GE
Grid Solutions
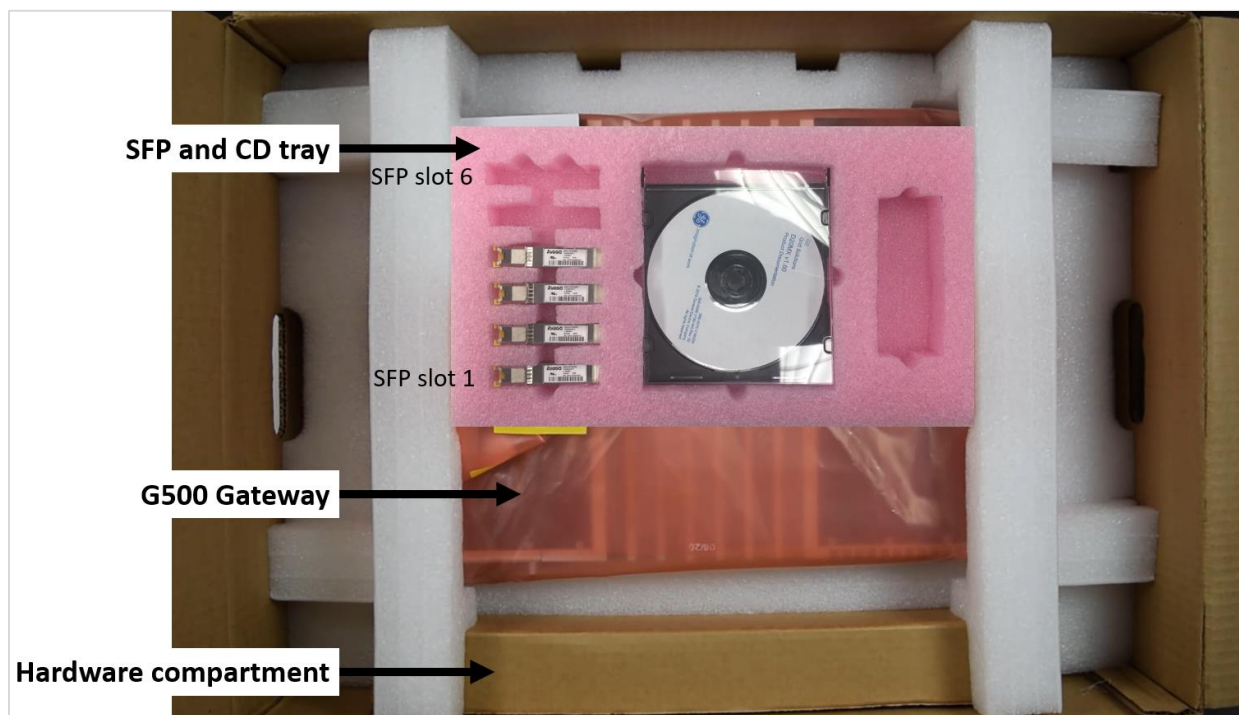
G500 Substation Gateway

Quick Start Guide

This document applies to G500 v2.80.

Please refer to previous versions of this document for previous G500 releases.

What's in the Box?

Your kit includes the following:

- G500 Substation Gateway
- SFP and CD tray
- Hardware Compartment

Hardware Compartment

The hardware compartment is a single package which contains:

- Mounting Bracket Kit : Top filler plate
  Bottom filler plate
  Left bracket
  Right bracket

- Bracket mounting : M4 screws (quantity 10)
  hardware   M3 screws (quantity 8)

