <td>Manual</td> <td>Local Service</td> </tr> <tr> <td>Phone Service</td> <td>Manages th...</td> <td></td> <td>Manual (Trigg...</td> <td>Local Service</td> </tr> <tr> <td>Plug and Play</td> <td>Enables a co...</td> <td>Running</td> <td>Manual</td> <td>Local System</td> </tr> <tr> <td>PNRP Machine Name Public...</td> <td>This service ...</td> <td>Manual</td> <td>Local Service</td> <td></td> </tr> <tr> <td>Portable Device Enumerator -</td> <td>Enforces gro...</td> <td>Manual (Trigg...</td> <td>Local System</td> <td></td> </tr> <tr> <td>Power</td> <td>Manages po...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> <tr> <td>Print Spooler</td> <td>This service ...</td> <td>Running</td> <td>Automatic</td> <td>Local System</td> </tr> </tbody> </table>	Name	Description	Status	Startup Type	Log On As	Node-RED	A wiring tool for the Internet of Things	Running	Automatic	Local System	Natural Authentication	Signal agre...	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Overview

Step	Action
17	Once installation/uninstallation process is completed in your system, Start Node-RED in Services to launch Node-RED application. 

To disable Node-RED as a service follow the steps given below:

- Navigate to NSSM folder in command prompt.
- Type `nssm remove <service-name>` confirm and press **Enter**.

Part II

Installation and Uninstallation - SE Harmony Hub Node

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
2	Prerequisites	31
3	Installation and uninstallation of SE Harmony Hub Node - Windows Platform	33
4	Installation and uninstallation of SE Harmony Hub Node - Linux Platform	77

Chapter 2

Prerequisites

System Requirements

Operating System

The SE Harmony Hub node V1.0.0 is supported on the following operating systems:

- Microsoft Windows 10
 - Standard Image and IIoT One Image (RC7 and above)

NOTE: Magelis HMIBMP - User has to install the Node.js, Node-RED and Python software in the **Magelis HMIBMP** box (Standard Image) manually.

- Linux Linaro - V1.00.010 and above
 - IIoT One Image (V1.00.010 and above)

NOTE: Magelis HMIBSC - The required softwares like Node.js, Node-RED and Python are pre-installed in the **Magelis HMIBSC** box.

Hardware Requirements

NOTE: The SE Harmony Hub node is supported in **Magelis HMIBMP** and **Magelis HMIBSC** only. Other **Magelis Edge Box** and **Magelis iPC** will be supported in future versions of the node.

IIoT Edge Box	PC hardware	Specification
Magelis HMIBMP	Processor	Reference HMIBMPHI74D4801 HMIBMP with 4 expansion slots, Intel Core I7
	RAM	8 GB
	Hard disk space	500 GB HDD
	Operating system	Microsoft Windows 10
Magelis HMIBSC	Processor	Reference HMIBSCEA53D1L0T HMIBSC with ARM
	Hard disk space	eMMC and TPM for hardware encryption
	Operating system	Linux Yocto

Software Requirements

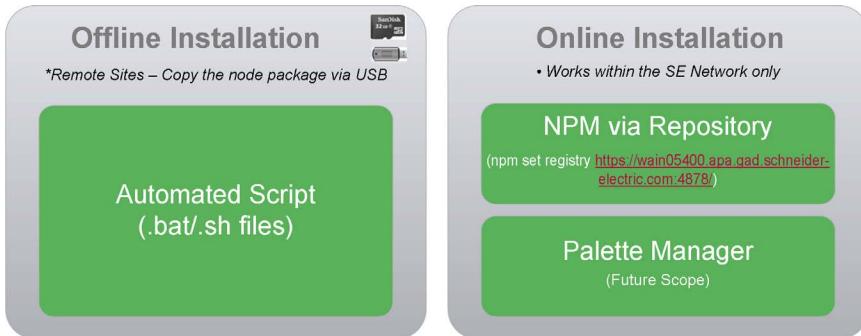
- Node.js V10.15.3 (*see page 35*)
- Node-RED server V0.20.7 (*see page 42*)
- Npm (Node package manager) V6.4.1

- Python V2.7 (online installation mode only) ([see page 44](#))
- Supported browser: Node-RED application is supported in any browser with V8 engine or similar (for instance: Google chrome V73.0, Firefox V66.0)

NOTE: The software versions mentioned above support the SE Nodes installation. Other versions do not support it.

Accessing the SE Harmony Hub Node

You can perform two modes of installation (online/offline) on either of the platforms:



Each installation mode can be performed on either of the two platforms.:

- Install the node - Windows platform ([see page 77](#))
- Install the node - Linux platform ([see page 67](#))

Chapter 3

Installation and uninstallation of SE Harmony Hub Node - Windows Platform

What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
3.1	Installing SE Harmony Hub node - Windows Platform	34
3.2	Uninstalling SE Harmony Hub node - Windows Platform	70

Section 3.1

Installing SE Harmony Hub node - Windows Platform

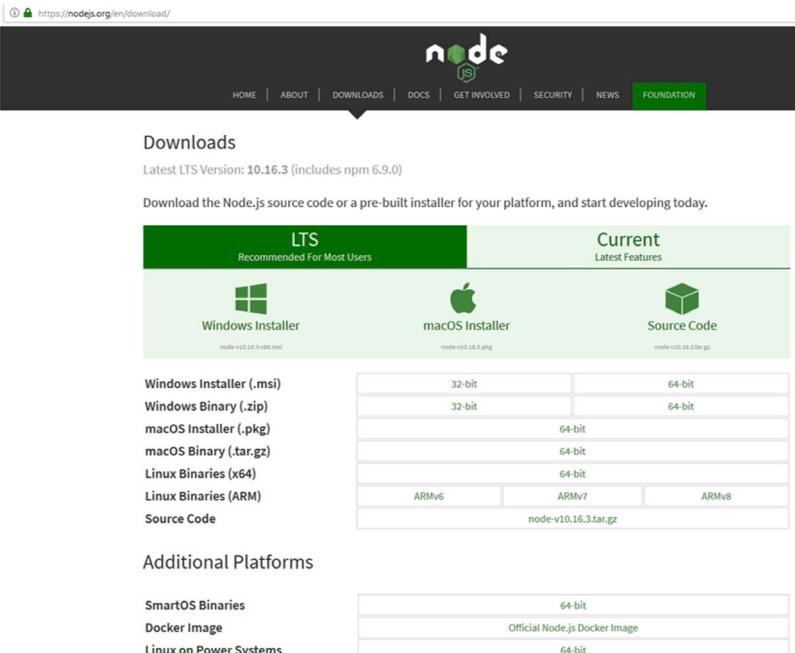
What Is in This Section?

This section contains the following topics:

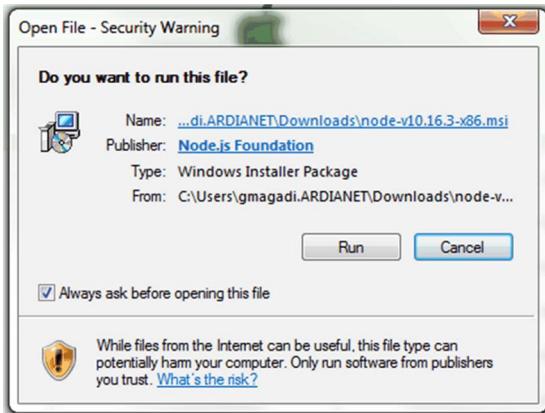
Topic	Page
Installing Node.js	35
Installing Node-RED	42
Installing Python	44
Commissioning of Node-RED server	48
Installing SE Harmony Hub Node - Offline Installation Mode	64
Installing SE Harmony Hub Node - Online Installation Mode	67

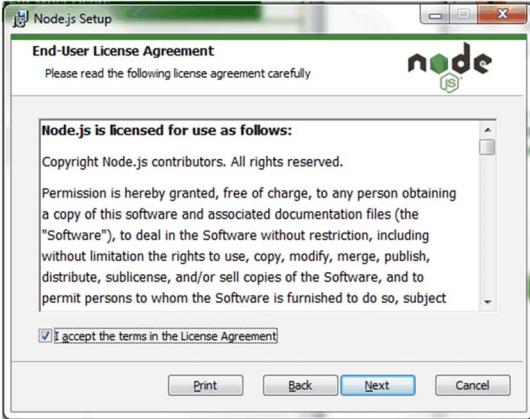
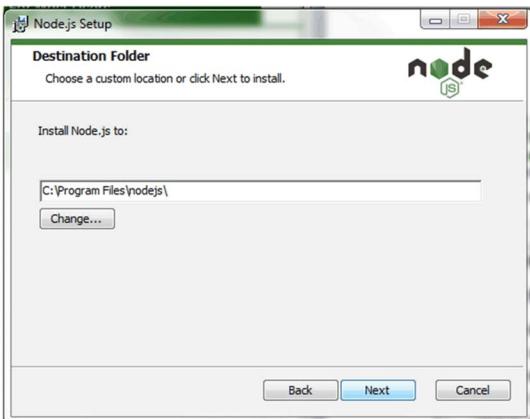
Installing Node.js

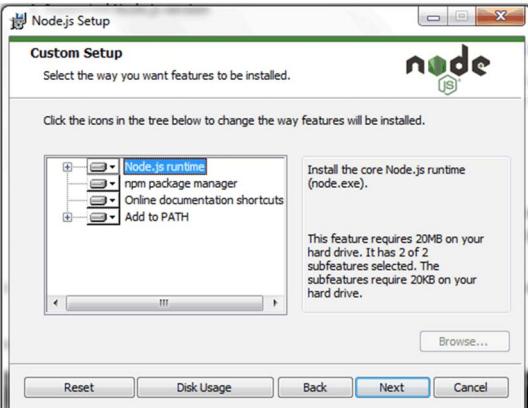
This table shows the installation procedure for Node.js:

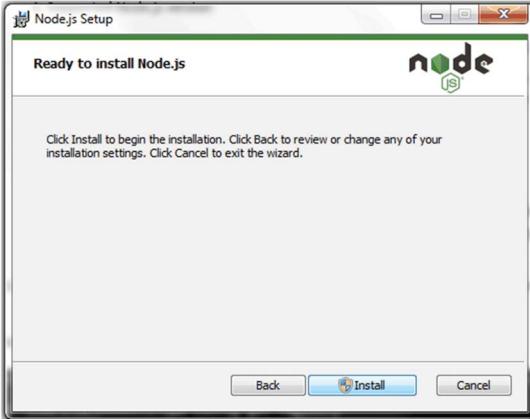
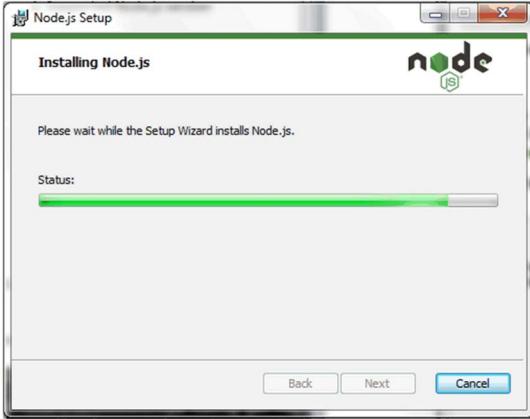
Step	Action
1	<p>Open the Node.js® for Windows from the below link: https://nodejs.org/en/download/</p>  <p>The screenshot shows the Node.js download page. At the top, there are two tabs: 'LTS' (Recommended For Most Users) and 'Current' (Latest Features). Under 'LTS', there are links for 'Windows Installer (.msi)', 'Windows Binary (.zip)', 'macOS Installer (.pkg)', 'macOS Binary (.tar.gz)', 'Linux Binaries (x64)', 'Linux Binaries (ARM)', and 'Source Code'. Under 'Current', there are sections for '32-bit' and '64-bit' with links for 'Windows Installer (.msi)', 'Windows Binary (.zip)', 'macOS Installer (.pkg)', 'macOS Binary (.tar.gz)', 'Linux Binaries (x64)', 'Linux Binaries (ARM)', and 'Source Code'. At the bottom, there is a section for 'Additional Platforms' with links for 'SmartOS Binaries', 'Docker Image', and 'Linux on Power Systems'.</p>

Step	Action																																																																																																												
2	<p>Use the node-v10.15.3-x64.msi version. Download the Node.js® from the link given below: https://nodejs.org/download/release/v10.15.3/</p>  <p>The screenshot shows a browser window with the URL https://nodejs.org/download/release/v10.15.3/. The page title is "Index of /download/release/v10.15.3/". Below the title is a table listing various Node.js packages with their file names, last modified dates, and sizes.</p> <table border="1"> <thead> <tr> <th>File</th> <th>Last Modified</th> <th>Size</th> </tr> </thead> <tbody> <tr><td>.. /</td><td>05-Mar-2019 15:21</td><td>-</td></tr> <tr><td>docs /</td><td>05-Mar-2019 15:50</td><td>-</td></tr> <tr><td>win-x64 /</td><td>05-Mar-2019 15:46</td><td>-</td></tr> <tr><td>win-x86 /</td><td>05-Mar-2019 17:15</td><td>3347</td></tr> <tr><td>SHASUMS256.txt</td><td>05-Mar-2019 17:15</td><td>3884</td></tr> <tr><td>SHASUMS256.txt.asc</td><td>05-Mar-2019 17:15</td><td>310</td></tr> <tr><td>SHASUMS256.txt.sig</td><td>05-Mar-2019 17:15</td><td>22800142</td></tr> <tr><td>node-v10.15.3-aix-ppc64.tar.gz</td><td>05-Mar-2019 15:31</td><td>16363752</td></tr> <tr><td>node-v10.15.3-darwin-x64.tar.gz</td><td>05-Mar-2019 15:14</td><td>11076732</td></tr> <tr><td>node-v10.15.3-darwin-x64.tar.xz</td><td>05-Mar-2019 15:15</td><td>447024</td></tr> <tr><td>node-v10.15.3-headers.tar.gz</td><td>05-Mar-2019 15:21</td><td>336764</td></tr> <tr><td>node-v10.15.3-headers.tar.xz</td><td>05-Mar-2019 15:21</td><td>18603100</td></tr> <tr><td>node-v10.15.3-linux-arm64.tar.gz</td><td>05-Mar-2019 15:10</td><td>11777924</td></tr> <tr><td>node-v10.15.3-linux-arm64.tar.xz</td><td>05-Mar-2019 15:11</td><td>17548409</td></tr> <tr><td>node-v10.15.3-linux-armv6l.tar.gz</td><td>05-Mar-2019 15:11</td><td>10767892</td></tr> <tr><td>node-v10.15.3-linux-armv6l.tar.xz</td><td>05-Mar-2019 15:12</td><td>17398229</td></tr> <tr><td>node-v10.15.3-linux-armv7l.tar.gz</td><td>05-Mar-2019 15:07</td><td>10686088</td></tr> <tr><td>node-v10.15.3-linux-armv7l.tar.xz</td><td>05-Mar-2019 15:08</td><td>18627922</td></tr> <tr><td>node-v10.15.3-linux-ppc64le.tar.gz</td><td>05-Mar-2019 15:08</td><td>11530044</td></tr> <tr><td>node-v10.15.3-linux-ppc64le.tar.xz</td><td>05-Mar-2019 15:08</td><td>18887114</td></tr> <tr><td>node-v10.15.3-linux-s390x.tar.gz</td><td>05-Mar-2019 15:07</td><td>11469120</td></tr> <tr><td>node-v10.15.3-linux-s390x.tar.xz</td><td>05-Mar-2019 15:07</td><td>18638507</td></tr> <tr><td>node-v10.15.3-linux-x64.tar.gz</td><td>05-Mar-2019 15:53</td><td>12309200</td></tr> <tr><td>node-v10.15.3-linux-x64.tar.xz</td><td>05-Mar-2019 15:54</td><td>19969855</td></tr> <tr><td>node-v10.15.3-sunos-x64.tar.gz</td><td>05-Mar-2019 15:10</td><td>12799064</td></tr> <tr><td>node-v10.15.3-sunos-x64.tar.xz</td><td>05-Mar-2019 15:10</td><td>9546864</td></tr> <tr><td>node-v10.15.3-win-x64.7z</td><td>05-Mar-2019 15:52</td><td>16066348</td></tr> <tr><td>node-v10.15.3-win-x64.zip</td><td>05-Mar-2019 15:53</td><td>8525340</td></tr> <tr><td>node-v10.15.3-win-x86.7z</td><td>05-Mar-2019 15:46</td><td>14664993</td></tr> <tr><td>node-v10.15.3-win-x86.zip</td><td>05-Mar-2019 15:46</td><td>17108992</td></tr> <tr><td>node-v10.15.3-x64.msi</td><td>05-Mar-2019 15:53</td><td>15630336</td></tr> <tr><td>node-v10.15.3-x86.msi</td><td>05-Mar-2019 15:46</td><td>16623869</td></tr> <tr><td>node-v10.15.3.pkg</td><td>05-Mar-2019 15:10</td><td>36370204</td></tr> <tr><td>node-v10.15.3.tar.gz</td><td>05-Mar-2019 15:16</td><td>20262632</td></tr> <tr><td>node-v10.15.3.tar.xz</td><td>05-Mar-2019 15:19</td><td></td></tr> </tbody> </table>	File	Last Modified	Size	.. /	05-Mar-2019 15:21	-	docs /	05-Mar-2019 15:50	-	win-x64 /	05-Mar-2019 15:46	-	win-x86 /	05-Mar-2019 17:15	3347	SHASUMS256.txt	05-Mar-2019 17:15	3884	SHASUMS256.txt.asc	05-Mar-2019 17:15	310	SHASUMS256.txt.sig	05-Mar-2019 17:15	22800142	node-v10.15.3-aix-ppc64.tar.gz	05-Mar-2019 15:31	16363752	node-v10.15.3-darwin-x64.tar.gz	05-Mar-2019 15:14	11076732	node-v10.15.3-darwin-x64.tar.xz	05-Mar-2019 15:15	447024	node-v10.15.3-headers.tar.gz	05-Mar-2019 15:21	336764	node-v10.15.3-headers.tar.xz	05-Mar-2019 15:21	18603100	node-v10.15.3-linux-arm64.tar.gz	05-Mar-2019 15:10	11777924	node-v10.15.3-linux-arm64.tar.xz	05-Mar-2019 15:11	17548409	node-v10.15.3-linux-armv6l.tar.gz	05-Mar-2019 15:11	10767892	node-v10.15.3-linux-armv6l.tar.xz	05-Mar-2019 15:12	17398229	node-v10.15.3-linux-armv7l.tar.gz	05-Mar-2019 15:07	10686088	node-v10.15.3-linux-armv7l.tar.xz	05-Mar-2019 15:08	18627922	node-v10.15.3-linux-ppc64le.tar.gz	05-Mar-2019 15:08	11530044	node-v10.15.3-linux-ppc64le.tar.xz	05-Mar-2019 15:08	18887114	node-v10.15.3-linux-s390x.tar.gz	05-Mar-2019 15:07	11469120	node-v10.15.3-linux-s390x.tar.xz	05-Mar-2019 15:07	18638507	node-v10.15.3-linux-x64.tar.gz	05-Mar-2019 15:53	12309200	node-v10.15.3-linux-x64.tar.xz	05-Mar-2019 15:54	19969855	node-v10.15.3-sunos-x64.tar.gz	05-Mar-2019 15:10	12799064	node-v10.15.3-sunos-x64.tar.xz	05-Mar-2019 15:10	9546864	node-v10.15.3-win-x64.7z	05-Mar-2019 15:52	16066348	node-v10.15.3-win-x64.zip	05-Mar-2019 15:53	8525340	node-v10.15.3-win-x86.7z	05-Mar-2019 15:46	14664993	node-v10.15.3-win-x86.zip	05-Mar-2019 15:46	17108992	node-v10.15.3-x64.msi	05-Mar-2019 15:53	15630336	node-v10.15.3-x86.msi	05-Mar-2019 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3	Select node-v10.15.3-x64.msi for download.																																																																																																												
4	Double-click the downloaded file to start the installation process. Result: Open File dialog box appears.																																																																																																												

