M³ Edge Core on-boarding

Commissioning & Installation procedure for Siemens SIMATIC Microbox 427E for M³ 1.X solutions

SiSoCom Project

Revision History

Date	Version	Change Description
11 Aug 2020	1.0	First Version

Table of Content

Introduction

On-boarding a new M^3 Edge Core device typically consists of following 3 steps

- Commissioning the Edge Core Device on M^3 servers
- Installing M^3 Edge Core Distribution on M^3 Edge Core Device
- Initializing M^3 Edge Core using Device Setup Application **(DSA)**

Step 1: Commissioning

This step is performed by the M^3 deployment administrator on user's request. Please email your M^3 deployment administrator with the following details:

- Serial Number of the SIMATIC IPC
- MAC address of the SIMATIC IPC LAN 1 (X1P1)

Admins: abdul_basit@mentor.com or emmanuel_petit@mentor.com

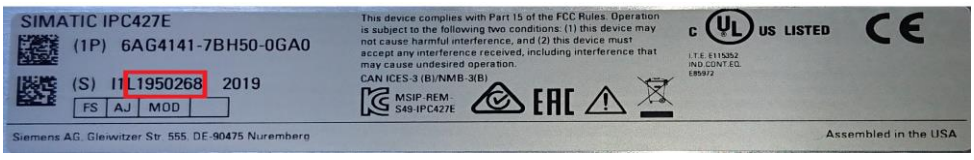
The serial number in available on the identification sticker of the SIMATIC microbox

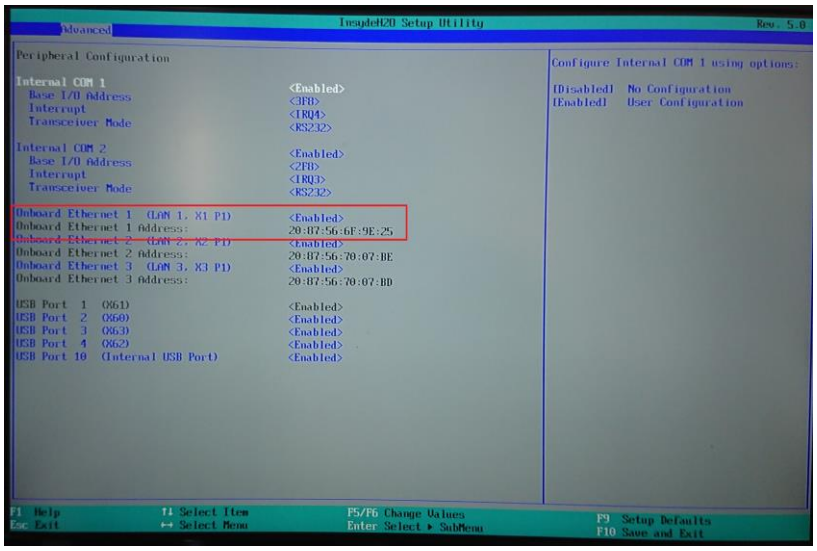
The MAC address can be obtained from the SIMATIC BIOS application as follow:

i. Connect a keyboard to the SIMATIC microbox
ii. Power up the SIMATIC IPC while hitting repetitively the ESC key
iii. When Bios menu appears, select "SCU" option, then "Advanced" tab
iv. Read LAN 1 MAC

Example:

In the following example the S/N is L1950268 and LAN 1 MAC is 20:87:56:6F:9E:25





The M³ deployment admin will then commission the SIMATIC IPC microbox as a M³ edge core on your user's account.

Once the deployment admin has confirmed the commissioning and communicated back to you your M³ account credential, proceed to the Installation step.

Step 2: Installing M^3 Edge Core Distribution

2.1 Preparing a USB stick installer.

2.1.1 Software Requirement

- M^3 Edge Core Distribution installer image: Available from the user's account on M^3 portal
- A USB Flashing utility : Etcher, rufus, win32 disk imager, power iso etc.. used to burn the image on the usb mass storage device for installation.