- Connector set : Power supply connectors (quantity – 2)
  IRIG-B connectors (quantity – 2)
  Alarm connector (quantity – 1)
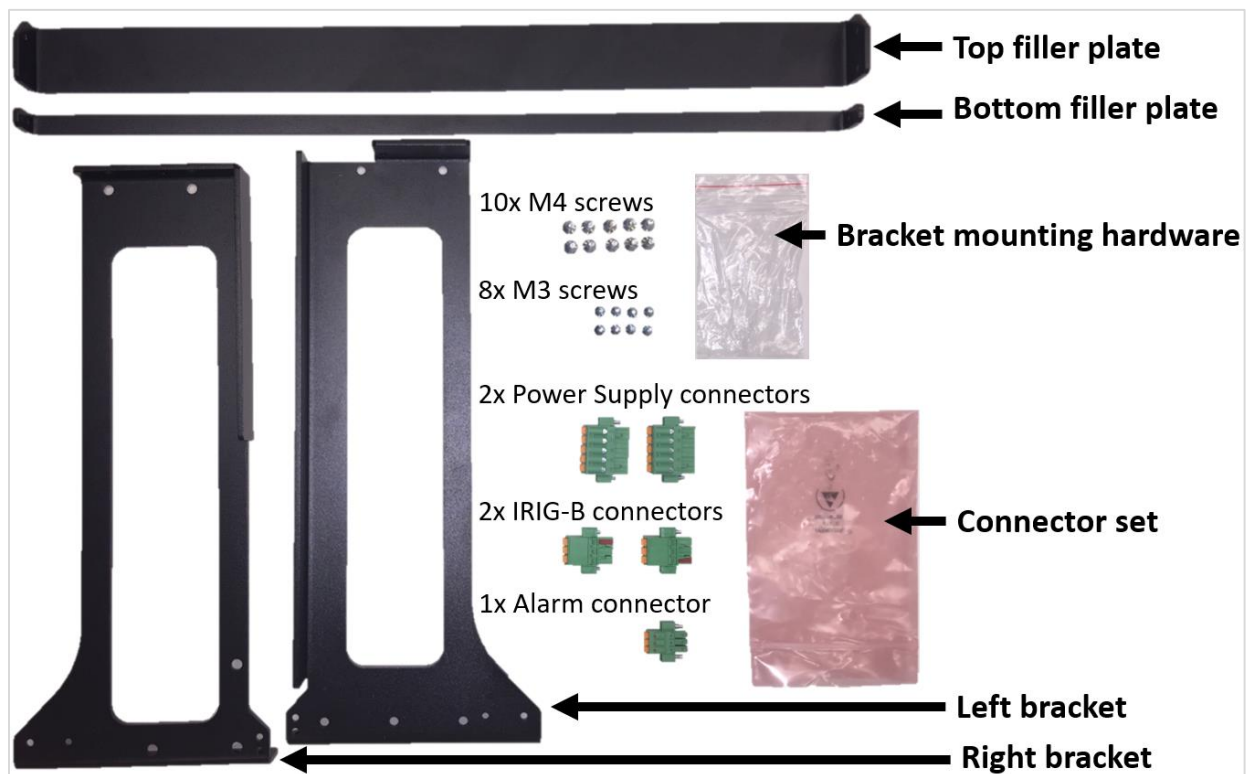
The rack mounting kit includes 4 metal pieces (left bracket, right bracket, top filler plate and the bottom filler plate) along with M4 (quantity 10) and M3 (quantity 8) screws. The M4 screws are used to attach the left and right bracket to the G500 chassis and the M3 screws are used to secure the top and bottom filler plates to the brackets.
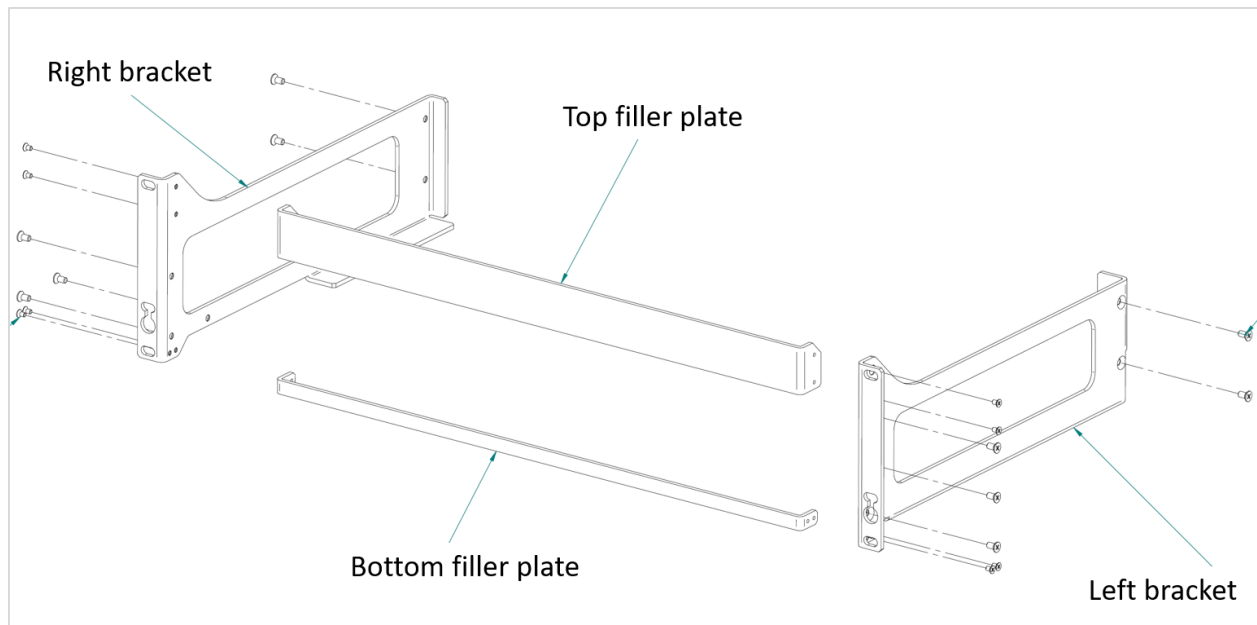