Step	Action
5	<p>Click Run.</p>  <p>Result: Node.js Setup Wizard dialog box appears.</p>
6	<p>Click Next.</p>  <p>Result: End-User License Agreement dialog box appears.</p>

Step	Action
7	<p>Select I accept the terms in the License Agreement and click Next.</p> 
8	<p>Click Next.</p> 

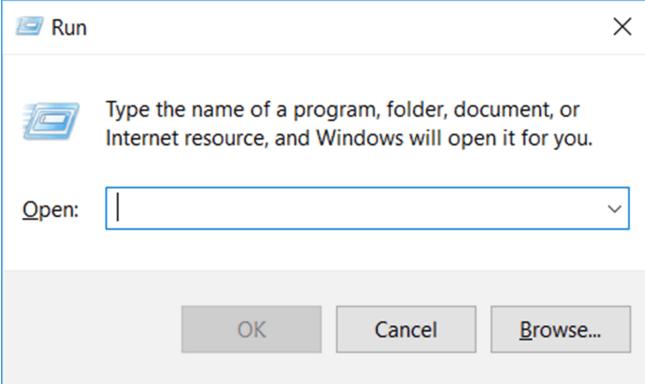
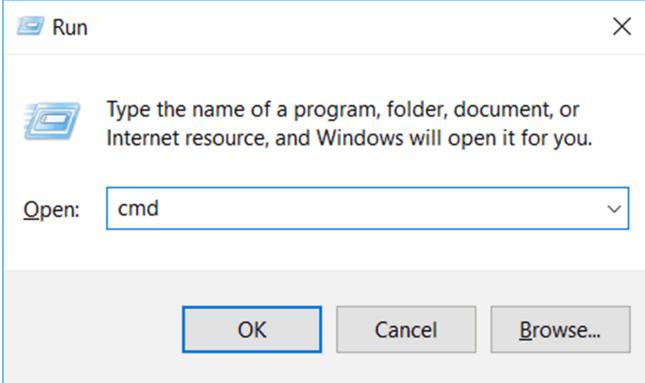
Step	Action
9	<p>Click Next.</p>  <p>The screenshot shows the 'Custom Setup' window of the Node.js Setup. The title bar says 'Node.js Setup'. The main area is titled 'Custom Setup' with the sub-instruction 'Select the way you want features to be installed.' Below this is a tree view with the following structure:</p> <ul style="list-style-type: none">Node.js runtime (selected)npm package managerOnline documentation shortcutsAdd to PATH <p>To the right of the tree view, there is a detailed description of the selected feature: 'Install the core Node.js runtime (node.exe)'. It notes that this feature requires 20MB on the hard drive and has 2 subfeatures selected. A 'Browse...' button is also present. At the bottom of the window are buttons for 'Reset', 'Disk Usage', 'Back', 'Next' (which is highlighted in blue), and 'Cancel'.</p>

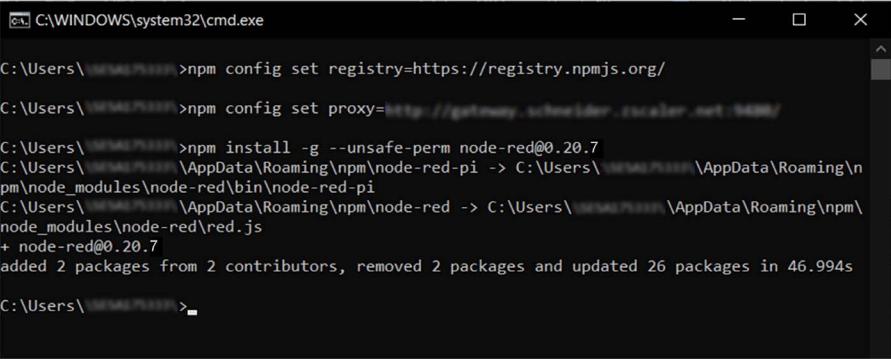
Step	Action
10	<p>Click Install.</p>  <p>The screenshot shows the 'Ready to install Node.js' window of the Node.js Setup wizard. It features a large green header bar with the Node.js logo. The main area contains the text: 'Click Install to begin the installation. Click Back to review or change any of your installation settings. Click Cancel to exit the wizard.' Below this are three buttons: 'Back', 'Install' (which is highlighted in blue), and 'Cancel'.</p>  <p>The screenshot shows the 'Installing Node.js' window of the Node.js Setup wizard. It has a green header bar with the Node.js logo. The main area displays the message: 'Please wait while the Setup Wizard installs Node.js.' Below it is a 'Status:' label followed by a progress bar that is mostly filled with green. At the bottom are three buttons: 'Back', 'Next' (which is highlighted in blue), and 'Cancel'.</p>

Step	Action
11	Click Finish .
12	Node.js installation is completed.

Installing Node-RED

This table shows the installation procedure for Node-RED:

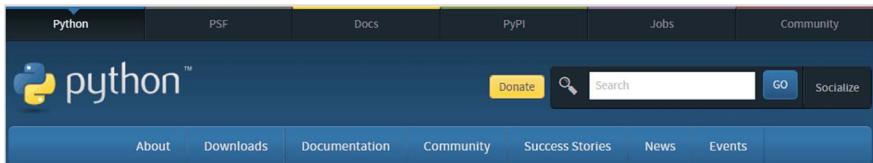
Step	Action
1	<p>Click  and type Run in the search bar and press Enter.</p> 
2	<p>Type the <code>cmd</code> in the Run dialog box and press OK.</p>  <p>Result: Command prompt window appears.</p>
3	<p>With Schneider network connected, type the text given below in the command prompt and press Enter.</p> <pre>npm config set registry=https://registry.npmjs.org/</pre>

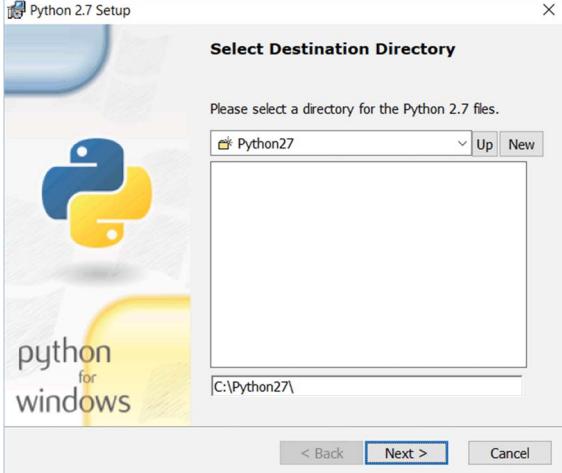
Step	Action
4	Type the valid proxy with respect to your organization or country (for instance, http://yourproxy:XXXX) and press Enter . npm config set proxy=http://yourproxy:XXXX/
5	Type npm install -g --unsafe-perm node-red@0.20.7 and press Enter .  A screenshot of a Windows Command Prompt window titled 'C:\WINDOWS\system32\cmd.exe'. The window shows the following command history: C:\Users\[REDACTED]>npm config set registry=https://registry.npmjs.org/ C:\Users\[REDACTED]>npm config set proxy=[REDACTED] C:\Users\[REDACTED]>npm install -g --unsafe-perm node-red@0.20.7 C:\Users\[REDACTED]\AppData\Roaming\npm\node-red-pi -> C:\Users\[REDACTED]\AppData\Roaming\npm\node_modules\node-red\bin\node-red-pi C:\Users\[REDACTED]\AppData\Roaming\npm\node-red -> C:\Users\[REDACTED]\AppData\Roaming\npm\node_modules\node-red\red.js + node-red@0.20.7 added 2 packages from 2 contributors, removed 2 packages and updated 26 packages in 46.994s C:\Users\[REDACTED]> The command 'npm config set proxy' has been redacted.
6	Node-RED application is installed.

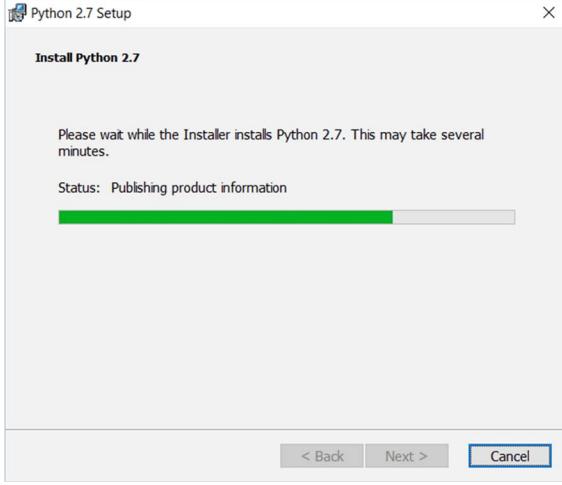
Installing Python

NOTE: Python installation is applicable only for online installation mode in Windows platform.

This table shows the installation procedure for Python:

Step	Action																																																												
1	Download python 2.7.x version from the link given below: https://www.python.org/downloads/release/python-2712/																																																												
2	Click the Windows x86-64 MSI to download the file.  <p>The screenshot shows the Python website's main navigation bar with links for Python, PSF, Docs, PyPI, Jobs, and Community. Below the navigation bar, the Python logo is displayed next to the text "python™". To the right of the logo are buttons for "Donate", "Search", "GO", and "Socialize". A horizontal menu bar below the logo includes links for About, Downloads, Documentation, Community, Success Stories, News, and Events.</p> <p>Python 2.7.12</p> <p>Release Date: June 25, 2016</p> <p>Python 2.7.12 is a bugfix release in the Python 2.7.x series.</p> <p>Full Changelog</p> <p>Files</p> <table border="1"> <thead> <tr> <th>Version</th> <th>Operating System</th> <th>Description</th> <th>MD5 Sum</th> <th>File Size</th> <th>GPG</th> </tr> </thead> <tbody> <tr> <td>Gzipped source tarball</td> <td>Source release</td> <td></td> <td>88d61f8e3616a4be952828b3694109d</td> <td>16935960</td> <td>SIG</td> </tr> <tr> <td>XZ compressed source tarball</td> <td>Source release</td> <td></td> <td>57dffce9cee8bb2ab5f82af1d8e9a69</td> <td>12390820</td> <td>SIG</td> </tr> <tr> <td>Mac OS X 32-bit i386/PPC installer</td> <td>Mac OS X</td> <td>for Mac OS X 10.5 and later</td> <td>3adbedcc935a0db1ab08aa41f3ec4e33</td> <td>24214628</td> <td>SIG</td> </tr> <tr> <td>Mac OS X 64-bit/32-bit installer</td> <td>Mac OS X</td> <td>for Mac OS X 10.6 and later</td> <td>86bedde2becd37335d27aa9df84952e1</td> <td>22350524</td> <td>SIG</td> </tr> <tr> <td>Windows debug information files</td> <td>Windows</td> <td></td> <td>1751598e16431be0441f424ca525b53a</td> <td>24678566</td> <td>SIG</td> </tr> <tr> <td>Windows debug information files for 64-bit binaries</td> <td>Windows</td> <td></td> <td>c5433a7fc9ede6e52835bd40e40aa8d</td> <td>25481382</td> <td>SIG</td> </tr> <tr> <td>Windows help file</td> <td>Windows</td> <td></td> <td>7bc4e15ecae0ed7c55e122f0a6d5f27</td> <td>6224175</td> <td>SIG</td> </tr> <tr> <td>Windows x86-64 MSI Installer</td> <td>Windows</td> <td>for AMD64/EM64T/x64</td> <td>8fa13925db87638aaa723a794ca4ee3</td> <td>19820544</td> <td>SIG</td> </tr> <tr> <td>Windows x86 MSI Installer</td> <td>Windows</td> <td></td> <td>fe0efbb8fd02722f32f7284324934f9d</td> <td>18907136</td> <td>SIG</td> </tr> </tbody> </table>	Version	Operating System	Description	MD5 Sum	File Size	GPG	Gzipped source tarball	Source release		88d61f8e3616a4be952828b3694109d	16935960	SIG	XZ compressed source tarball	Source release		57dffce9cee8bb2ab5f82af1d8e9a69	12390820	SIG	Mac OS X 32-bit i386/PPC installer	Mac OS X	for Mac OS X 10.5 and later	3adbedcc935a0db1ab08aa41f3ec4e33	24214628	SIG	Mac OS X 64-bit/32-bit installer	Mac OS X	for Mac OS X 10.6 and later	86bedde2becd37335d27aa9df84952e1	22350524	SIG	Windows debug information files	Windows		1751598e16431be0441f424ca525b53a	24678566	SIG	Windows debug information files for 64-bit binaries	Windows		c5433a7fc9ede6e52835bd40e40aa8d	25481382	SIG	Windows help file	Windows		7bc4e15ecae0ed7c55e122f0a6d5f27	6224175	SIG	Windows x86-64 MSI Installer	Windows	for AMD64/EM64T/x64	8fa13925db87638aaa723a794ca4ee3	19820544	SIG	Windows x86 MSI Installer	Windows		fe0efbb8fd02722f32f7284324934f9d	18907136	SIG
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Windows x86 MSI Installer	Windows		fe0efbb8fd02722f32f7284324934f9d	18907136	SIG																																																								
3	Downloaded file name: <code>python-2.7.12.amd64.</code>																																																												
4	Double-click the downloaded file to install python software.																																																												

Step	Action
5	Select Install for all users and click Next 
6	Click Next 

Step	Action
7	<p>Click Next</p>  <p>The screenshot shows the 'Customize Python 2.7' window. It displays a tree view under the 'Python' category with sub-options: Register Extensions, Tcl/Tk, Documentation, Utility Scripts, and Test suite. Below the tree view, there is a section titled 'Python Interpreter and Libraries' with a note stating: 'This feature requires 22MB on your hard drive. It has 5 of 5 subfeatures selected. The subfeatures require 29MB on your hard drive.' At the bottom of the window are buttons for 'Disk Usage', 'Advanced', '< Back', 'Next >', and 'Cancel'.</p>  <p>The screenshot shows the 'Install Python 2.7' window. It contains a message: 'Please wait while the Installer installs Python 2.7. This may take several minutes.' Below this is a status message: 'Status: Publishing product information'. A green progress bar is visible at the bottom. At the bottom of the window are buttons for '< Back', 'Next >', and 'Cancel'.</p>

Step	Action
8	<p>Click Finish</p>  <p>Result: Python installation is completed.</p>

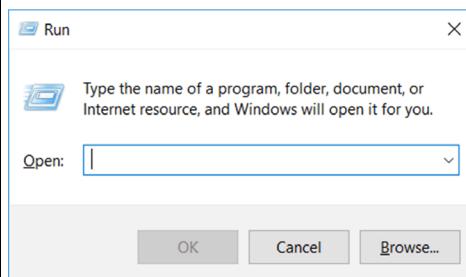
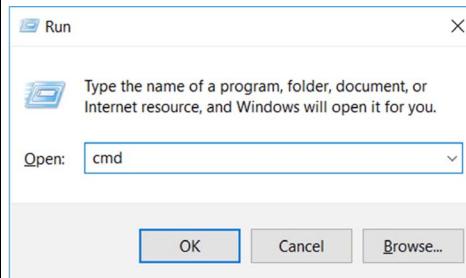
Commissioning of Node-RED server

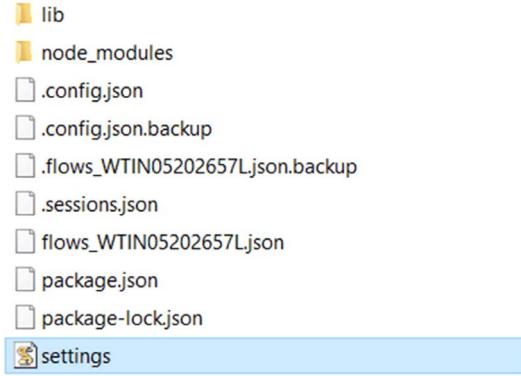
Overview

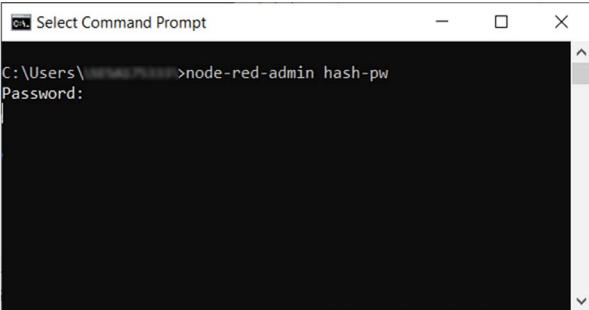
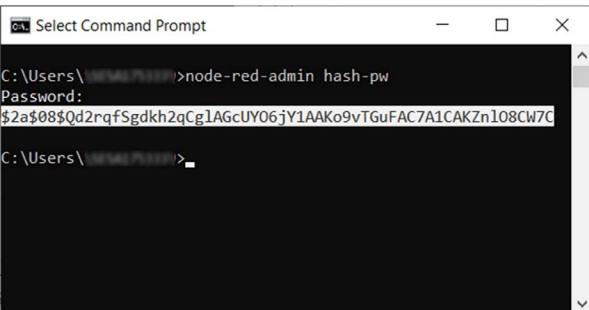
Before enabling login credentials you need to install the Node-RED software. It has to be a secured platform to be compliant with cybersecurity.

Securing Node-RED - Enable Login Credentials

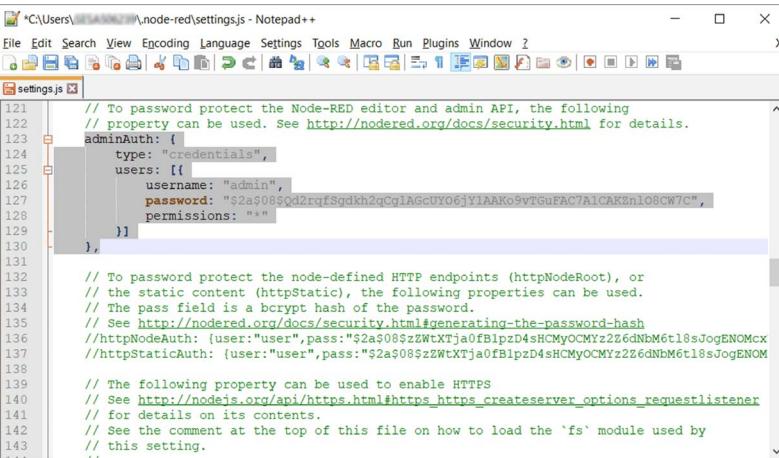
The following steps explains the enabling of user authentication when accessing the Node-RED Editor.