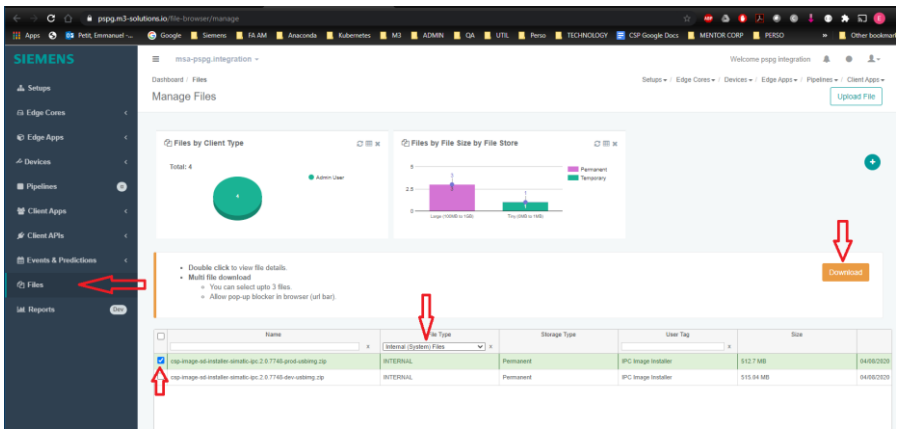
2.1.2 Hardware Requirement

- Siemens SIMATIC Microbox PC (427E) ,
- Display (supporting DisplayPort - DP)
- Keyboard
- USB Flash Disk (16 GB or 8 GB)

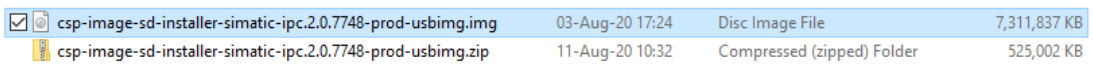
2.1.3 Preparing the Installation Disk

The image to flash on the SIMATIC microbox is available on your M^3 portal account:

(i) Sign in on the portal
(ii) Proceed to 'Files' menu
(iii) Select 'Internal' file type on the type filter
(iv) Pick 'csp-image-sd-installer-simatic-ipc.2.0.7748-prod-usbimg.zip'
(v) Download and decompress the image



Your image should be of 7.311.837 KB after decompression.



Using USB Flashing utility, burn this installer image on the USB Flash Disk.

> ***Note:*** *Usb flash drive should be formatted first before image burn process , this eliminates the chances of any other previous bootable file execution if there is any already in the flash drive.*

2.2 Setting the IPC Boot Order & Flashing the IPC

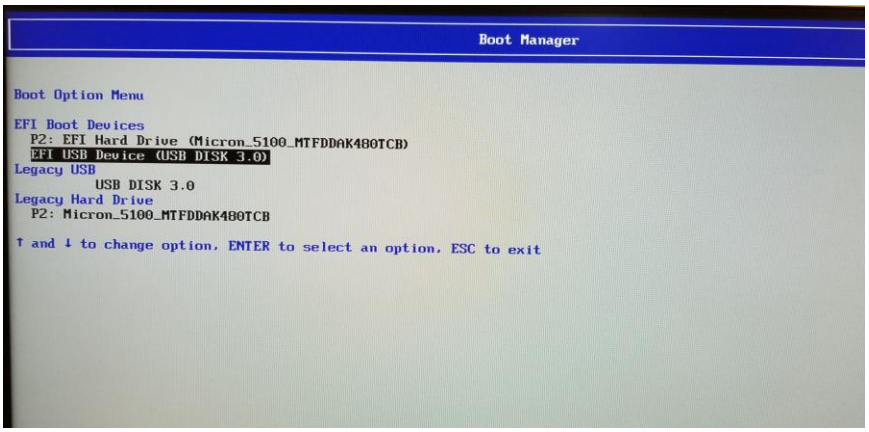
2.2.1 Connecting Peripherals to SIMATIC Microbox PC

- Connect the power, display and keyboard to the SIMATIC Microbox PC
- Connect the network cable. There are 3 ethernet ports on 427E labeled as X1 P1, X2 P1 and X3 P1. Ensure to connect the network cable on Port X1 P1. Other two ports are not supported.