The SFP's are inserted in the tray in the same order as the cages are labeled on the rear of the G500 chassis.

NOTE: The single notch in the tray corresponds to the SFP cage labeled 1.

The Hardware compartment also includes the Connector set which includes two power supply connectors, one Alarm connector, one IRIG-B input and output connectors.

NOTE: The IRIG-B input and output connectors are keyed and can only be installed in the corresponding position.
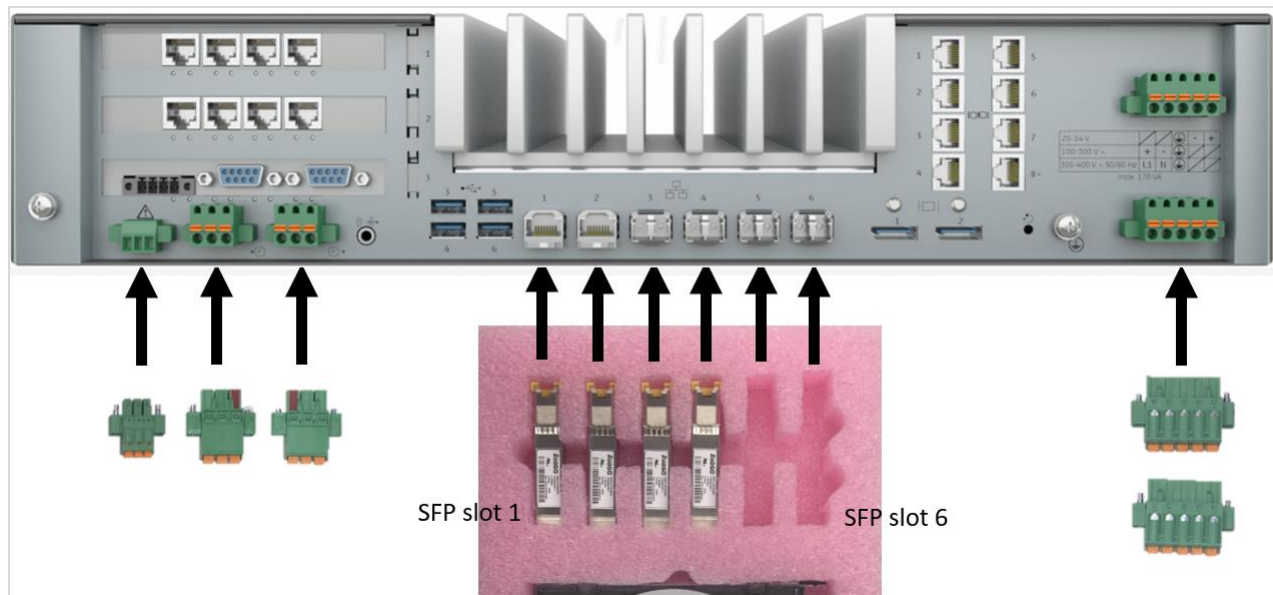
Missing Something?