Step	Action
1	<p>Click  and type Run in the search bar and press Enter.</p> 
2	<p>Type the <code>cmd</code> in the run dialog box and click OK.</p>  <p>Result: Command prompt window appears.</p>
3	<p>Type <code>npm config set registry https://registry.npmjs.org</code> in the command prompt and press Enter.</p>

Step	Action
4	Type <code>npm set proxy http://yourproxy:XXXX/</code> in the command prompt and press Enter . NOTE: Type the valid proxy with respect to your organization or country.
5	Type <code>node-red</code> in the command prompt and press Enter . Result: <code>.node-red</code> folder is created in Local Disk (C:/Users/SESAXXXXXX/).
6	In <code>.node-red</code> folder open <code>settings.json</code> file in the Notepad++. NOTE: Download Notepad++ software if not available in your windows system.  <pre> lib node_modules .config.json .config.json.backup .flows_WTIN05202657L.json.backup .sessions.json flows_WTIN05202657L.json package.json package-lock.json settings </pre>
7	Type <code>npm i -g node-red-admin</code> in the command prompt and press Enter .  <p>Result: Node-RED admin is installed globally.</p>

Step	Action
8	<p>Type <code>node-red-admin hash-pw</code> in the command prompt and press Enter.</p> 
9	<p>Type the Password and press Enter.</p>  <p>Result: The password is encrypted.</p>

Step	Action
10	Copy the encrypted text (password), search for <code>adminAuth</code> in <code>settings.js</code> file and paste encrypted text as password. Uncomment (remove <code>//</code>) <code>adminAuth</code> credential details.

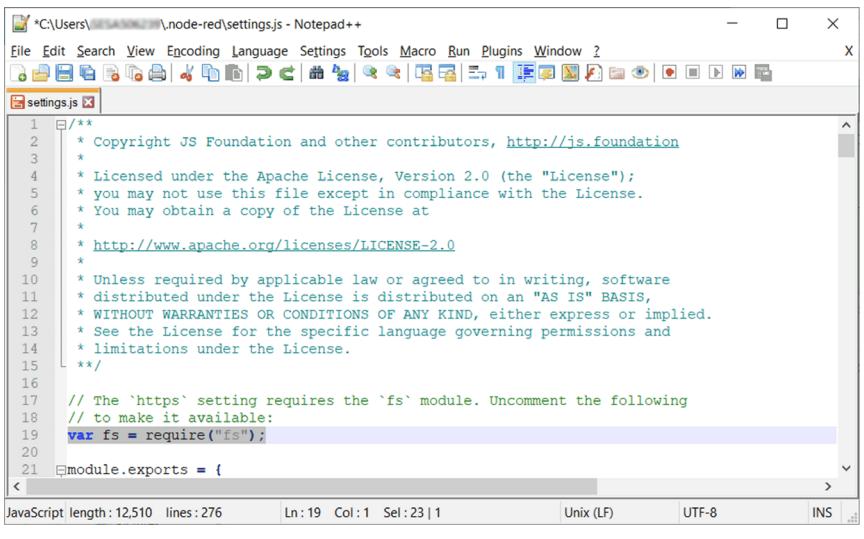
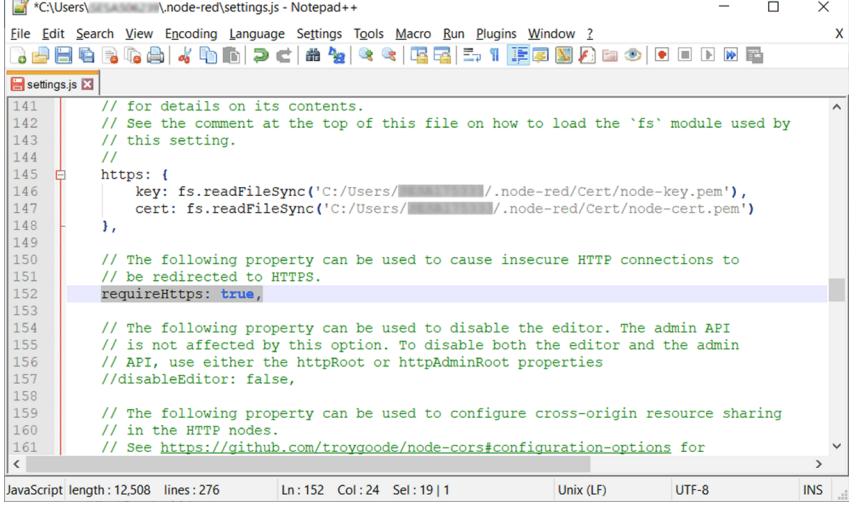


```
/* * node-red/settings.js - Notepad++ * File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ? * * settings.js * * 121 // To password protect the Node-RED editor and admin API, the following * 122 // property can be used. See http://nodered.org/docs/security.html for details. * 123 adminAuth: { * 124   type: "credentials", * 125   users: [ { * 126     username: "admin", * 127     password: "S2a$08$ZwTxa0fB1pzD4sHCMYOCMMyzZ26dNbM6t18sJogENOMCx", * 128     permissions: "*" * 129   } , * 130 }, * 131 * 132 // To password protect the node-defined HTTP endpoints (httpNodeRoot), or * 133 // the static content (httpStatic), the following properties can be used. * 134 // The pass field is a bcrypt hash of the password. * 135 // See http://nodered.org/docs/security.html#generating-the-password-hash * 136 // httpNodeAuth: {user:"user",pass:"$2a$08$ZwTxa0fB1pzD4sHCMYOCMMyzZ26dNbM6t18sJogENOMCx" * 137 // httpStaticAuth: {user:"user",pass:"$2a$08$ZwTxa0fB1pzD4sHCMYOCMMyzZ26dNbM6t18sJogENOMCx" * 138 * 139 // The following property can be used to enable HTTPS * 140 // See http://nodejs.org/api/https.html#https\_https\_createserver\_options\_requestlistener * 141 // for details on its contents. * 142 // See the comment at the top of this file on how to load the 'fs' module used by * 143 // this setting. * 144 * 145 <
```

Securing Node-RED - Enabling SSL

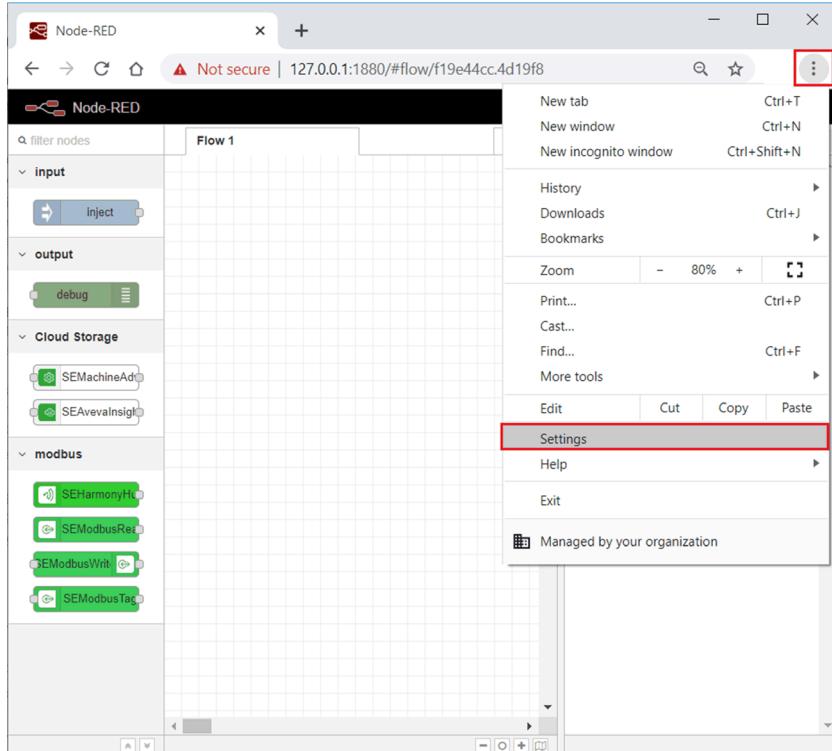
Follow the steps below to enable SSL (Secure Socket Layer) on Node-RED - Editor:

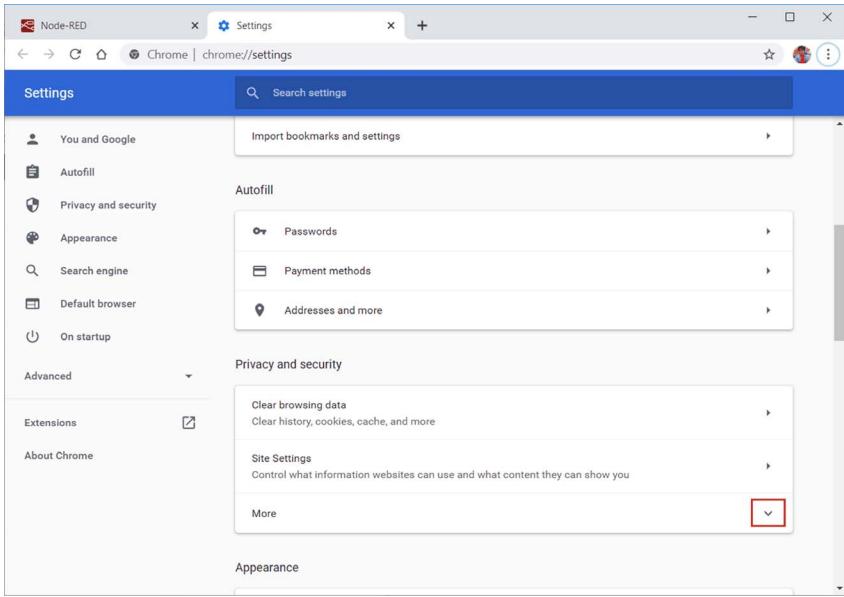
Step	Action
1	Create a new folder called Cert in .node-red folder. For instance, C:/Users/SESAXXXXX/.node-red
2	Copy the SSL certificate files (for instance, node-key.pem and node-cert.pem) and paste them in the path given below: For instance, C:/Users/SESAXXXXX/.node-red/Cert
3	Open settings.js file in Notepad++ . The settings.js file will be located in the path given below: C:/Users/SESAXXXXX/.node-red/

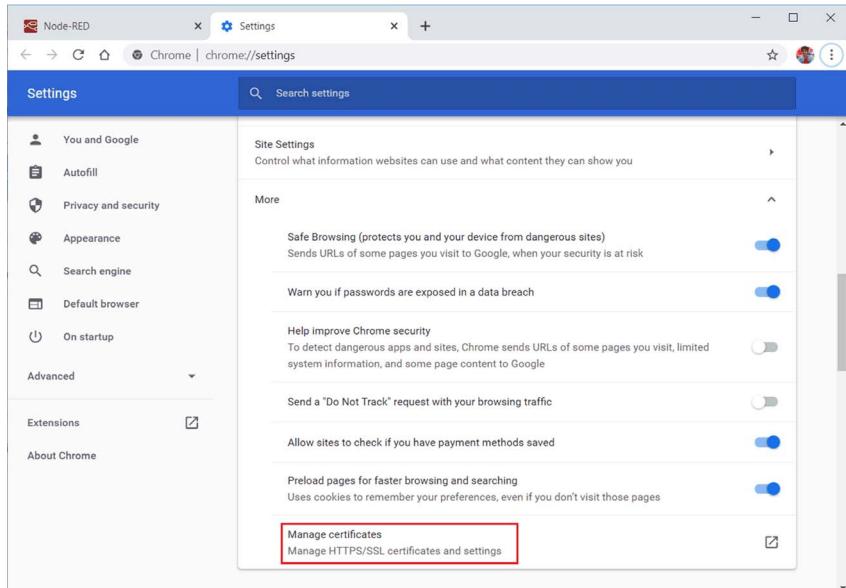
Step	Action
4	<p>Search for the <code>var fs</code> and uncomment (remove <code>//</code>) the statement.</p>  <pre data-bbox="326 241 1190 780"> 1 /** 2 * Copyright JS Foundation and other contributors, http://js.foundation 3 * 4 * Licensed under the Apache License, Version 2.0 (the "License"); 5 * you may not use this file except in compliance with the License. 6 * You may obtain a copy of the License at 7 * 8 * http://www.apache.org/licenses/LICENSE-2.0 9 * 10 * Unless required by applicable law or agreed to in writing, software 11 * distributed under the License is distributed on an "AS IS" BASIS, 12 * WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. 13 * See the License for the specific language governing permissions and 14 * limitations under the License. 15 */ 16 17 // The 'https' setting requires the 'fs' module. Uncomment the following 18 // to make it available: 19 var fs = require("fs"); 20 21 module.exports = { </pre>
5	<p>Search for <code>https</code> in <code>settings.js</code> file and edit the key and cert files path and uncomment (remove <code>//</code>) <code>https</code> details.</p> <p>Search for the <code>requireHttps</code> and uncomment (remove <code>//</code>) the statement.</p>  <pre data-bbox="326 926 1190 1432"> 141 // for details on its contents. 142 // See the comment at the top of this file on how to load the 'fs' module used by 143 // this setting. 144 // 145 https: { 146 key: fs.readFileSync('C:/Users/[REDACTED]/.node-red/Cert/node-key.pem'), 147 cert: fs.readFileSync('C:/Users/[REDACTED]/.node-red/Cert/node-cert.pem') 148 }, 149 150 // The following property can be used to cause insecure HTTP connections to 151 // be redirected to HTTPS. 152 requireHttps: true, 153 154 // The following property can be used to disable the editor. The admin API 155 // is not affected by this option. To disable both the editor and the admin 156 // API, use either the httpRoot or httpAdminRoot properties 157 // disableEditor: false, 158 159 // The following property can be used to configure cross-origin resource sharing 160 // in the HTTP nodes. 161 // See https://github.com/troygoode/node-cors#configuration-options for </pre>

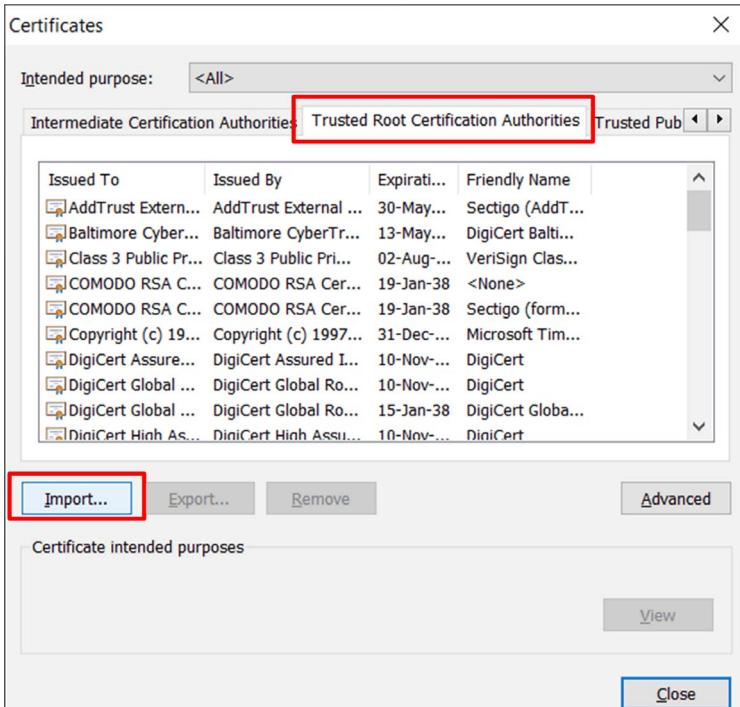
Step	Action
6	Save the settings.js file and close.
7	Restart the node-red server.