Connection	Port Label	Usage Description
USB	X60, X61, X62, X63	Any port can be used
Display	X71, X70	Any DP Port can be used
Ethernet	X1 P1	Only use this for LAN connectivity
Ethernet	X2 P1, X3 P1	Unused - Do not use these

2.2.2 Installing the M^3 Edge Core Distribution Image

- Insert the newly flashed USB Flash Disk in any USB Port of SIMATIC Microbox PC and power on the device.
- As soon as BIOS Notice appears, press Esc OR F12 on the Keyboard to enter into BIOS Menu.
- On the BIOS Menu press “Boot Manager”. You should see 2 boot devices as shown below. Select “EFI USB Device” and press ENTER to boot from USB disk.



- The installation will start. During the installation the Maintenance L3 LED on 427E is steady RED. You may also notice information on your display related to installation but you can safely ignore that.
- Once the installation completes successfully, Maintenance L3 LED on 427E will blink as heartbeat in ORANGE. You can now Power off the device.

  Notes:

  This image writing operation typically take 5 mn, depending on the class of the USB device. The 'prod' version of M³ edge core image does not output anything on the device console for security reasons. The operator shall monitor the LEDs during installation.
- Remove the USB Flash Installer Disk. (This USB stick can be reused to flash another IPC)
- Power on the IPC. By default the Siemens SIMATIC Microbox PC will boot from an internal SATA disk but you can ensure this in the BIOS Settings.
- After this first boot, the M³ Edge Core device comes up in Blank / Newly Imported state: The LED L1 is ON state in ORANGE color. You are now ready to proceed to initialize your M³ Edge Core Device

Step 3: Initializing M³ Edge Core Device

This operation involves the secure injection of device credentials via M³ Device Setup Application (DSA) and changing network configuration if required.

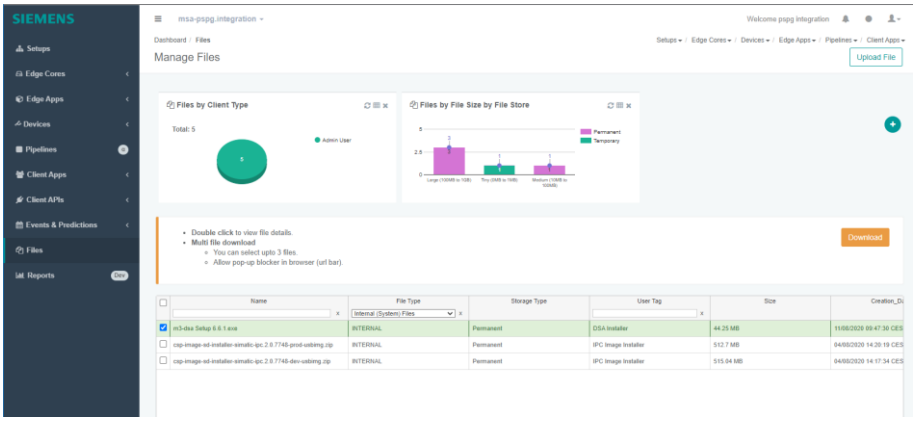
3.1 Prerequisite

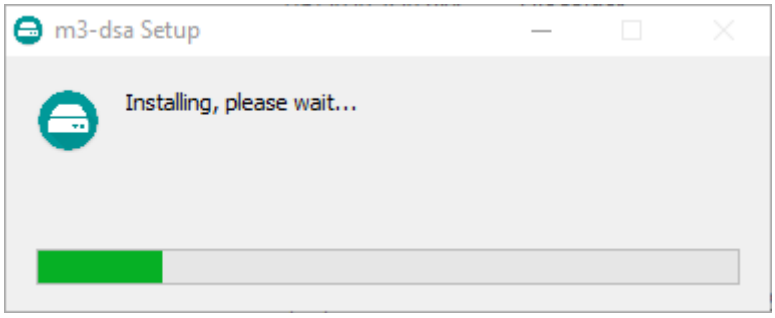
- Your M³ Edge Core Device is already commissioned by the deployment admin.
- M³ Edge Core Device firmware is running. At this state it must be in Blank state (LED L1 in ON state in orange color).