Contact GE Customer Service right away and we'll figure it out. Be sure to include your order number and mail address associated with your order.

Prerequisites

- DS-Agile Studio's MCP Studio

- Minimum Windows 7 x64, 10 x64 and 8GB Memory required for DS Agile MCP Studio

G500 Interface Options

The following connection/interface options are available after G500 first powers up.

- Local KVM (Keyboard, Video, Mouse)

- Front Ethernet port – Default IP address 192.168.168.81

- Front USB Serial port with a baud rate 115200

Setup & Configuration Tools

The following setup & configuration tools are available for the G500.

1.	**DS Agile MCP Studio** Offline & Online Editor	:	To configure the Gateway & SCADA Configuration.
2.	**G500 Runtime HMI** (Remote/Local)	:	To view and control the runtime stats including One-line diagrams and to configure the G500 Settings (e.g. User Management, Automatic Login etc.).
3.	**G500 Gateway Settings GUI (or Shell based application)**	:	To configure G500 system settings and perform the initial G500 setup (e.g. Users, network, serial, time sync etc.).

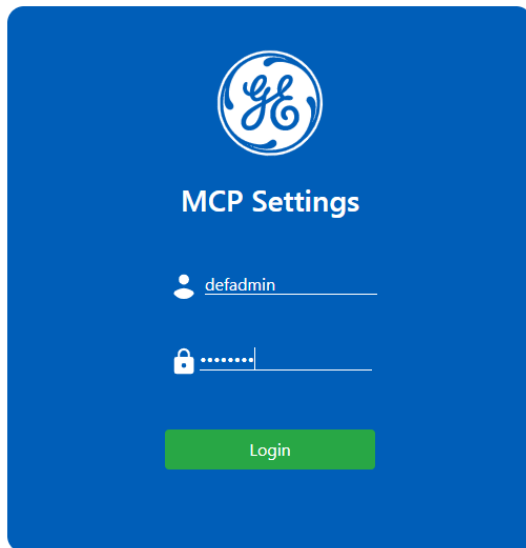## G500 Gateway Settings GUI

The local G500 settings, including Serial ports, Network configuration, Time settings, User management etc. are managed using the **Gateway Settings GUI**.

You can access MCP Settings Web Interface through Local or Remote G500 connection. Remote access must be completed using a supported web browser (Internet Explorer, Microsoft Edge, Mozilla Firefox, Google Chrome).
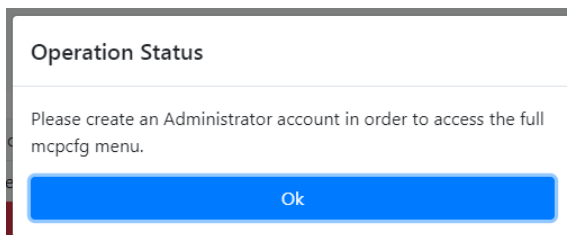
Initial Setup