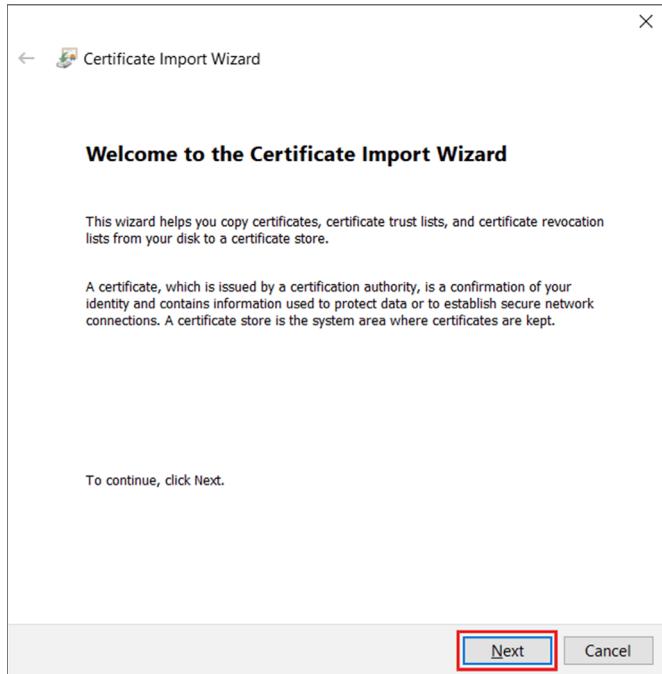
If your Node-RED server (<https://127.0.0.1.1880/>) is showing Not-secure then follow the steps given below to make the server secure:

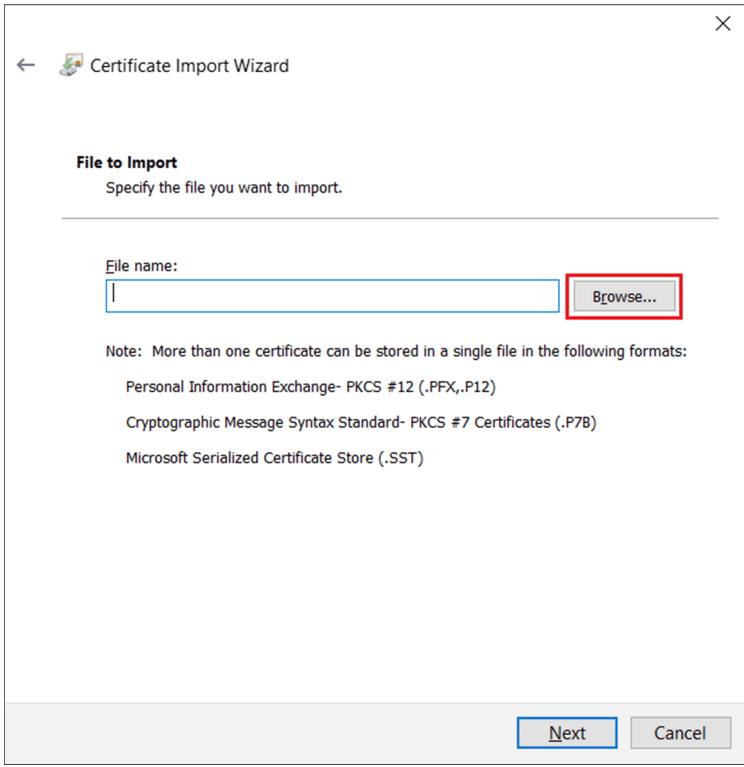
Step	Action
1	<p>Open Node-RED application in a specified browser. Click Kebab Menu → Settings as shown in the image below.</p>  <p>Result: Settings window appears.</p>

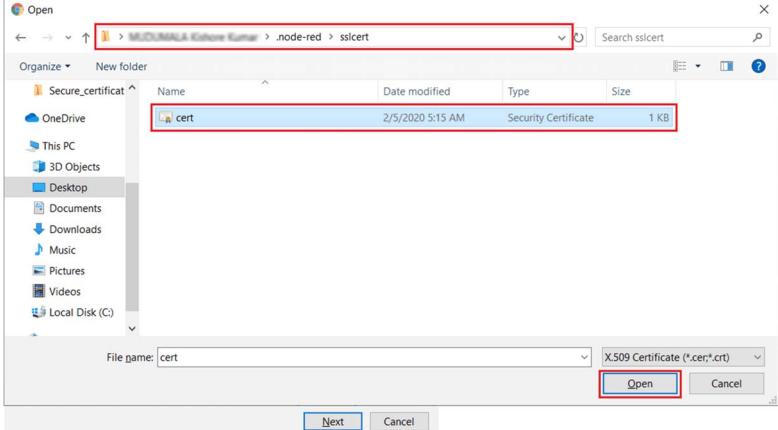
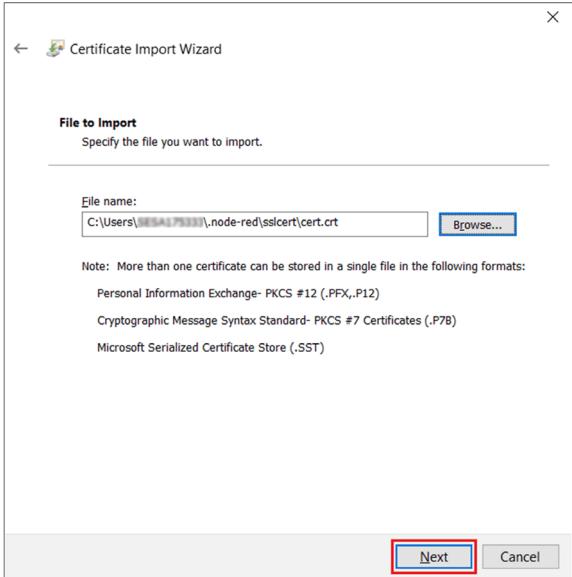
Step	Action
2	<p>Click More drop-down.</p>  <p>The screenshot shows the Chrome Settings page. A red box highlights the 'More' dropdown menu at the bottom right of the main content area. The menu is open, displaying options like 'Import bookmarks and settings', 'Autofill', 'Passwords', 'Payment methods', 'Addresses and more', 'Clear browsing data', 'Site Settings', and 'More'.</p>

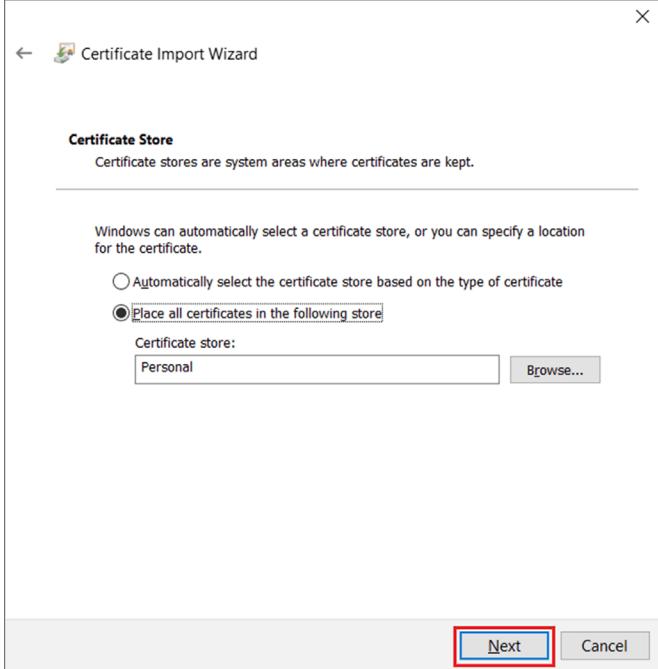
Step	Action
3	<p>Click Manage certificates.</p> 

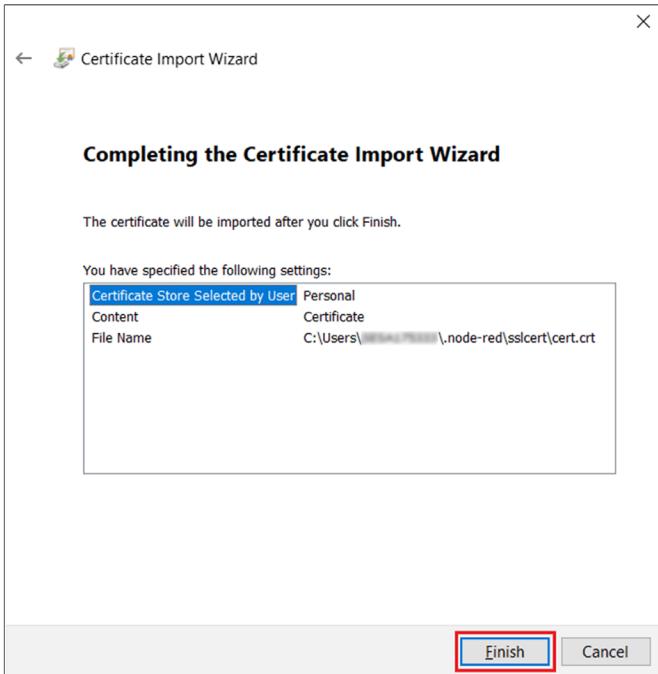
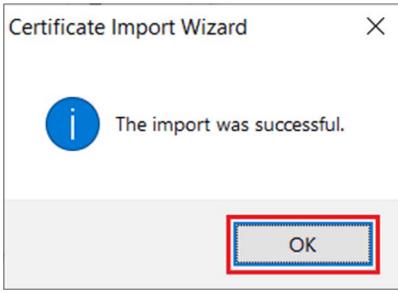
Step	Action
4	<p>Click Trusted Root Certification Authorities and Import....</p>  <p>The screenshot shows the Windows Certificates dialog box. The 'Trusted Root Certification Authorities' tab is selected. Below it, there is a list of certificates with columns for Issued To, Issued By, Expiration Date, and Friendly Name. At the bottom of the dialog, there are buttons for Import..., Export..., Remove, Advanced, View, and Close. The 'Import...' button is highlighted with a red box.</p>

Step	Action
5	<p>Click Next.</p>  <p>The screenshot shows the 'Welcome to the Certificate Import Wizard' screen. At the top right is a close button (X). Below it is a back arrow icon and the text 'Certificate Import Wizard'. The main title is 'Welcome to the Certificate Import Wizard'. A descriptive text block explains the wizard's purpose: 'This wizard helps you copy certificates, certificate trust lists, and certificate revocation lists from your disk to a certificate store.' Another text block describes a certificate: 'A certificate, which is issued by a certification authority, is a confirmation of your identity and contains information used to protect data or to establish secure network connections. A certificate store is the system area where certificates are kept.' At the bottom, the text 'To continue, click Next.' is followed by a 'Next' button with a red rectangular border around it, and a 'Cancel' button.</p>

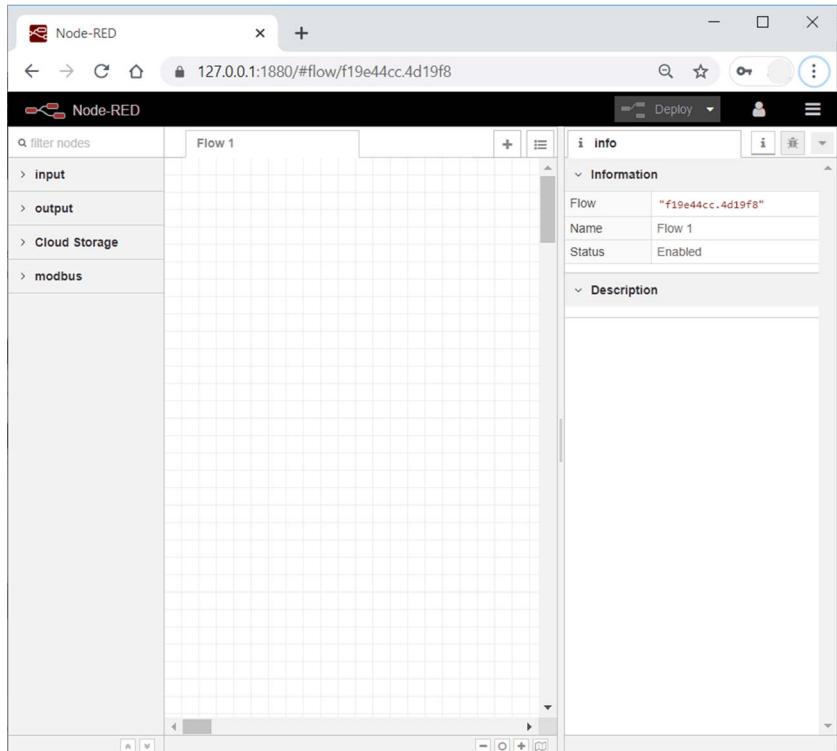
Step	Action
6	<p>Click Browse....</p>  <p>← Certificate Import Wizard</p> <p>File to Import Specify the file you want to import.</p> <p>File name: <input type="text"/> Browse...</p> <p>Note: More than one certificate can be stored in a single file in the following formats:</p> <ul style="list-style-type: none">Personal Information Exchange- PKCS #12 (.PFX,.P12)Cryptographic Message Syntax Standard- PKCS #7 Certificates (.P7B)Microsoft Serialized Certificate Store (.SST) <p>Next Cancel</p>

Step	Action
7	<p>Select the location of the certificates which are available in the .node-red folder. Select cert and click Open.</p> <p>For example, C:/Users/SESAXXXXX/.node-red/sslcert</p> 
8	<p>Click Next.</p> 

Step	Action
9	<p>Click Next.</p> 

Step	Action
10	<p>Click Finish.</p> 
11	<p>Click OK.</p> 
12	<p>Reload the browser, and restart your computer if required.</p>

Step	Action
13	<p>Copy https://127.0.0.1.1880 and paste the link in a supported browser. Type the Username and Password in related fields and click Login.</p> 

Step	Action
14	Secured Node-RED application is launched successfully. 

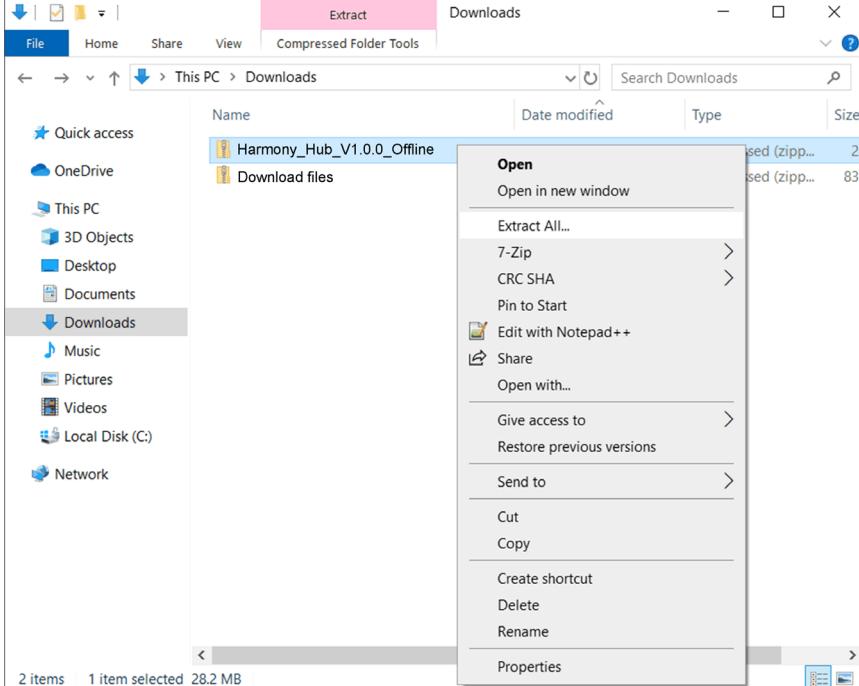
Installing SE Harmony Hub Node - Offline Installation Mode

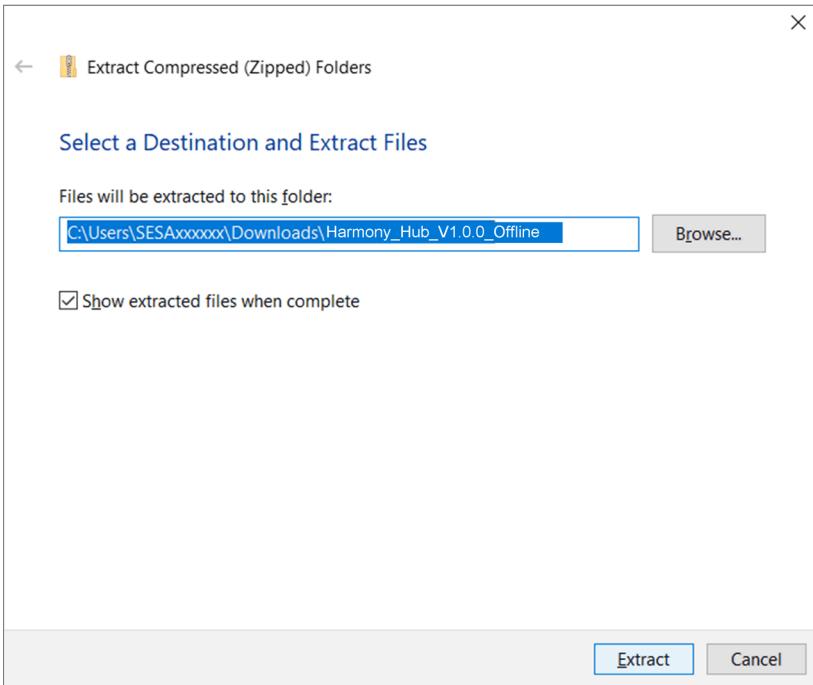
Overview

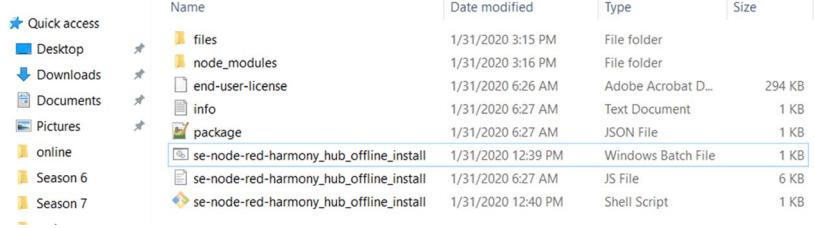
You should install the software below in your system before proceeding with the offline installation mode:

- Node.js ([see page 35](#))
- Node-RED ([see page 42](#))

Installing SE Harmony Hub Node

Step	Action
1	<p>Download the <code>Harmony_Hub_V1.0.0_Offline.Zip</code> file from the link given below: https://schneider-electric.box.com/s/xsmgvjhjo4km8jwlsn8qyprgb0gy8bv6</p> <p>NOTE: Make sure unzip software is available in your device, if not available, download it from the given link: https://www.7-zip.org/download.html</p>
2	<p>Right click the downloaded <code>Harmony_Hub_V1.0.0_Offline</code> file and select Extract All...</p>  <p>Result: The selected file is unzipped.</p>

Step	Action
3	<p>Click Extract.</p>  <p>Result: The selected file is unzipped.</p>

Step	Action
4	<p>Open <code>Harmony_Hub_V1.0.0_Offline</code> folder. Double click on the <code>se-node-red-harmony_hub_offline_install.bat</code> file for installing node.</p> 
	<p>Result: The below license document and statement appears:</p> <ul style="list-style-type: none"> • EULA (End User Licensing Agreement) document will appear in PDF format. Read it carefully and go back to command prompt window. • Please read the Terms & Conditions carefully. Do you agree to our Terms & Conditions? (yes/no) :
5	<p>Type <code>yes</code> and press <code>Enter</code> to agree the terms and conditions and install SE Harmony Hub node.</p>  <p>Result: SE Harmony Hub node is successfully installed.</p> <p>NOTE: The node package is saved in the User folder (for example: <code>C:\Users\SESAXXXXX\Harmony_Hub_V1.0.0_Offline</code>).</p> <p>NOTE: If you type <code>no</code>, the installation is canceled.</p>
6	<p>Launch SE Harmony Hub node (see page 97).</p>

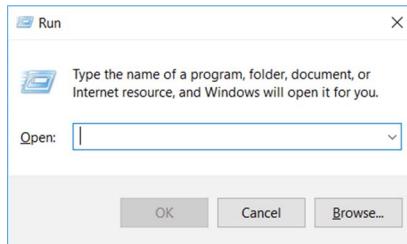
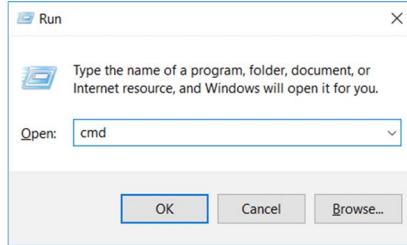
Installing SE Harmony Hub Node - Online Installation Mode

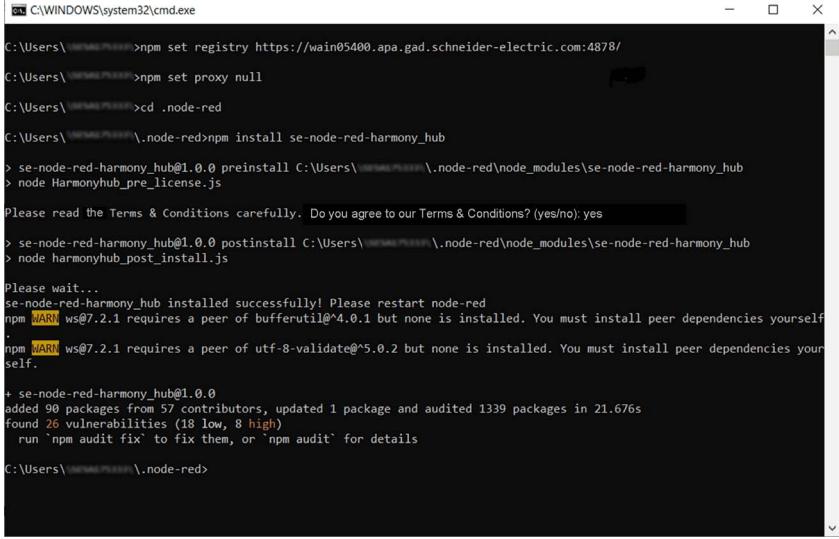
Overview

You should install the software below in your system before proceeding with the online installation mode:

- Node.js (*see page 35*)
- Node-RED (*see page 42*)
- Python v2.7.x (*see page 44*)

Installing SE Harmony Hub Node

Step	Action
1	<p>Click  and type Run in the search bar and press Enter.</p>  <p>Result: Run dialog box appears.</p>
2	<p>Type the cmd in the Run dialog box and click OK.</p>  <p>Result: Command prompt window appears.</p>
3	<p>Type the below text in the command prompt and press Enter:</p> <pre>npm set registry https://wain05400.apa.gad.schneider-electric.com:4878/</pre>

Step	Action
4	Type the text given below in the command prompt: npm set proxy null Note: If set proxy null command is not working, remove proxy for respective types as follows: <ul style="list-style-type: none">● npm config rm proxy● npm config rm http-proxy● npm config rm https-proxy
5	Press Enter .
6	Type the text given below in the command prompt: cd .node-red
7	Press Enter .
8	Type npm install se-node-red-harmony_hub and press Enter to install SE Harmony Hub node. Result: The below license document and statement appears: <ul style="list-style-type: none">● EULA (End User Licensing Agreement) document will appear in PDF format. Read it carefully and go back to command prompt window.● Please read the Terms & Conditions carefully. Do you agree to our Terms & Conditions? (yes/no) :
9	Type yes and press Enter to agree the terms and conditions and install SE Harmony Hub node. 
	Result: Installation is successfully completed. NOTE: If you type no , the installation is canceled.
10	To launch SE Harmony Hub node (see page 97), refer the node usage section.