3.2 DSA Installation

The DSA installer is available on your M³ portal account:

(i) Sign in on the portal
(ii) Proceed to 'Files' menu
(iii) Select 'Internal' file type on the type filter
(iv) Pick 'm3-dsa Setup 6.6.1.exe'
(v) Download and run the installer

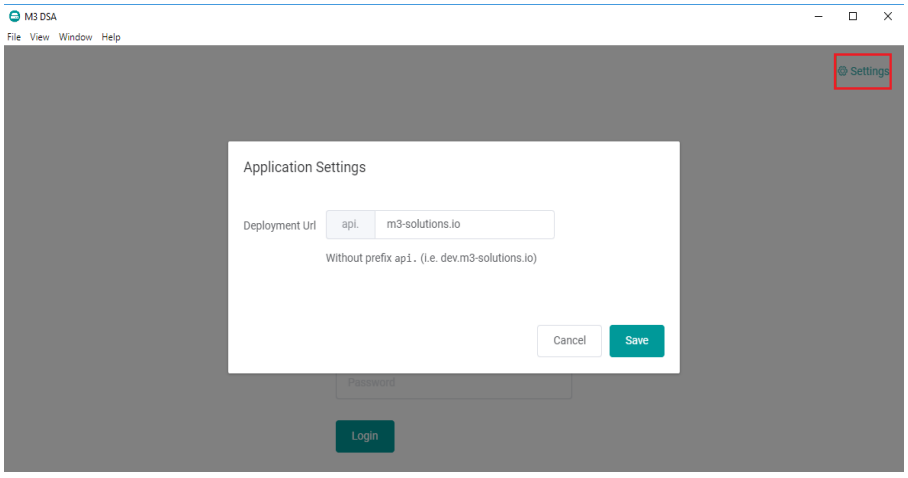




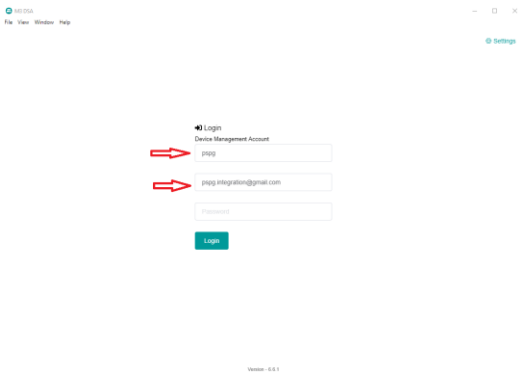
Once DSA is installed, it will automatically start.

3.3 Setting up Deployment URL and Login

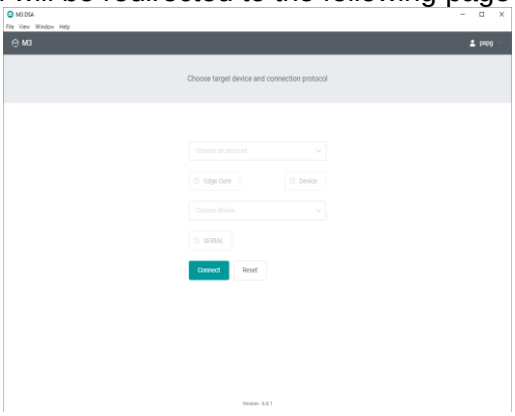
Before logging in to the DSA, ensure you are using the correct M^3 servers URL prefix: On the login page of DSA, click the Settings button at the top right and provide the M3 servers prefix as **m3-solutions.io** and click save.