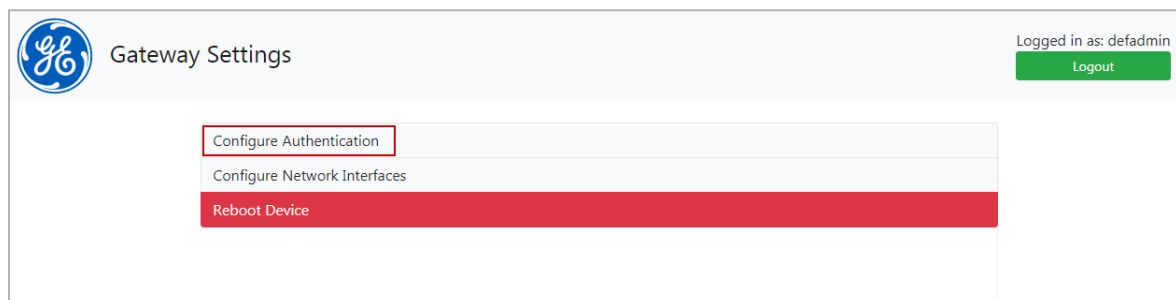**NOTE:** Initial Setup section is identical between Local KVM/Remote access.

1. Enter the default **Username** (defadmin), default **Password** (defadmin) and click **Login**.
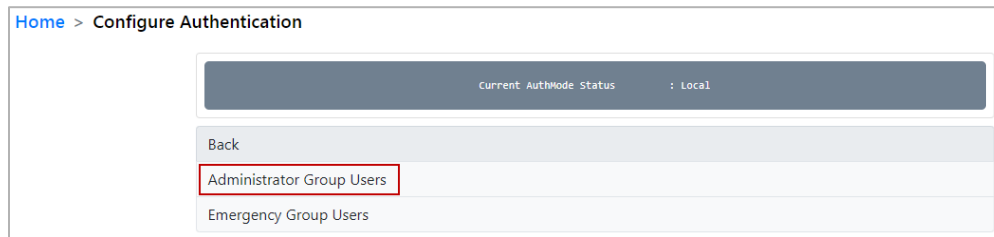

2. If the **defadmin** account is used to login, you will be prompted to create an **Administrator** account to access the full Settings GUI menu. Click **OK**.

3. The **Gateway Settings** main menu appears.

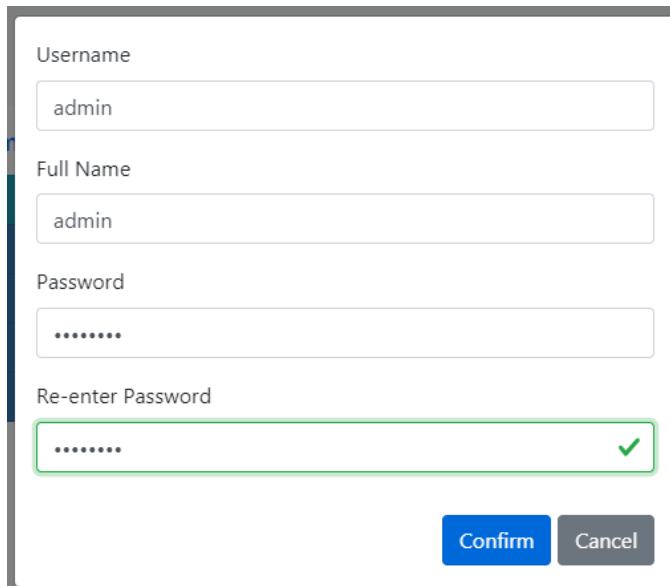   Select the **Configure Authentication** tab from the main menu.