NOTE: The online installation process sometimes does not work with in Schneider Network, due to Schneider proxy issue. If you face proxy issue, follow the offline installation process as a workaround ([see page 64](#)).

Section 3.2

Uninstalling SE Harmony Hub node - Windows Platform

What Is in This Section?

This section contains the following topics:

Topic	Page
Uninstalling SE Harmony Hub Node - Offline Uninstallation Mode	71
Uninstalling SE Harmony Hub Node - Online Uninstallation Mode	73

Uninstalling SE Harmony Hub Node - Offline Uninstallation Mode

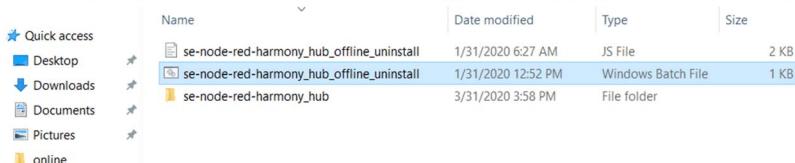
NOTICE

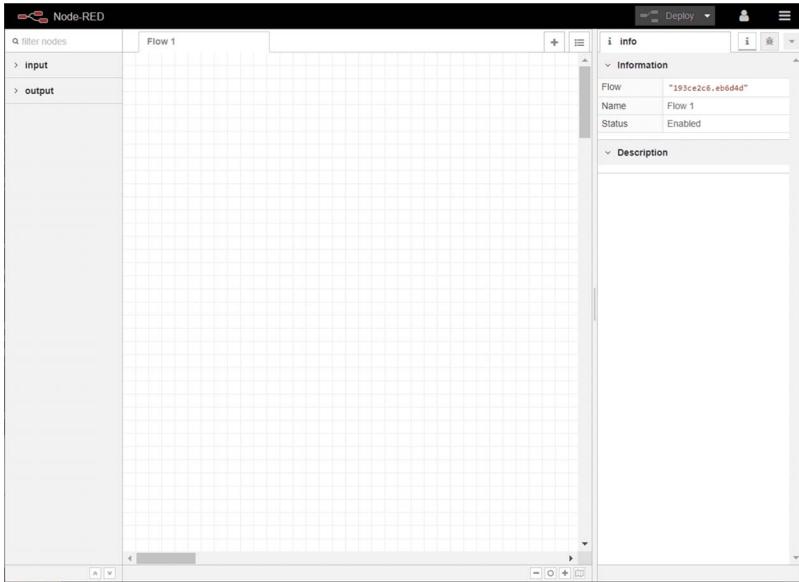
LOSS OF DATA

Backup the data before uninstalling SE Harmony Hub node.

Failure to follow these instructions can result in equipment damage.

This procedure explains how to uninstall SE Harmony Hub node:

Step	Action
1	Delete SE Harmony Hub node from the flow.
2	Click  and Logout from Node-RED application.
3	Stop the Node-RED server running in the command prompt window.
4	Open users folder. For example: C:\Users\SESAXXXXXX
5	Double click <code>se-node-red-harmony_hub_offline_uninstall.bat</code> file to uninstall SE Harmony Hub node.  Result: SE Harmony Hub node is uninstalled.

Step	Action
6	<p>To restart Node-RED server, follow the steps:</p> <ol style="list-style-type: none">1. Type <code>node-red</code> in the command prompt and press Enter. Result: Node-RED server starts.2. Copy the IP address (https://127.0.0.1:1880/) in which the Node-RED server is running.3. Open a browser.4. Paste the IP address in the URL field in the browser and press Enter.5. Type the Username and Password in related fields and click login. Result: Node-RED factory window reappears.  The screenshot shows the Node-RED interface with a blank canvas area labeled "Flow 1". On the left sidebar, there are sections for "input" and "output". On the right side, there is a sidebar titled "info" with a "Information" section containing the following details: <ul style="list-style-type: none">Flow: "193ce2c6.ebd6d4d"Name: Flow 1Status: Enabled

Uninstalling SE Harmony Hub Node - Online Uninstallation Mode

NOTE: You can uninstall SE Harmony Hub node using the command prompt.

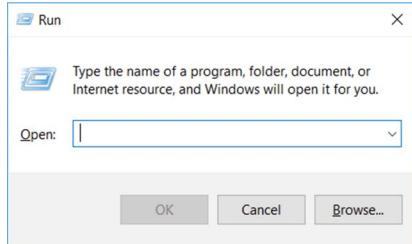
NOTICE

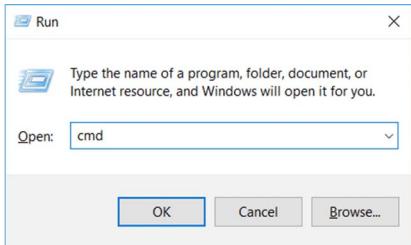
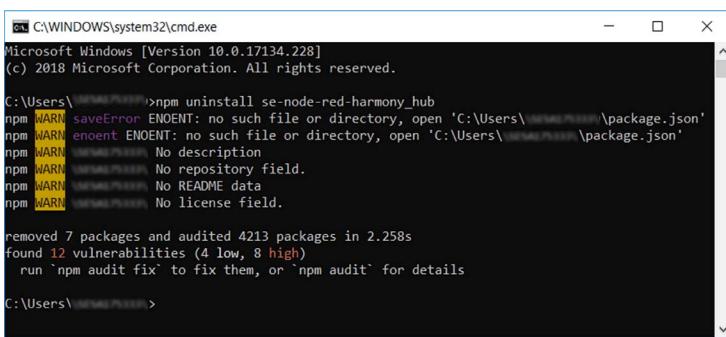
LOSS OF DATA

Backup the data before uninstalling SE Harmony Hub node.

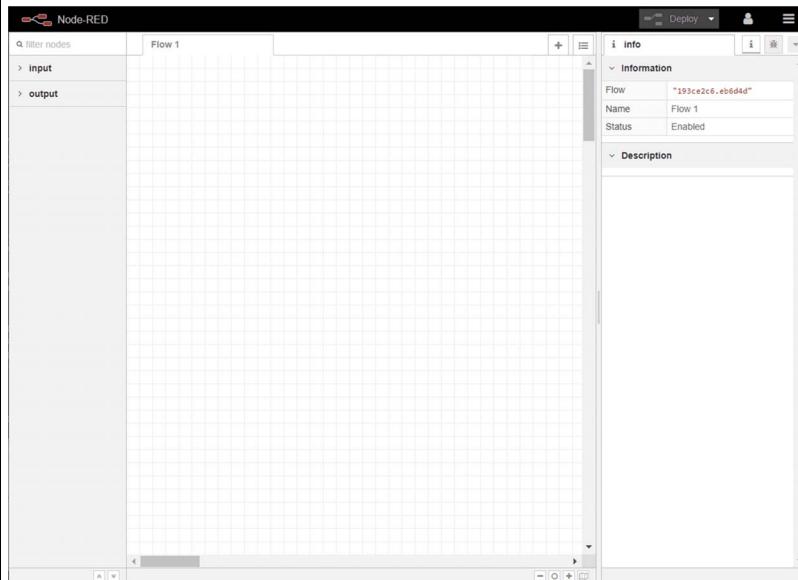
Failure to follow these instructions can result in equipment damage.

This procedure explains how to uninstall SE Harmony Hub node:

Step	Action
1	Delete SE Harmony Hub node from the flow.
2	Click  and Logout from Node-RED application.
3	Stop Node-RED server running in the command prompt window.
4	Click  and type Run in the search bar and press Enter .  <p>Result: Run dialog box appears.</p>

Step	Action
5	<p>Type cmd in the Run dialog box and click OK.</p> 
	<p>Result: Command prompt window appears.</p>
6	<p>Type cd .node-red and press Enter.</p>
7	<p>Type npm uninstall se-node-red-harmony_hub.</p>
8	<p>Press Enter.</p>  <p>Result: SE Harmony Hub node is uninstalled.</p>

Step	Action
9	<p>To restart Node-RED server, follow the steps:</p> <ol style="list-style-type: none">1. Type <code>node-red</code> in the command prompt and press Enter. Result: Node-RED server starts.2. Copy the IP address (https://127.0.0.1:1880) in which the Node-RED server is running.3. Open a browser.4. Paste the IP address in the URL field in the browser and press Enter.5. Type the Username and Password in related fields and click login. Result: Node-RED factory window reappears.



Chapter 4

Installation and uninstallation of SE Harmony Hub Node - Linux Platform

NOTE: Linux version of SE Harmony Hub node will be supported in the future updates.

NOTE: Magelis HMIBSC - The required softwares like Node.js, Node-RED and Python are pre-installed in the **Magelis HMIBSC** box.

Hardware requirements for Linux - Linaro - V1.00.010

IIoT Edge Box	PC hardware	Specification
Magelis HMIBSC	Processor	Reference HMIBSCEA53D1L0T HMIBSC with ARM
	Hard disk space	eMMC and TPM for hardware encryption
	Operating system	Linux Yocto

What Is in This Chapter?

This chapter contains the following sections:

Section	Topic	Page
4.1	Installing SE Harmony Hub Node – Linux Platform	78
4.2	Uninstalling SE Harmony Hub Node - Linux Platform	85

Section 4.1

Installing SE Harmony Hub Node – Linux Platform

What Is in This Section?

This section contains the following topics:

Topic	Page
Installing SE Harmony Hub Node – Offline Installation Mode	79
Installing SE Harmony Hub Node - Online Installation Mode	82

Installing SE Harmony Hub Node – Offline Installation Mode

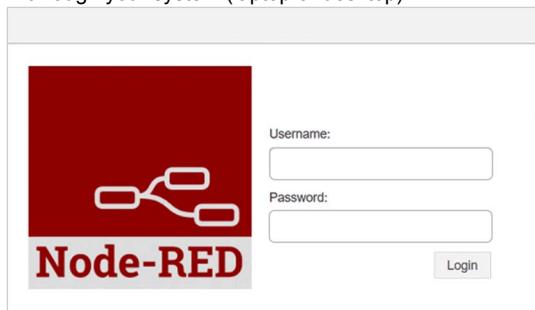
The Linux based Edge Boxes (for example, HMIBSC) have in-built Node-RED-as-a-Service. This provides Node.js, Node-RED and python are pre-installed in the OS image.

The SE Harmony Hub node is installed by the user from the portable disk.

The below procedure is applicable for the Edge Boxes running on Linux Yocto (for example, HMIBSC):

Step	Action
1	Download the <code>Harmony_Hub_V1.0.0_Offline.Zip</code> file from the link given below: https://schneider-electric.box.com/s/xsmgvjhjo4km8jwlsn8qyprgb0gy8bv6
2	Extract the downloaded file <code>Harmony_Hub_V1.0.0_Offline.Zip</code> and transfer the extracted folder (<code>Harmony_Hub_V1.0.0_Offline</code>) into a portable disk. Example: Pendrive.
3	Connect the portable device to IIoT Edge Box.
4	<ul style="list-style-type: none"> ● Navigate to the directory of the portable device (for instance, <code>cd mount/media/<disk name></code>) and press Enter. ● Type <code>cd Harmony_Hub_V1.0.0_Offline</code> and press Enter to go to the directory where the offline files for SE Harmony Hub node are placed.
5	Type <code>sh se-node-red-harmony_hub_offline_install.sh</code> and press Enter to install the SE Harmony Hub node. Result: Please read the Terms & Conditions carefully! press any key to continue... statement appears.
6	Press any key to read the Terms & Conditions. <pre>root@hmibsc:~/mount/sda1/Harmony_Hub_V1.0.0_Offline se-node-red-harmony_hub_offline_install.sh root@hmibsc:~/mount/sda1/Harmony_Hub# sh se-node-red-harmony_hub_offline_install.sh Please wait ... Please read the Terms & Conditions carefully! press any key to continue ... -</pre>
	NOTE: Press any key to continue until the result appears below. Result: Do you agree to our Terms & Conditions? (yes/no) :.
7	Read the entire license document and press any key to continue... at the end of each page. Result: Do you agree to our Terms & Conditions? (yes/no):

Step	Action
8	<p>Type yes and press Enter to agree the terms and conditions and install SE Harmony Hub node.</p> <p>in both cases, for the sole and restricted purpose of exercising the concurrent use license right granted to You under said Corporate License within the limits set forth hereinabove. This Appendix forms an integral part of this EULA, and all terms and conditions of this EULA which are not expressly deviated under this Appendix, shall apply to You in accordance with the foregoing in addition to the terms and conditions set forth in this Appendix.</p> <p>As used herein and for the purposes of Corporate Licenses only, the following terms shall have the following meaning :</p> <ul style="list-style-type: none"> -the term ■Group of Companies■ means any company or corporation: a)in which You directly or indirectly own or control the voting rights attached to more than 50% of the issued ordinary share capital. or (ii) control directly or indirectly the appointment of a majority of directors (or equivalent) of its board of directors (or equivalent body); or b)which directly or indirectly (i) owns or controls the voting rights attached to more than 50% of Your issued ordinary share capital, or (ii) controls the appointment of a majority of directors (or equivalent) of Your board of directors (or equivalent body); or c)which is directly or indirectly owned or controlled by the same company or corporation as You in accordance with sub-case b) above. <ul style="list-style-type: none"> -the term ■Authorized Users■ means any end-users at the Sites who use the Software Product; -the term ■Sites■ means Your facility to which Schneider Electric Initially supplied the Software Product as well as all of Your facilities and the facilities of Your Group of Companies, irrespective whether said facilities are located within the same country or several countries. <p>22 Press any key to continue Do you agree to our Terms & Conditions? (yes/no): Please wait ... Successfully copied se-node-red-harmony_hub files Running: cd /home/root/se-node-red-harmony_hub && npm link Done: cd /home/root/se-node-red-harmony_hub && npm link se-node-red-harmony_hub installed successfully! Please restart node-red root@hmibsc:~/mount/sda1/Harmony_Hub_V1.0.0_Offline</p> <p>Result: se-node-red-harmony_hub installed successfully. Please restart node-red by rebooting Magelis HMIBSC Edge box.</p> <p>NOTE: If you type no, the installation is canceled.</p>

Step	Action
9	<p>To check if your node is uninstalled follow the steps below</p> <ul style="list-style-type: none"> ● Open a browser from system (laptop or desktop) connected in same network as the Linux Edge box: ○ Go to <a href="https://<ip address>:1880">https://<ip address>:1880 <p>NOTE: To know your ip address, type <code>ifconfig</code> in your Linux edge box.</p> <pre>/home/root\$ ifconfig eth0 Link encap:Ethernet HWaddr 74:FE:48:34:66:93 inet addr:192.168.10.78 Bcast:192.168.255.255 Mask:255.255.0 inet6 addr: 2405:204:5510:d6f7:76fe:48ff:fe34:6693%4804152/64 Scope:Global inet6 addr: fe80::76fe:48ff:fe34:6693%4804152/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:144095435 errors:79654 dropped:40320 overruns:0 frame:39334 TX packets:145389576 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:10131566838 (9.4 GiB) TX bytes:11357314537 (10.5 GiB) eth1 Link encap:Ethernet HWaddr 74:FE:48:34:66:94 UP BROADCAST MULTICAST MTU:1500 Metric:1 RX packets:0 errors:0 dropped:0 overruns:0 frame:0 TX packets:0 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:0 (0.0 B) TX bytes:0 (0.0 B) lo Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1%4804152/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:174 errors:0 dropped:0 overruns:0 frame:0 TX packets:174 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1 RX bytes:13456 (13.1 KiB) TX bytes:13456 (13.1 KiB) wlan0 Link encap:Ethernet HWaddr 02:00:16:B1:2F:02 inet addr:192.168.225.250 Bcast:192.168.225.255 Mask:255.255.255.0 inet6 addr: 2405:204:5510:d6f7:0:16ff:feb1:2f02%4804152/64 Scope:Global inet6 addr: fe80::16ff:feb1:2f02%4804152/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:21598 errors:0 dropped:0 overruns:0 frame:0 TX packets:5230 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:1019306 (995.4 KiB) TX bytes:434633 (424.4 KiB)</pre> <ul style="list-style-type: none"> ○ Login window appears. Use your Node-RED login credentials to operate Linux Edge box through your system (laptop or desktop).  <p>NOTE: As browser is not available in Linux edge box you can connect to another system (laptop or desktop) using the ip address of Linux Edge box.</p>

Installing SE Harmony Hub Node - Online Installation Mode

The Linux based Edge Boxes (for example, HMIBSC) have in-built Node-RED-as-a-Service. This means Node.js, Node-Red and python are pre-installed in the OS image.

To install SE Harmony Hub node follow the steps given below:

Step	Action
1	Type the text given below in the terminal and press Enter : <code>npm set registry https://wain05400.apa.gad.schneider-electric.com:4878/</code>
2	Type the text given below in the terminal and press Enter : <code>npm set proxy null</code> Note: If set proxy null command is not working, remove proxy for respective types as follows: <ul style="list-style-type: none">● <code>npm config rm proxy</code>● <code>npm config rm http-proxy</code>● <code>npm config rm https-proxy</code>
3	Type <code>npm install se-node-red-harmony_hub</code> and press Enter . NOTE: Press any key to continue until the result appears. Result: Do you agree to our Terms & Conditions? (yes/no) :.