On Login Screen, Enter Customer name **pspg** user's account pspg.integration@gmail.com and use the M^3 portal credentials provided by the deployment admin to connect to the DSA application

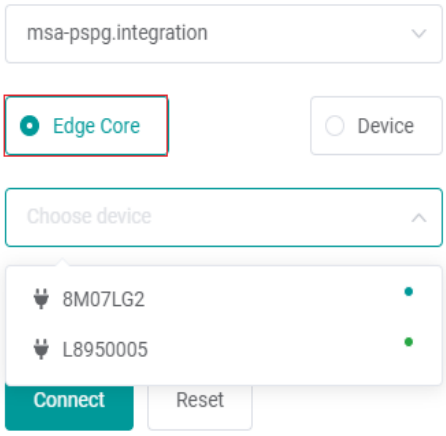


Upon successful login, you will be redirected to the following page

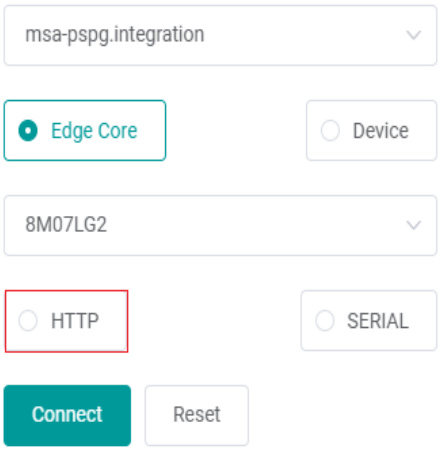


3.4 Connection with Edge Core

Once logged in, Select the target account and click on the Edge Core option and then click on the drop-down menu. Select the newly commissioned and newly installed edge core device.



After Edge Core selection, DSA will enable the supported options for communication. Select the HTTP Method



Important Note: *For HTTP based connections it is mandatory to both DSA Client and Edge Core Device are in the same network and internet connection is in a functional state*

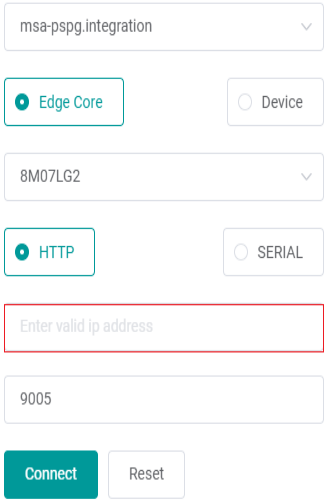
Now, to connect the DSA with Edge Core via HTTP, you will need to provide the correct IP address of your M^3 Edge Core.

IP Address of Edge Core can be obtained by the following methods:

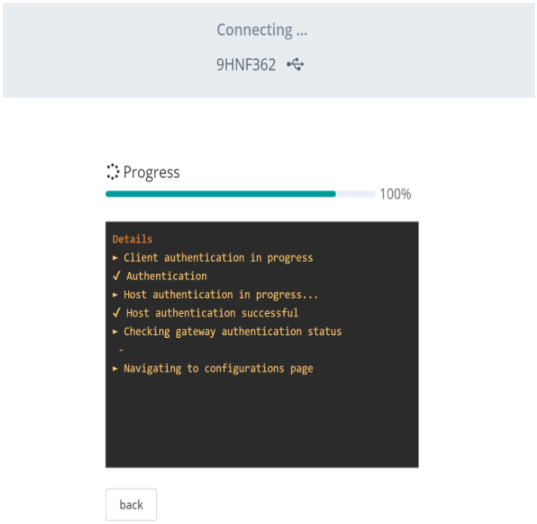
- If you are connected to a router which you control or can access, then the ip address can be obtained from the IP Assignment table in the router configuration.
- Give a fixed IP using the MAC address via a DHCP rule on the router.
- If you are on an administered network, the above two cases may not be possible. In that case user will have to ask for the Edge Core IP by providing the MAC address of the edge core.