4. Select the **Administrator Group Users** tab from the **Configure Authentication** menu.

Home > Configure Authentication

Current AuthMode Status   : Local

Back

Administrator Group Users

Emergency Group Users

This function is used to perform the following actions:

- List Users
- Add User
- Change Password
- Remove User

5. Select the **Add User** tab to create administrator-level users.

- Enter the desired **Username**, conforming to the Username rules as listed below:

    o Username must be between 2 and 31 characters

    o Username must start with a lowercase alphabetical character

    o Username must only contain [a-z] [0-9] [-,_] characters

- Enter the **Full Name** of the User.

- Enter the **Password**, conforming to the password security rules as listed below:

    o Password must be between 8 and 199 characters in length

    o Password must contain:

        ▪ 1 character from [a-z]

        ▪ 1 character from [A-Z]

        ▪ 1 digit from [0-9]
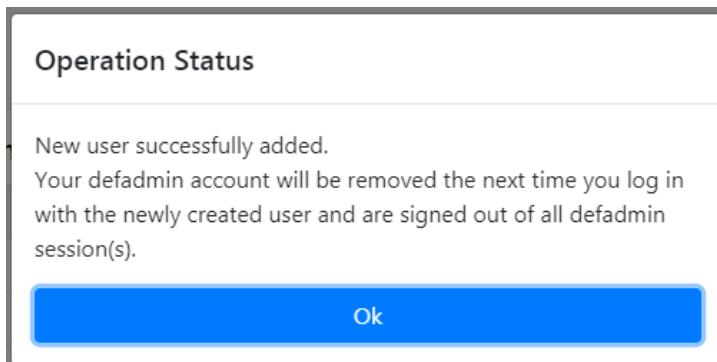
        ▪ 1 special character from the set [$%@!&]

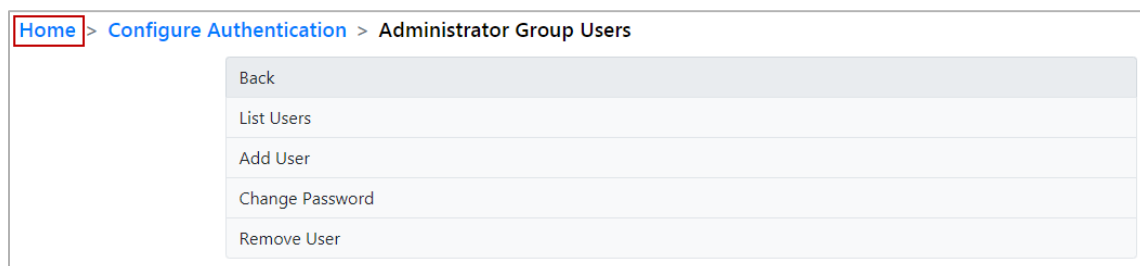- **Re-enter Password** and click **Confirm**.

RESULT: Pop-up window appears showing the **Operation Status**, click **OK.**

NOTE: defadmin account will be removed the next time you login with the newly-created user and are signed out of all defadmin sessions.
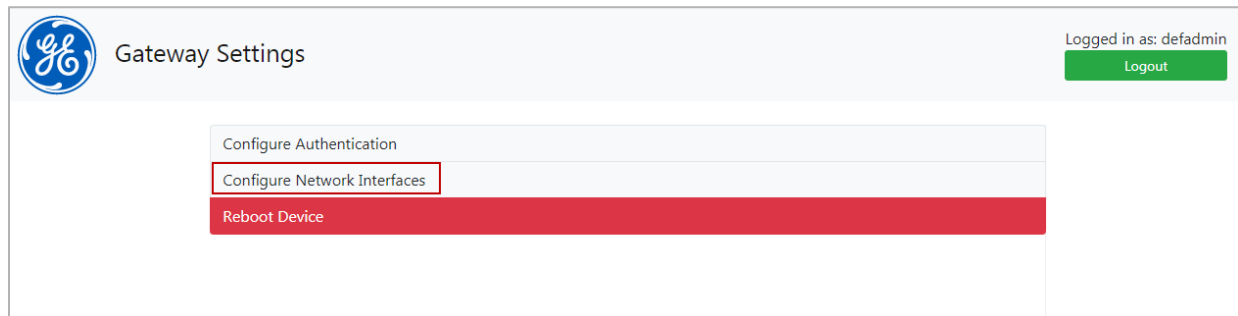