Step	Action
4	<p>Type yes and press Enter to agree the terms and conditions and install SE Harmony Hub node.</p> <p>in both cases, for the sole and restricted purpose of exercising the concurrent use license right granted to You under said Corporate License within the limits set forth hereinabove.</p> <p>This Appendix forms an integral part of this EULA, and all terms and conditions of this EULA which are not expressly deviated under this Appendix, shall apply to You in accordance with the foregoing in addition to the terms and conditions set forth in this Appendix.</p> <p>As used herein and for the purposes of Corporate Licenses only, the following terms shall have the following meaning :</p> <ul style="list-style-type: none"> -the term ■Group of Companies■ means any company or corporation: a)in which You directly or indirectly own or control the voting rights attached to more than 50% of the issued ordinary share capital. or (ii) control directly or indirectly the appointment of a majority of directors (or equivalent) of its board of directors (or equivalent body); or b)which directly or indirectly (i) owns or controls the voting rights attached to more than 50% of Your issued ordinary share capital, or (ii) controls the appointment of a majority of directors (or equivalent) of Your board of directors (or equivalent body); or c)which is directly or indirectly owned or controlled by the same company or corporation as You in accordance with sub-case b) above. <ul style="list-style-type: none"> -the term ■Authorized Users■ means any end-users at the Sites who use the Software Product; -the term ■Sites■ means Your facility to which Schneider Electric initially supplied the Software Product as well as all of Your facilities and the facilities of Your Group of Companies, irrespective whether said facilities are located within the same country or several countries. <p>22 Press any key to continue Do you agree to our Terms & Conditions? (yes/no):</p> <p>Result: Installation is successfully completed.</p> <p>NOTE: If you type no, the installation is cancelled.</p>
5	Restart Node-RED application by rebooting Magelis HMIBSC Edge box.

Step	Action
6	<p>Open a browser from system (laptop or desktop) connected in same network as the Linux Edge box:</p> <ul style="list-style-type: none"> Go to <a href="https://<ip address>:1880">https://<ip address>:1880 <p>NOTE: To know your ip address, type <code>ifconfig</code> in your Linux edge box.</p> <pre>/home/root\$ ifconfig eth0 Link encap:Ethernet HWaddr 74:FE:48:34:66:93 inet addr:192.168.10.78 Bcast:192.168.255.255 Mask:255.255.0.0 inet6 addr: 2405:204:551b:6f77:76fe:48ff:fe34:6693%4804152/64 Scope:Global inet6 addr: fe80::76fe:48ff:fe34:6693%4804152/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:144095435 errors:79654 dropped:40320 overruns:0 frame:39334 TX packets:145389576 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:10131566838 (9.4 GiB) TX bytes:11357314537 (10.5 GiB) eth1 Link encap:Ethernet HWaddr 74:FE:48:34:66:94 UP BROADCAST MULTICAST MTU:1500 Metric:1 RX packets:0 errors:0 dropped:0 overruns:0 frame:0 TX packets:0 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:0 (0.0 B) TX bytes:0 (0.0 B) lo Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1%4804152/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:174 errors:0 dropped:0 overruns:0 frame:0 TX packets:174 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1 RX bytes:13456 (13.1 KiB) TX bytes:13456 (13.1 KiB) wlan0 Link encap:Ethernet HWaddr 02:00:16:B1:2F:02 inet addr:192.168.225.250 Bcast:192.168.225.255 Mask:255.255.255.0 inet6 addr: 2405:204:551b:6f77:0:16ff:feb1:2f02%4804152/64 Scope:Global inet6 addr: fe80::16ff:feb1:2f02%4804152/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:21598 errors:0 dropped:0 overruns:0 frame:0 TX packets:5230 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:1019306 (995.4 KiB) TX bytes:434633 (424.4 KiB)</pre> <ul style="list-style-type: none"> Login window appears. Use your Node-RED login credentials to operate Linux Edge box through your system (laptop or desktop).  <p>NOTE: As browser is not available in Linux edge box you can connect to another system (laptop or desktop) using the ip address of Linux Edge box.</p>

Section 4.2

Uninstalling SE Harmony Hub Node - Linux Platform

What Is in This Section?

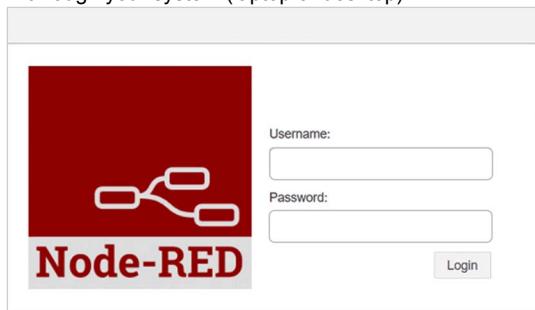
This section contains the following topics:

Topic	Page
Uninstalling SE Harmony Hub Node - Offline Uninstallation Mode	86
Uninstalling SE Harmony Hub Node - Online Uninstallation Mode	88

Uninstalling SE Harmony Hub Node - Offline Uninstallation Mode

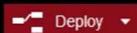
The below procedure is applicable for the Edge Boxes running on Linux Yocto (for example, **HMIBSC**):

Step	Action
1	Type <code>ls</code> and press Enter . Result: Installed nodes appears.
2	Type <code>sh se-node-red-harmony_hub_offline_uninstall.sh</code> and press Enter to uninstall the SE Harmony Hub node. <pre>root@hmibsc:~# ls se-node-red-harmony_hub_offline_uninstall.sh root@hmibsc:~# sh se-node-red-harmony_hub_offline_uninstall.sh Running: cd /home/root/se-node-red-harmony_hub && npm unlink Done: cd /home/root/se-node-red-harmony_hub && npm unlink Running: cd /home/root && rm -rf se-node-red-harmony_hub Done: cd /home/root && rm -rf se-node-red-harmony_hub root@hmibsc:~#</pre> NOTE: After uninstalalation restart Node-RED by rebooting Magelis HMIBSC Edge box.

Step	Action
3	<p>To check if your node is uninstalled follow the steps below</p> <ul style="list-style-type: none"> Open a browser from system (laptop or desktop) connected in same network as the Linux Edge box: Go to <a href="https://<ip address>:1880">https:<ip address>:1880 <p>NOTE: To know your ip address, type <code>ifconfig</code> in your Linux edge box.</p> <pre>/home/root\$ ifconfig eth0 Link encap:Ethernet HWaddr 74:FE:48:34:66:93 inet addr:192.168.10.78 Bcast:192.168.255.255 Mask:255.255.0 inet6 addr: 2405:204:5510:d6f7:76fe:48ff:fe34:66934804152/64 Scope:Global inet6 addr: fe80::76fe:48ff:fe34:66934804152/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:144095435 errors:79654 dropped:40320 overruns:0 frame:39334 TX packets:145389576 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:10131566838 (9.4 GiB) TX bytes:11357314537 (10.5 GiB) eth1 Link encap:Ethernet HWaddr 74:FE:48:34:66:94 UP BROADCAST MULTICAST MTU:1500 Metric:1 RX packets:0 errors:0 dropped:0 overruns:0 frame:0 TX packets:0 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:0 (0.0 B) TX bytes:0 (0.0 B) lo Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1%4804152/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:174 errors:0 dropped:0 overruns:0 frame:0 TX packets:174 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1 RX bytes:13456 (13.1 KiB) TX bytes:13456 (13.1 KiB) wlan0 Link encap:Ethernet HWaddr 02:00:16:B1:2F:02 inet addr:192.168.225.250 Bcast:192.168.225.255 Mask:255.255.255.0 inet6 addr: 2405:204:5510:d6f7:0:16ff:feb1:2f02%4804152/64 Scope:Global inet6 addr: fe80::16ff:feb1:2f02:4804152/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:21598 errors:0 dropped:0 overruns:0 frame:0 TX packets:5230 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:1019306 (995.4 KiB) TX bytes:434633 (424.4 KiB)</pre> <ul style="list-style-type: none"> Login window appears. Use your Node-RED login credentials to operate Linux Edge box through your system (laptop or desktop).  <p>NOTE: As browser is not available in Linux edge box you can connect to another system (laptop or desktop) using the ip address of Linux Edge box.</p>

Uninstalling SE Harmony Hub Node - Online Uninstallation Mode

This procedure explains how to uninstall the SE Harmony Hub node:

Step	Action
1	From the browser where Node-RED server is running, delete the SE Harmony Hub node from the flow.
2	Click Deploy  and Logout from the Node-RED application.
3	Go to HMIBSC terminal.
4	Type <code>npm uninstall se-node-red-harmony_hub</code> .
5	Press Enter to uninstall the SE Harmony Hub node. Result: SE Harmony Hub node is successfully uninstalled.
6	Restart Node-RED application by rebooting Magelis HMIBSC Edge box.

Step	Action
7	<p>To check if your node is uninstalled follow the steps below</p> <ul style="list-style-type: none"> ● Open a browser from system (laptop or desktop) connected in same network as the Linux Edge box: ○ Go to <a href="https://<ip address>:1880">https://<ip address>:1880 <p>NOTE: To know your ip address, type <code>ifconfig</code> in your Linux edge box.</p> <pre>/home/root\$ ifconfig eth0 Link encap:Ethernet HWaddr 74:FE:48:34:66:93 inet addr:192.168.10.78 Bcast:192.168.255.255 Mask:255.255.0 inet6 addr: 2405:204:5510:d6f7:76fe:48ff:fe34:6693/64 Scope:Global inet6 addr: fe80::76fe:48ff:fe34:6693%4/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:144095435 errors:79654 dropped:40320 overruns:0 frame:39334 TX packets:145389576 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:10131566838 (9.4 GiB) TX bytes:11357314537 (10.5 GiB) eth1 Link encap:Ethernet HWaddr 74:FE:48:34:66:94 UP BROADCAST MULTICAST MTU:1500 Metric:1 RX packets:0 errors:0 dropped:0 overruns:0 frame:0 TX packets:0 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:0 (0.0 B) TX bytes:0 (0.0 B) lo Link encap:Local Loopback inet addr:127.0.0.1 Mask:255.0.0.0 inet6 addr: ::1%4804152/128 Scope:Host UP LOOPBACK RUNNING MTU:65536 Metric:1 RX packets:174 errors:0 dropped:0 overruns:0 frame:0 TX packets:174 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1 RX bytes:13456 (13.1 KiB) TX bytes:13456 (13.1 KiB) wlan0 Link encap:Ethernet HWaddr 02:00:16:B1:2F:02 inet addr:192.168.225.250 Bcast:192.168.225.255 Mask:255.255.255.0 inet6 addr: 2405:204:5510:d6f7:0:16ff:feb1:2f02%4804152/64 Scope:Global inet6 addr: fe80::16ff:feb1:2f02%4804152/64 Scope:Link UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1 RX packets:21598 errors:0 dropped:0 overruns:0 frame:0 TX packets:5230 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000 RX bytes:1019306 (995.4 KiB) TX bytes:434633 (424.4 KiB)</pre> <ul style="list-style-type: none"> ○ Login window appears. Use your Node-RED login credentials to operate Linux Edge box through your system (laptop or desktop).  <p>NOTE: As browser is not available in Linux edge box you can connect to another system (laptop or desktop) using the ip address of Linux Edge box.</p>

Part III

Node Usage

What Is in This Part?

This part contains the following chapters:

Chapter	Chapter Name	Page
5	About SE Harmony Hub Node	93
6	SE Harmony Hub Node Configuration	101
7	Context Monitoring Use Case	115

Chapter 5

About SE Harmony Hub Node

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Introduction	94
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Introduction

Overview

SE Harmony Hub node is a data collecting node using Modbus communication protocol (TCP or Serial). SE Harmony Hub node is connected to the Harmony Hub gateway which retrieves sensors data which are commissioned and connected wirelessly to the gateway. SE Harmony Hub Node extracts the sensors data from the gateway and displays it on the web page to monitor the latest data at the specified time intervals. The data from sensors will be in Common Message Structure (CMS) format ([see page 120](#)).

Node Description

SE Harmony Hub node consists of one node that reads from the connected devices:



Item number	Item name	Description
1	Connection status	Indicates the following connection status: <ul style="list-style-type: none">● Connecting: Node is connecting to the Harmony Hub gateway.● Connected: Node is connected to the gateway.● Success: Data is read from the gateway successfully.● Error: Indicates when the node detects an error.● ConfigError: Parameters are not configured properly.● Read Error: Error in reading data from gateway.
2	Output	Generated CMS is passed as an output.

Types of Sensors and respective parameters

You can use the sensors and the respective parameters below to connect to the node:

- E3 sensor (Electrical Energy Estimator)
 - RSSI
 - Sensor Type
 - Timeout
 - Timestamp
 - Temperature
 - Current
 - Apparent Power
 - Active Power
 - Apparent Energy

- Corrected Apparent Energy
- Active Energy
- CL110 sensor (thermal monitoring)
 - RSSI
 - Sensor Type
 - Timeout
 - Timestamp
 - Battery
- ESST01 sensor (Radio probes sensors - thermal monitoring)
 - RSSI
 - Sensor Type
 - Timeout
 - Timestamp
 - Battery
 - Temperature
- S1 sensor (generic ZigBee Green Power sensor)
 - RSSI
 - Sensor Type
 - Timeout
 - Timestamp
 - Battery
 - Temperature
 - Energy
 - Unit of Measure
 - Power Phase A
 - Power Phase B
 - Power Phase C
 - Current Phase A
 - Current Phase B
 - Current Phase C
 - Voltage Phase A
 - Voltage Phase B
 - Voltage Phase C
 - CO2 Level
 - CO Level
 - Illuminace
 - Pressure
 - Flow
 - Humidity
 - Occupancy
 - State

RSSI (Received Signal Strength Indicator)

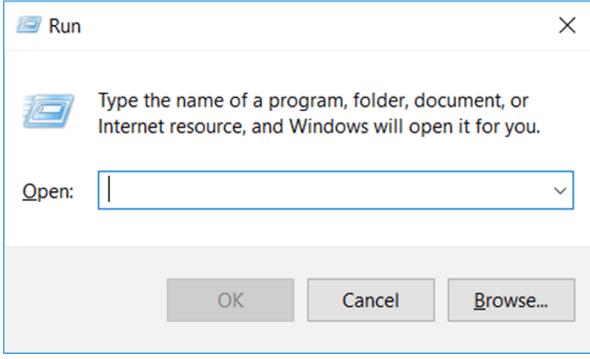
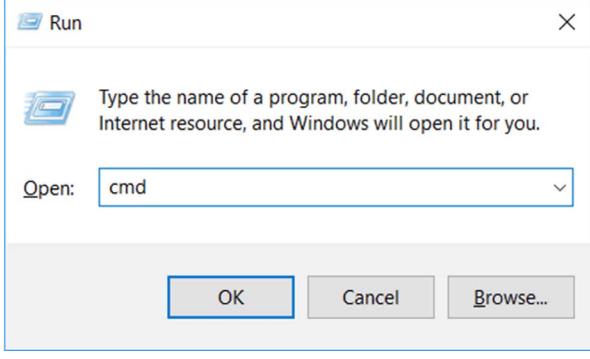
The **RSSI** signals strength are given below:

- **High:** If the **RSSI** signal strength is between -10...-70 dbm then signal is high and the signal strength indicate 4 green bars.
- **Medium:** If the **RSSI** signal strength is between -70...-80 dbm then signal is medium and the signal strength indicate 3 orange bars.
- **Low:** If the **RSSI** signal is between -80...-100 dbm then the signal is slow and the signal strength indicate 1 red bars.

Launching the Node-RED Server and SE Harmony Hub Node

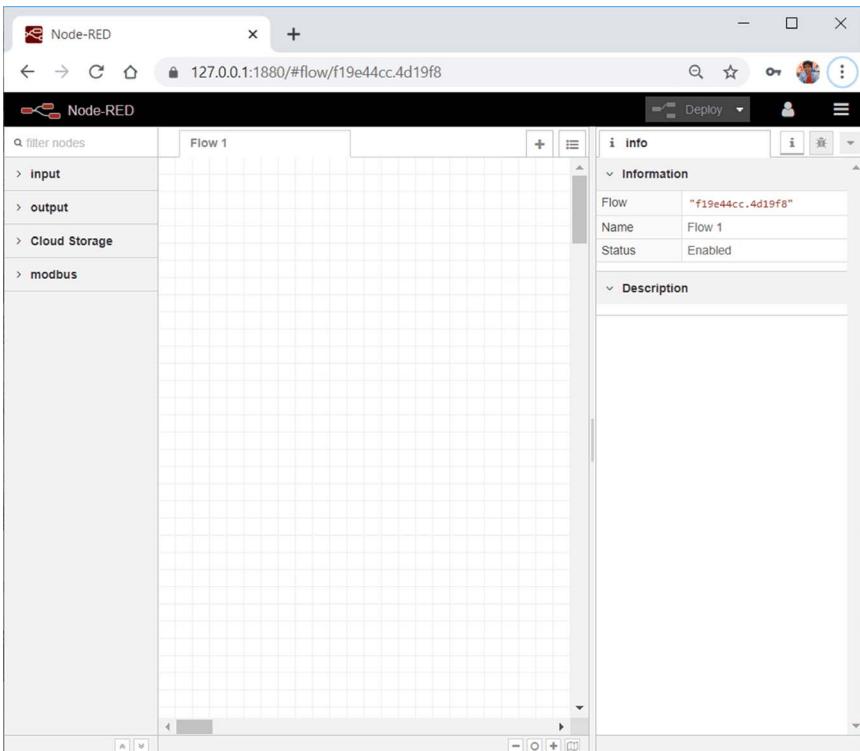
Node-RED

After the Node-RED and SE Harmony Hub node are installed, launch the Node-RED server.