Once you get the IP address, enter it in the IP Address field and click connect.

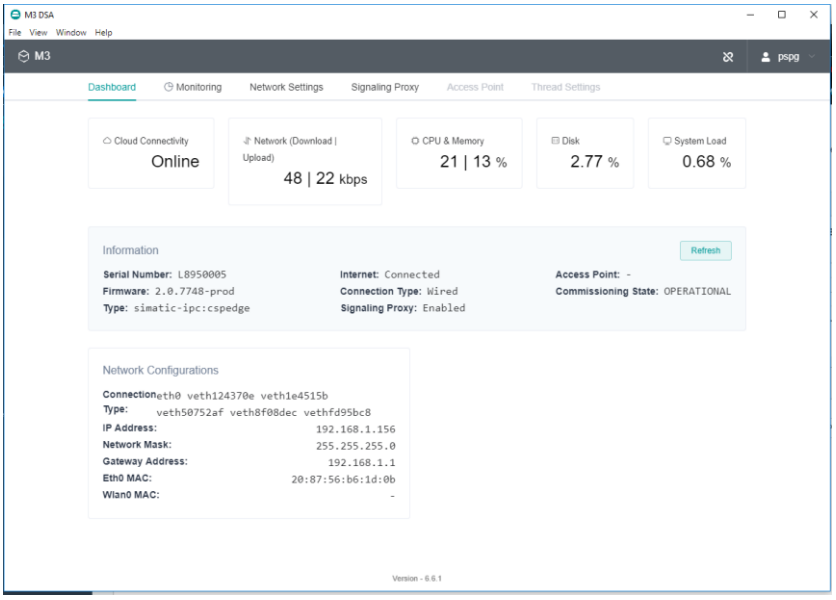
Note: *DSA Port for Edge Core is 9005.*



When you click Connect, DSA will retrieve initialization details from the M^3 servers and securely inject them into the M^3 Edge Core Device. You see the progress of all operations on the DSA as shown in the example below.



Once initialization details injection is complete, the Edge Core Device transitions to Operational state and the L1 LED will change its state to a steady green. DSA will redirect to the Dashboard screen showing the default network configuration and status of the Edge Core device as shown below.

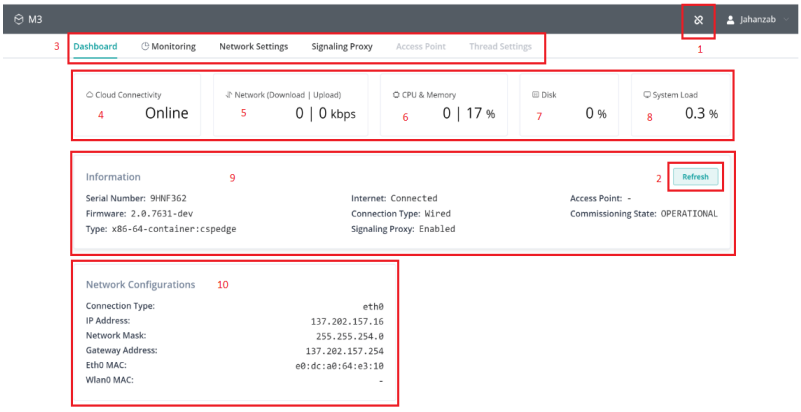


3.5 DSA User Interface

This section covers the additional activities that are related to viewing or setting up the network configurations, reloading configurations from the device or to simply disconnect from the device.