6. Navigate back to the main menu by clicking on the **HOME** link located at the upper left corner of the page.
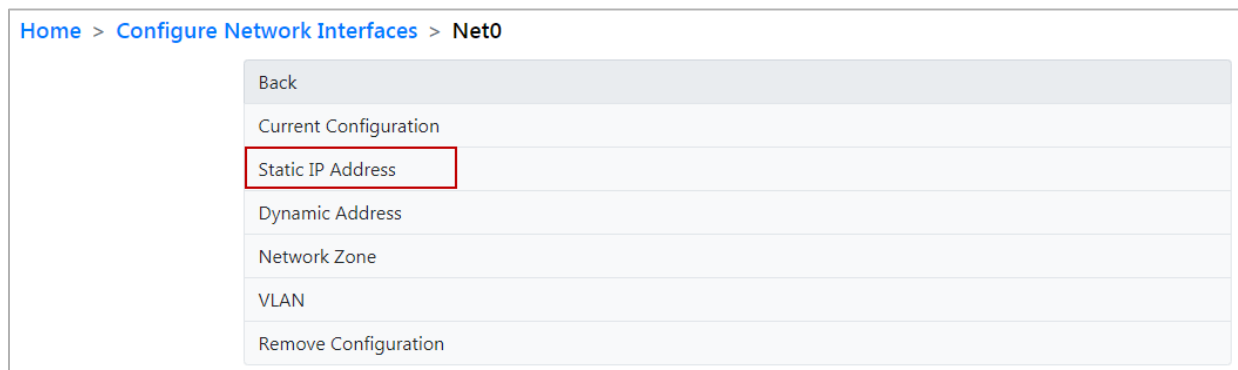
7. Select the **Configure Network Interfaces** tab from the main menu.

8. Select the desired network port (**default Net0/192.168.168.81**) which is connected to G500 device from the list.
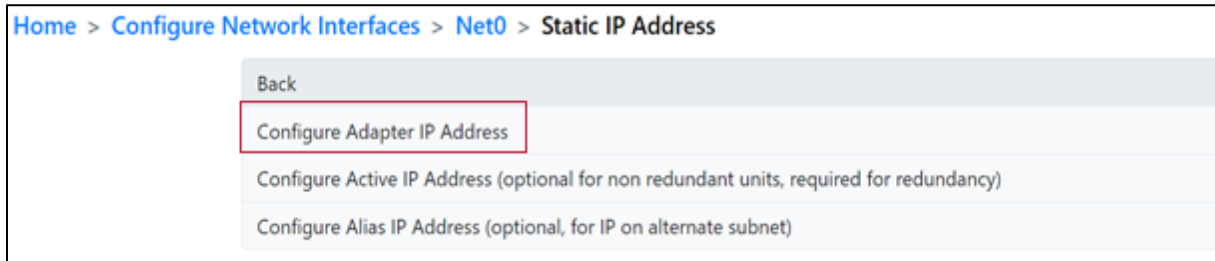