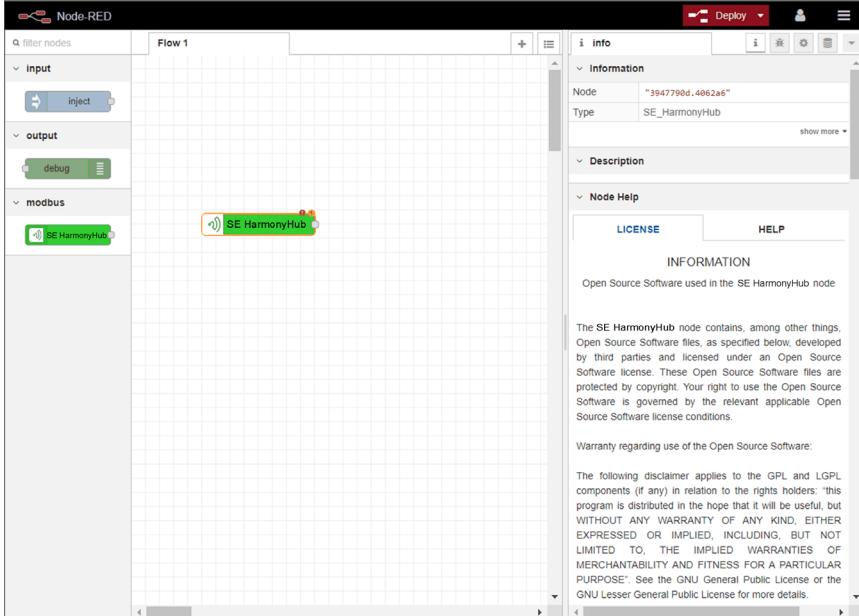
Step	Action
1	<p>Click  button, type Run in the search bar and press Enter</p> 
2	<p>Type the <code>cmd</code> in the Run dialog box and click OK.</p>  <p>Result: Command prompt window appears.</p>

About SE Harmony Hub Node

Step	Action
3	Type <code>node-red</code> in the command prompt and press Enter .
4	Node-RED server now running at https://127.0.0.1:1880/

Step	Action
5	<p>Copy the URL in which the Node-RED server is running (https://127.0.0.1:1880) and open the link in a supported browser. Type the Username and Password in related fields and click Login.</p>  <p>Result: Node-RED factory window appears.</p>
6	 <p>Result: Node-RED editor appears.</p>

SE Harmony Hub Node

Step	Action
1	<p>In the Node-RED window, use the scroll bar to find the SE Harmony Hub node on the left side.</p> <p>NOTE: Alternatively, you can also search from the Filter Nodes search option available at the left side node palette area.</p>  <p>The screenshot shows the Node-RED interface with a flow titled "Flow 1". On the left, there's a node palette with categories like "input" (containing "inject"), "output" (containing "debug"), and "modbus" (containing "SE HarmonyHub"). A node from the "modbus" category is currently selected and highlighted in green. On the right, the "info" tab of the node details panel is open, showing the node's ID ("3947790d.4062a6") and type ("SE_HarmonyHub"). Below it, the "Description" and "Node Help" tabs are visible. The "LICENSE" tab is active, displaying the Open Source Software license information for the SE HarmonyHub node. The "HELP" tab is also present. The "INFORMATION" section of the license tab contains the following text:</p> <p>The SE HarmonyHub node contains, among other things, Open Source Software files, as specified below, developed by third parties and licensed under an Open Source Software license. These Open Source Software files are protected by copyright. Your right to use the Open Source Software is governed by the relevant applicable Open Source Software license conditions.</p> <p>Warranty regarding use of the Open Source Software:</p> <p>The following disclaimer applies to the GPL and LGPL components (if any) in relation to the rights holders: "this program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE". See the GNU General Public License or the GNU Lesser General Public License for more details.</p> <p>Result: In modbus category, the SE Harmony Hub node is available.</p> <p>NOTE: SE Harmony Hub nodes license information is available in the LICENSE tab. Help manual is available in the HELP tab (right next to LICENSE tab).</p>
2	Drag-and-drop the SE Harmony Hub node on a flow page.

Chapter 6

SE Harmony Hub Node Configuration

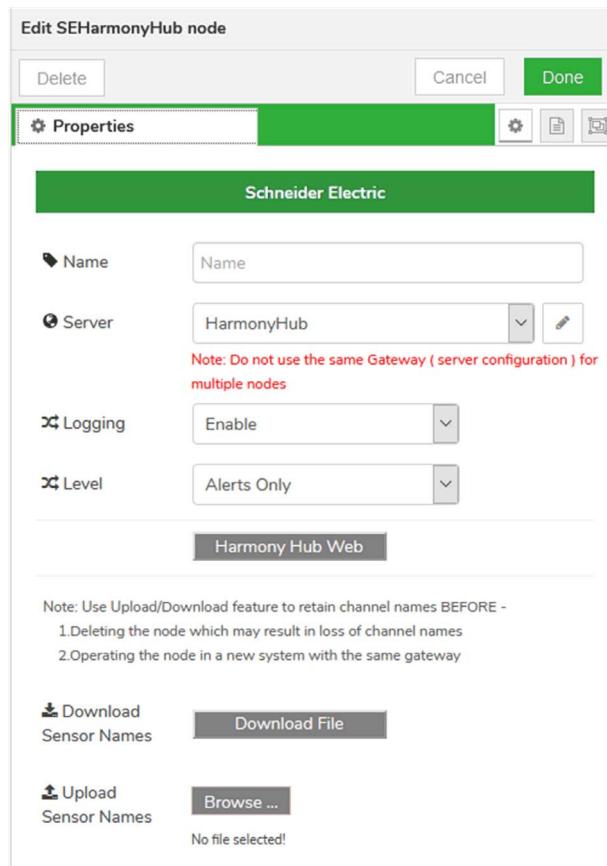
What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Configuring SE Harmony Hub node	102
Launching SE Harmony Hub Node Web Page	108

Configuring SE Harmony Hub node

Double-click on the SE Harmony Hub node. The configuration screen of the node appears:



Parameters	Description
Name	Type the name to be displayed on the node.
Server	Click icon to configure the parameters of the selected server type. For TCP and Serial , refer to the below tables. NOTE: Do not use the same Gateway (server configuration) for multiple nodes.

Parameters	Description
Logging	<p>Select the Enable or Disable for logging the events. By default, Enable is selected. When Enabled, the log events are recorded in the log file. The log files will be saved in the path given below: <Installed Node Directory>/nodes/log/ For instance the location will be:</p> <ul style="list-style-type: none"> ● Offline installation <ul style="list-style-type: none"> ○ <User Directory>/se-node-red-harmony_hub/nodes/log/ ● Online installation <ul style="list-style-type: none"> ○ <User Directory>/.node-red/node_modules/se-node-red-harmony_hub/nodes/log/
Level	<p>Select the logging level from the list:</p> <ul style="list-style-type: none"> ● All Events Error, info, debug messages are logged ● Alerts Only Error messages are logged <p>NOTE: By default, Alerts Only is selected.</p>
Harmony Hub Web	<p>Click Done and Deploy  to save the changes.</p> <p>NOTE: Once configure settings are saved Harmony Hub Web will be enabled. Click Harmony Hub Web to navigate to the web page to commission the channels and to get the data from Zigbee sensors.</p>
Download Sensor Names	<p>Click Download File to download the data of sensor paired to the Harmony Hub gateway.</p> <p>NOTE: The channel names cannot be changed in downloaded file as the data is encrypted.</p>
Upload Sensor Names	<p>Click Browse... and select the respective file to be uploaded and the data appears in the Harmony Hub Web page. The file contains channel names of the sensors which are paired.</p> <p>NOTE: Whenever we upload a file, all the channel names will be replaced by the corresponding names in the uploaded file.</p>

Server type: TCP properties

The screenshot shows the configuration interface for a Schneider Electric SEHarmonyHub node. The 'Properties' tab is active. The 'Schneider Electric' section contains the following settings:

- Name:** HarmonyHub
- Type:** TCP
- Unit ID:** 248
- Host:** 127.0.0.1
- Port:** 502
- TCP Type:** DEFAULT
- Timeout (ms):** 1000
- Reconnect-Timeout (ms):** 2000
- Queue delay (ms):** 100

Server configuration for TCP connection:

Parameters	Description
Unit ID	Type the slave address of the Serial (TCP: 248 non editable) device.
Host	Type the slave address.
Port	Type the port number.
TCP Type	Select the TCP Type from the drop-down list: <ul style="list-style-type: none"> ● Default ● RTU-BUFFERD
Timeout	Set the timeout for ModbusRTU command. By default, the time duration for connecting is 1000 ms.
Reconnect timeout	Set the reconnect time out for reconnecting the node. By default, the reconnect time is 2000 ms.
Queue delay (ms)	Set the time interval to delay sending the commands from queue. By default, the queue delay is 100 ms.

Server type: **Serial** Properties

Properties

Schneider Electric

Name	HarmonyHub
Type	Serial
Unit ID	248
Serial port	/dev/ttyUSB
Serial type	RTU
Baud rate	19200
Data Bits	8
Stop Bits	1
Parity	None
Connection delay (ms)	100
Timeout (ms)	1000
Reconnect-Timeout (ms)	2000
Queue delay (ms)	100

Server configuration for **Serial** connection:

Parameters	Description
Serial Port	Click Search button /dev/ttyUSB

Parameters	Description
Serial Type	Select the required option from the drop-down list: <ul style="list-style-type: none"> ● RTU ● RTU-BUFFERD
Baud rate	Select the suitable option from the drop-down list: <ul style="list-style-type: none"> ● 115200 ● 57600 ● 38400 ● 19200 ● 9600 ● 4800 ● 2400 ● 1200 ● 300 ● 110 ● 75 <p>NOTE: Based on the rate selected, the information is transferred in a communication channel.</p>
Data Bits	Select the suitable option from the drop-down list: <ul style="list-style-type: none"> ● 8 ● 7 ● 6 ● 5 <p>NOTE: Based on the bit selected, the information is transferred in a communication channel.</p>
Stop Bits	Select the suitable option from the drop-down list: <ul style="list-style-type: none"> ● 1 ● 1.5 ● 2
Parity	Select the suitable parity bit from the drop-down list: <ul style="list-style-type: none"> ● None ● Even ● Mark ● Odd ● Space
Connection delay (ms)	Type the delay time for sending data after reconnection. By default, the value is 100 ms.
Timeout (ms)	Set the timeout for ModbusRTU command. By default, the delay time is 1000 ms.
Reconnect-Timeout (ms)	Set the reconnect time out for reconnecting the node. By default, the reconnect time is 2000 ms.

Parameters	Description
Queue delay (ms)	Set the time interval to delay sending the commands from queue. By default, the queue delay is 100 ms.

Launching SE Harmony Hub Node Web Page

Click **Harmony Hub Web** to navigate to the web page, when it is enabled (tab colour turns green).

Edit SEHarmonyHub node

Delete Cancel Done

Properties

Schneider Electric

Name:

Server:
Note: Do not use the same Gateway (server configuration) for multiple nodes

Logging:

Level:

Harmony Hub Web

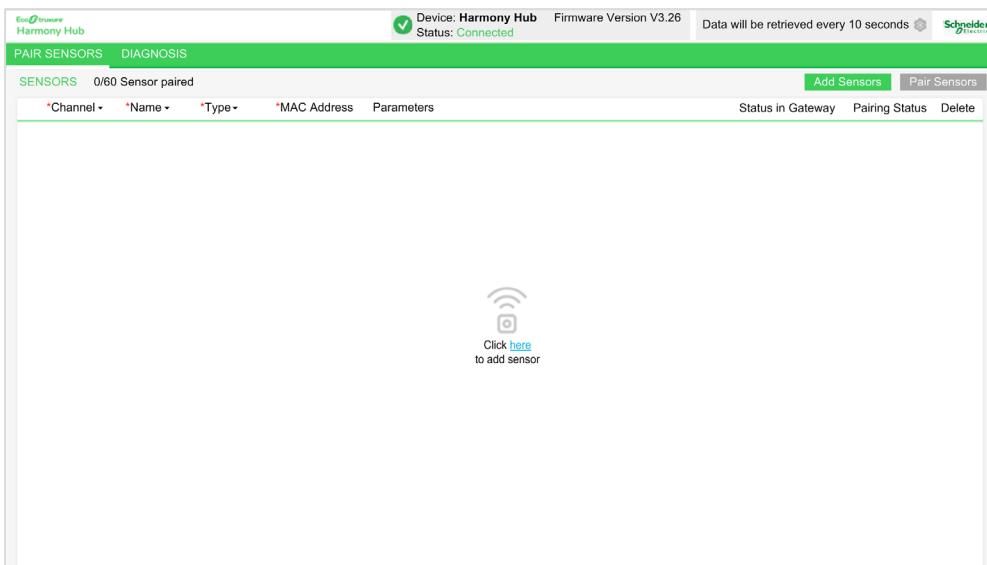
Note: Use Upload/Download feature to retain channel names BEFORE -
1.Deleting the node which may result in loss of channel names
2.Operating the node in a new system with the same gateway

Download Sensor Names **Download File**

Upload Sensor Names
No file selected!

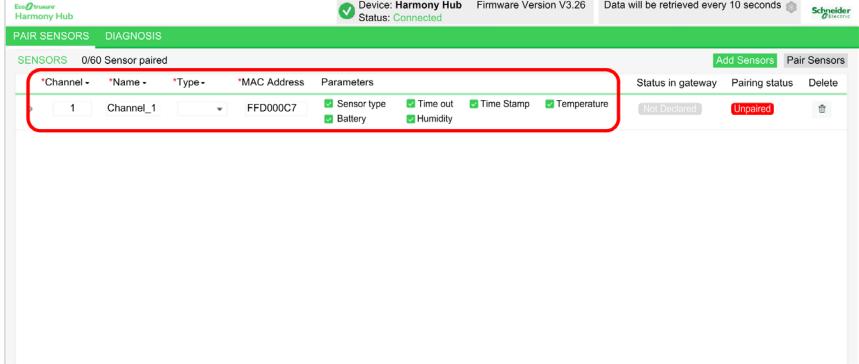
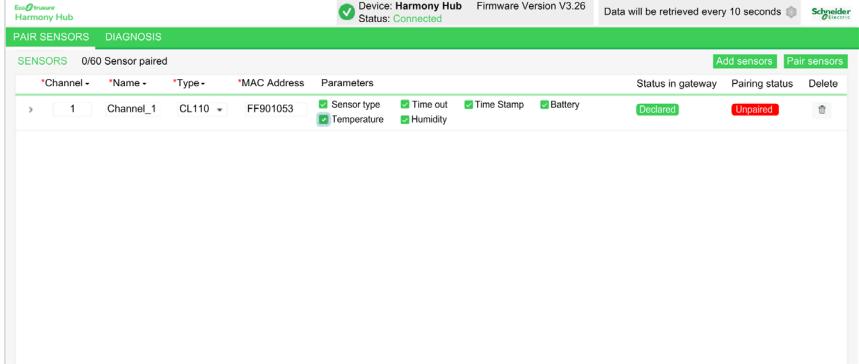
The **SE Harmony Hub Node** web page appears where you can add and pair the sensors to be monitored. You can monitor maximum 60 sensors at a time. Make sure that the sensor is not paired to any other device.

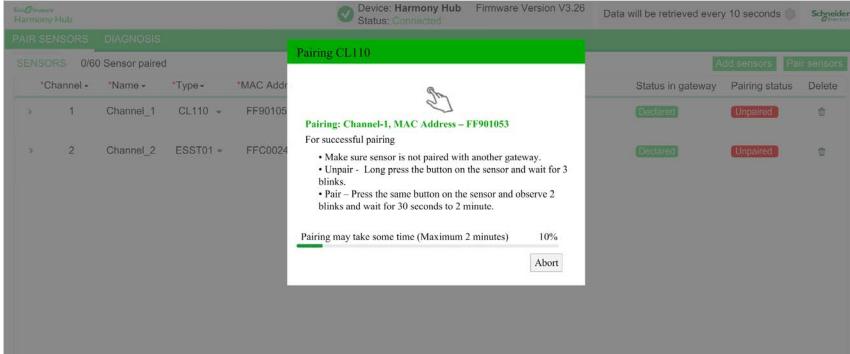
The following figure shows **SE Harmony Hub Node** web page:

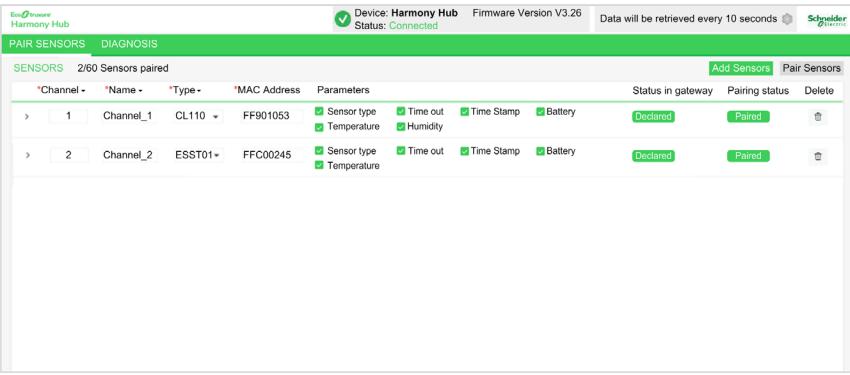


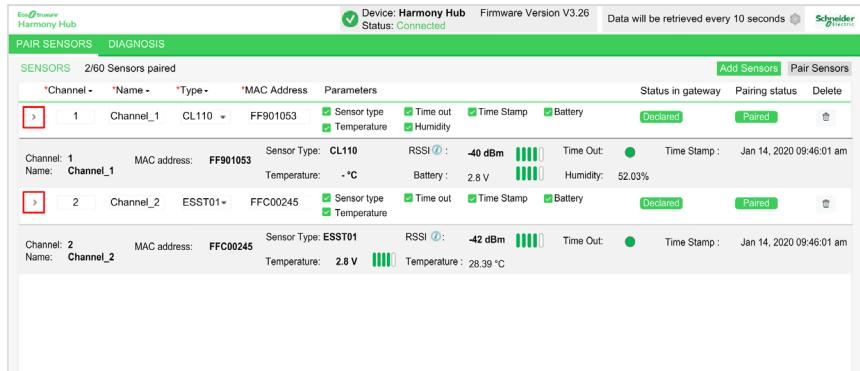
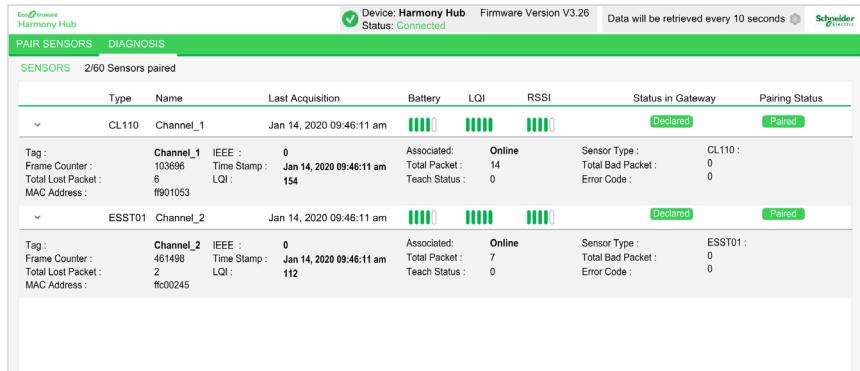
The table shows procedure to pair the sensors (CL110 and ESST01) in Harmony Hub gateway:

Step	Action
1	<p>Click Add Sensors.</p>

Step	Action
2	<p>Declare the sensors in the required fields:</p> <ul style="list-style-type: none"> ● Channel ● Name ● Type ● MAC Address ● Select the parameters <p>NOTE: To declare the sensor, you have to select atleast one parameter.</p> 
3	<p>Check if the Status in gateway is changed to Declared.</p> 
4	You can add multiple sensors by clicking Add Sensors .