3.5.1 Dashboard

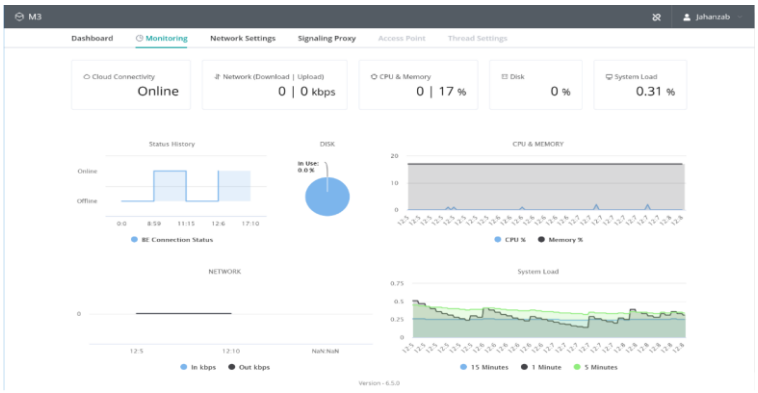
After successful connection with the edge core, User will be first redirected to the following dashboard screen where he can view the basic information and network configurations of the Edge Core Device.



1. Disconnect from the device (break HTTP connection)
2. Reload or re-fetch latest device configuration values.
3. Navigation tabs to move around different sections of the application while connected to the Edge Core device.
4. Edge Core's backend connectivity status.
5. Current network activity monitor (uploads and downloads).
6. Edge Core's CPU and RAM usage meter.
7. Edge Core's disk utilization.
8. Edge Core's System load.
9. Top-level information related to firmware, type, connection and commissioning states.
10. Edge Core's current network configuration such as IP, Gateway, Network Mask etc.

3.5.2 System Monitoring

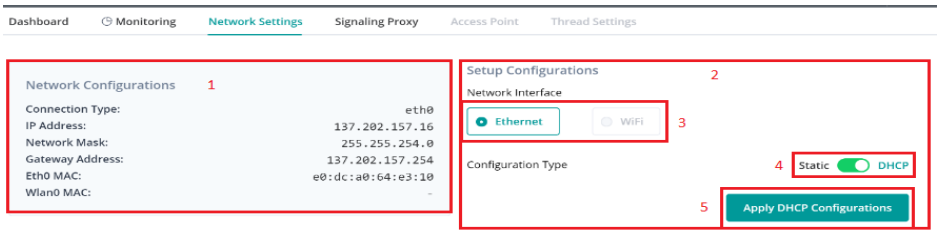
The Monitoring section in DSA provides the most recent analytics information about different components and automatically refreshes graphs in the background.



3.5.3 Network Settings

Network setting tab provides an option to update network information of the connected Edge Core device and this can be accessed by clicking on *Network Settings* tab.

In this section, Edge Core's network setting mode can toggle between DHCP or Static, or update the static IP address to another one. Network setting screen looks like the followingscreenshot.



1. Presents existing network configuration on the device.
2. Configurations update panel.
3. Network interface switch to configure the device's network to WLAN(*) or wired Ethernet
4. In Ethernet mode switch to setup IP mode on auto DHCP or Static
5. Button to apply configuration (if Ethernet/DHCP configuration is intended then clicking on this button would supply a command to the device to update network configurations)

Note: Latest Edge Core devices are not equipped with WLAN hardware module so WiFi network option is disabled at DSA level.

Appendix A. LED Status Chart

Below is the LED status mapping on the SIMATIC IPC before , during and after the installation of the firmware image are mapped in the form of table matrix.

LED L1	LED L2	LED L3	State
OFF	OFF	RED - ON	Firmware Installation
OFF	OFF	ORANGE - Heartbeat	Installation Finished
GREEN - Timer	OFF	OFF	System Initializing
GREEN - Timer	RED - ON	OFF	Network error during system initialization
GREEN - Timer	RED - Heartbeat (30 seconds)		Time synchronization failed.
ORANGE - On	OFF	OFF	Device in Blank State
GREEN - Heartbeat	OFF	OFF	Establishing connection with M^3 Platform
GREEN - On			Connection with M^3 Platform established
		ORANGE - Heartbeat	Application Deploying
GREEN - Heartbeat			Application Starting
GREEN - On			Application Started
	RED - Heartbeat (30 seconds)		Application Error
	RED - ON		Fatal Error