Step	Action
5	<p>Click Pair sensors.</p>  <p>NOTE: The sensor takes maximum 120 seconds to connect to the SE Harmony Hub node. You can pair maximum 60 sensors at a time.</p> <p>NOTE: While pairing single sensor, you can not abort the process. For multiple sensors, if you want to abort, the pairing for the on-going sensor is completed and the process stops.</p>

Step	Action
6	<p>To pair CL110 and ESST01 sensors to Harmony Hub gateway, follow the step given below:</p> <ul style="list-style-type: none"> Press the highlighted button till three LED flashes to reset the sensor. Press highlighted button till two LED flashes to start pairing process. Within 120 seconds, the sensor will be paired to the gateway.  <p>CL110</p>  <p>ESST01</p> <p>Result: Pairing status is changed to Paired.</p> <p>NOTE: To pair other sensors (Power tag, E-cube) you need not wait for LED blinks.</p>
7	<p>The data for the selected sensor parameters are received from the gateway and the data is converted to Common Message Structure (CMS) format (see page 120).</p> 

Step	Action
8	<p>Expand highlighted option to monitor the selected parameters.</p>  <p>Result: Once the sensor is paired, all parameters are displayed.</p>
9	<p>Click DIAGNOSIS tab to diagnose the paired sensors. For example:</p> 

Chapter 7

Context Monitoring Use Case

What Is in This Chapter?

This chapter contains the following topics:

Topic	Page
Context Monitoring	116
SE Harmony Hub Node Usage	118
Common Message Structure (CMS)	120

Context Monitoring

Overview

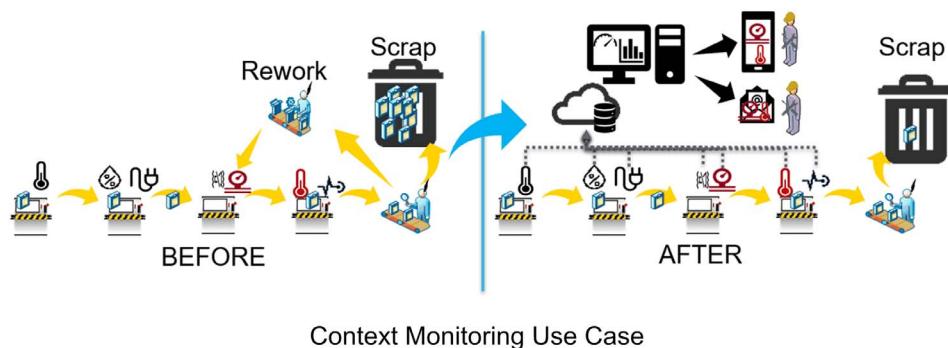
Imagine a production line in a plant with several devices that are subjected to drift. Such device drifts include scraps and rework. This means waste of time, waste of money and sometimes loss of consumers if they are not delivered on time and at a good quality standard.

Our value proposition is to provide a solution for monitoring process parameters from upstream to downstream. To do so, the solution proposed is as follows:

- Collects secondary sensing process parameters (wireless Zigbee sensors), hence the use of the SE Harmony Hub node.
- Use alert system to prevent quality issues based on supplier specifications or people experience.

SE Aveva Insight node collects data in CMS format ([see page 120](#)) from collection node (SE Harmony Hub), converts it into SE Aveva Insight data format and pushes the data to the Aveva Insight cloud. Enable the **SET ALERT** function in Aveva Insight cloud to receive the data in specific time intervals.

The following figure shows the context monitoring use case with before/after situation:



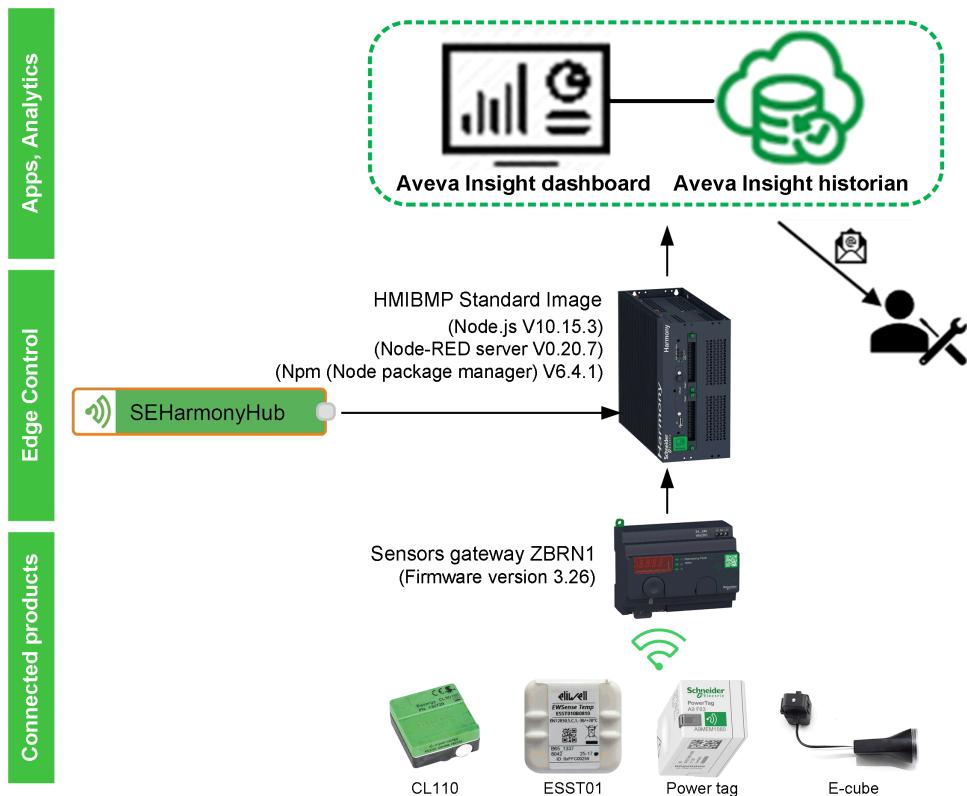
The pain is reduced by using a collection node (SE Harmony Hub) and a publishing node (SE Aveva Insight).

Below given are the steps performed by Engineers:

- **Automation Engineer:**
 - installs node.
 - installs sensors on the machine to be monitored and pair them to Harmony Hub gateway.
 - creates data flow.
- **Maintenance Engineer:**
 - creates an account in AVEVA Insight.
 - creates dashboard in AVEVA Insight.

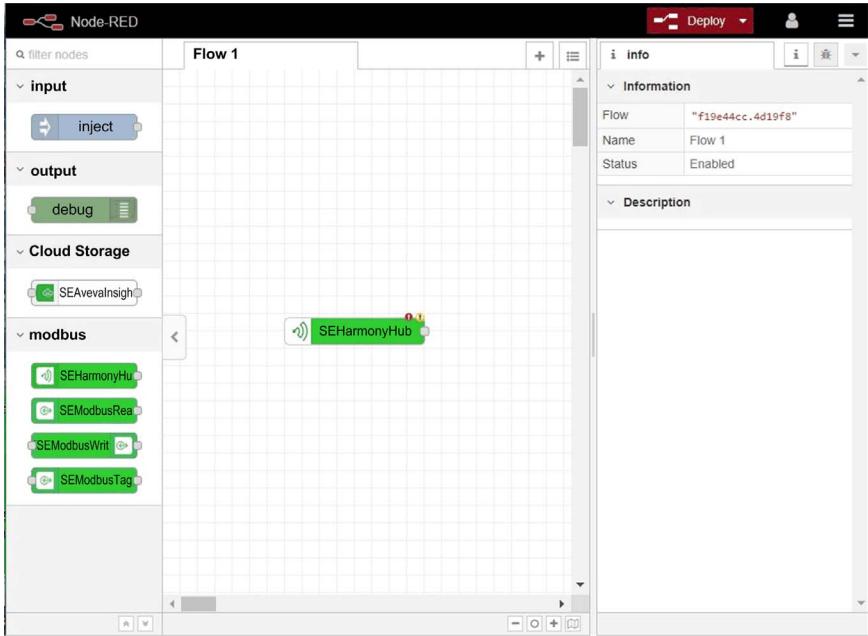
- logs in AVEVA Insight and configures the threshold for the collected variables.
- activate alerts triggering.

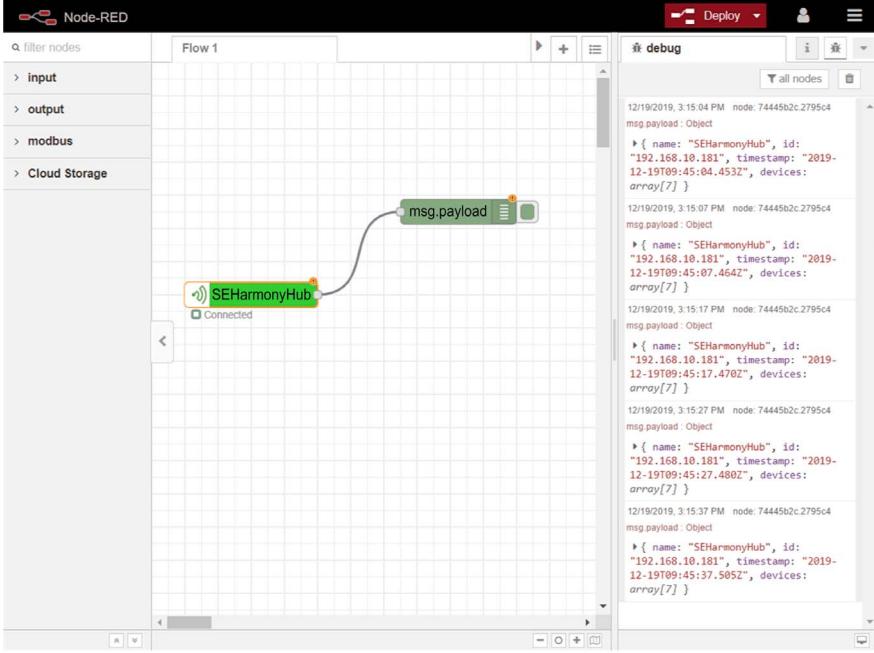
The following figure shows an architecture of context monitoring use case:



SE Harmony Hub Node Usage

The procedure for SE Harmony Hub node usage is given below:

Step	Action
1	Launch the Node-RED server and SE Harmony Hub node (see page 97).
2	Drag and drop the SE Harmony Hub node on the flow as shown below: 
3	Double-click SE Harmony Hub node. Result: Edit SEHarmonyHub node opens.
4	Configure SE Harmony Hub node (see page 102) and click Harmony Hub Web . Result: Harmony Hub Web landing page appears in new tab.
5	Launch the Harmony Hub Web page (see page 97).
6	Click Done and Deploy to save the changes. Result: The nodes status changes to Connected .
7	Once the sensors are paired in Harmony Hub Web page, the node output data is available in Common Message Structure (CMS) format (see page 120) which is pushed to publishing node.

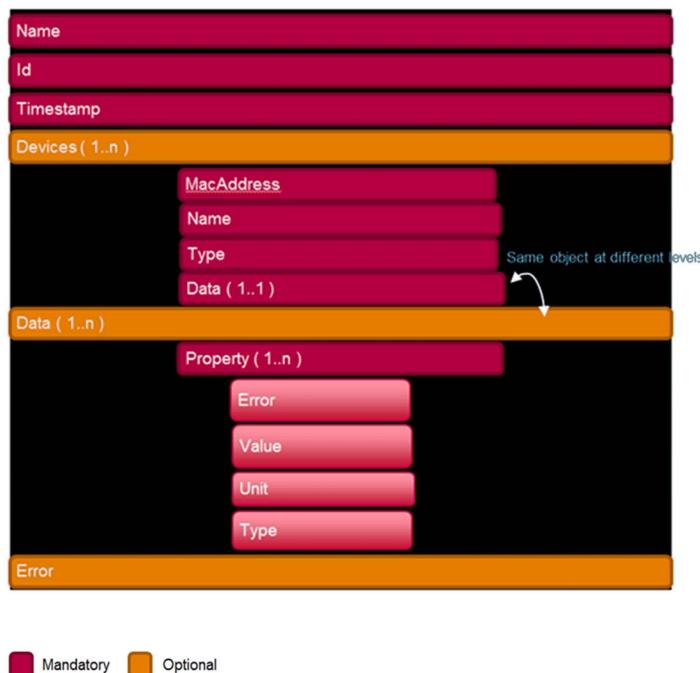
Step	Action
8	<p>Below is an example to push the data of SE Harmony Hub node to the debug node.</p>  <pre> graph LR SEHarmonyHub((SEHarmonyHub)) --> msgpayload[msg.payload] msgpayload --> debug[debug] </pre> <p>The screenshot shows the Node-RED interface with a single flow named 'Flow 1'. The flow starts with an 'SEHarmonyHub' node, which is connected to a 'msg.payload' node. This 'msg.payload' node then connects to a 'debug' node. The 'debug' node has a log tab open, showing five entries of JSON data. Each entry represents a message from the SE Harmony Hub node. The data includes fields like 'name', 'id', 'timestamp', and 'devices'. The timestamp for each entry is '2019-12-19T09:45:04.453Z'.</p>

Common Message Structure (CMS)

A Node-RED flow works by passing messages between nodes. All messages are conformed in a common message format to simplify the navigation of the message content. The messages are simple JavaScript objects that can have any set of properties.

To avoid any intermediate function nodes, CMS is standard JSON format between a connecting node and a publishing node. JSON is a standard way for representing a JavaScript object as a string. It is commonly used by web APIs to return data.

The following is the CMS structure:

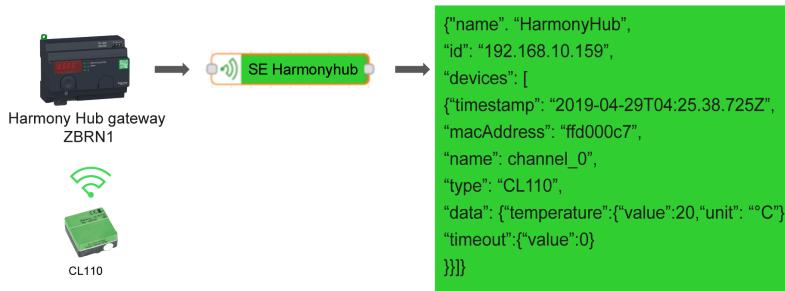


Field	Description
Name	Name of the node.
Id	Unique Identifier of the device.
Timestamp	The exact time at which the read or write operation is performed by the node.
Devices	Applicable for Harmony Hub sensor. All nested objects consists of one or many Device objects.

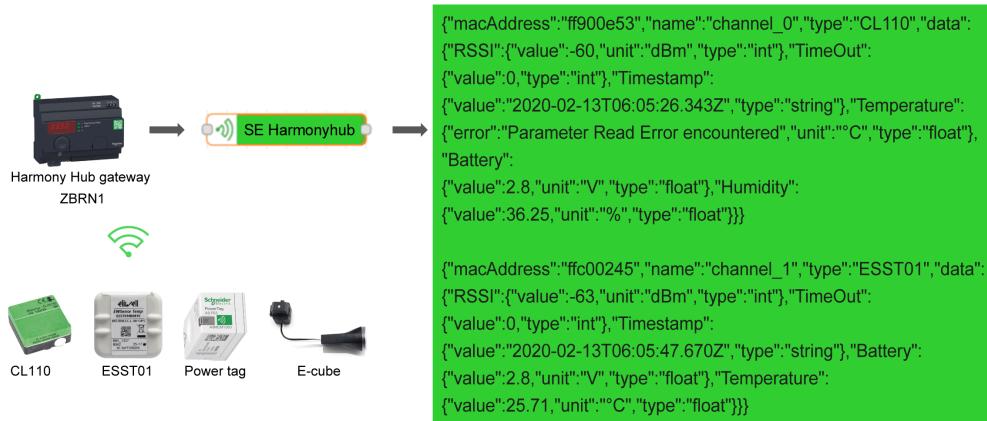
Field	Description
Data	Object at root level and as a composite inside devices object. It contains at least one property object.
Error	Detected error at the root level, not tied to any parameter. <ul style="list-style-type: none"> ● Scenario 1: Gateway disconnected. ● Scenario 2: Gateway timed out. ● Scenario 3: Modbus port not opened. ● Scenario 4: Gateway connected. Read Error encountered.
Property	If data object exists, then atleast one property (value) is mandatory. This is mapped to the parameter details. It contains Error, Value, Unit, Type.
Error	Local detected error pertaining to the parameter. <ul style="list-style-type: none"> ● Scenario 1: No Radio (at a sensor level) ● Scenario 2: Parameter Read Error encountered. (e.g.: FF, FFFF, FFFFFFFF) <ul style="list-style-type: none"> ○ Value: When mandatory, always in case of success. When optional, in case of error. ○ Unit - optional field ○ Type- optional field

The following graphics are an example of CMS input data:

Example 1: One gateway (**associated with one sensor**) is connected directly through SE Harmony Hub node.



Example 2: One gateway (**associated with multiple sensors**) is connected directly through SE Harmony Hub node.



NOTE: Here we have shown SE Harmony Hub node output for two sensors only. Output may vary if you use multiple sensors paired to Harmony Hub gateway.

Part IV

IIoT and Cybersecurity

Chapter 8

IIoT and Cybersecurity

Cybersecurity

Overview

Because of the IIoT design, industrial and control systems are increasingly vulnerable to cyber-attacks for the following reasons:

- Magelis Edge Box and Magelis iPC are commercially available in the market.
- Publishing nodes can be remotely accessible.
- IIoT designs are a strategic location in the industrial processes that is of interest to hackers.

To secure the industrial installation, the following fundamental characteristics should be considered:

- Availability of the system to help ensure that the system remains operational
- Integrity of the data to maintain the integrity of information
- Confidentiality to avoid information disclosure

General Practices

To keep the system as secured as possible, secure the environment where the Box is installed.

Unauthorized persons may gain access to the Magelis iPC and Magelis Edge Box as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to the software and networks.

Before creating user login details, cross-check again if it is necessary to give access to others. Users may have one of two permissions (*-full access/read-only access). Admin login and password details must be secured.

To avoid unauthorized access to the Magelis iPC and Magelis Edge Box, you must have the:

- Operating system, libraries, runtime environments, etc. are installed and correctly configured.
- Patch management controls to ensure that all software is kept up-to-date.
- Configuration change management controls.
- Malicious code detection and prevention controls, for example:
 - Anti-virus signature and pattern updates are applied in a timely fashion.
 - Application whitelisting.
- Access control and permission management.
- Backup and restore functionality.
- Area where the Box is placed must be physically protected to keep the device as safe as possible.

- Authentication and authorization enabled for Node-RED environment.
- SSL enabled to secure Node-RED in Windows platform (*see page 48*). By default, SSL is enabled to secure Node-RED in the HMIBSC boxes.

Cybersecurity Certification

Schneider Electric developed cybersecurity guidelines based on the following recommendations:

- ISA Secure.