9. Select the **Static IP Address** tab.
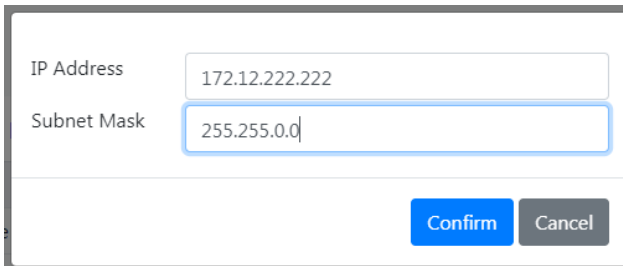
10. Select the **Configure Adapter IP Address** tab.
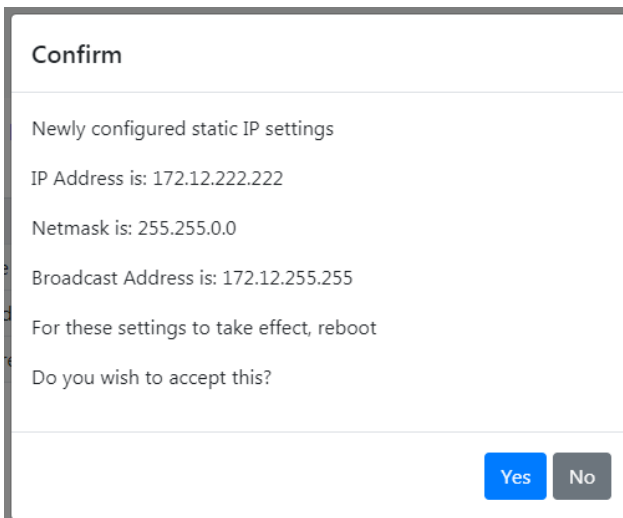
Home > **Configure Network Interfaces** > **Net0** > **Static IP Address**

Back
Configure Adapter IP Address
Configure Active IP Address (optional for non redundant units, required for redundancy)
Configure Alias IP Address (optional, for IP on alternate subnet)

11. Enter **IP Address** and **Subnet Mask**. Click **Confirm**.

IP Address	172.12.222.222
Subnet Mask	255.255.0.0

Confirm   Cancel

12. Click **Yes** to confirm the newly-configured static IP settings.

NOTE: Reboot the device for changes to take effect.

Confirm

Newly configured static IP settings

IP Address is: 172.12.222.222

Netmask is: 255.255.0.0

Broadcast Address is: 172.12.255.255

For these settings to take effect, reboot

Do you wish to accept this?

Yes   No

13. Navigate back to the main menu and select the **Reboot Device** tab.
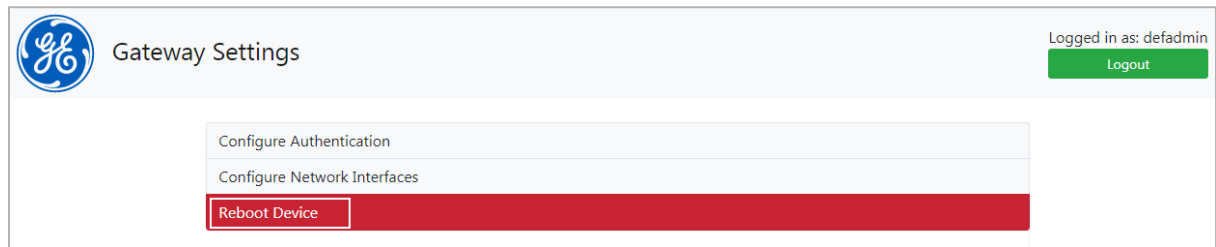
14. Click **Yes** to confirm and the device is rebooted.
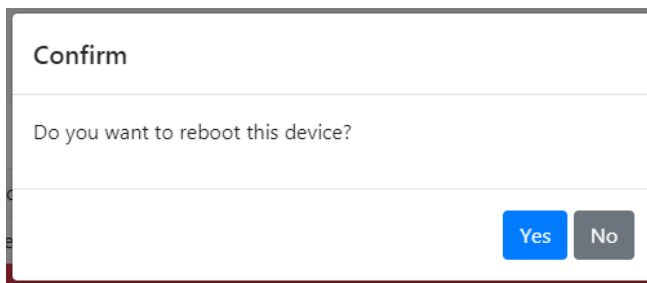
15. Type "**YES**" and click **Confirm**.

    NOTE: Rebooting the device will cause it to disconnect from the network for a few minutes.
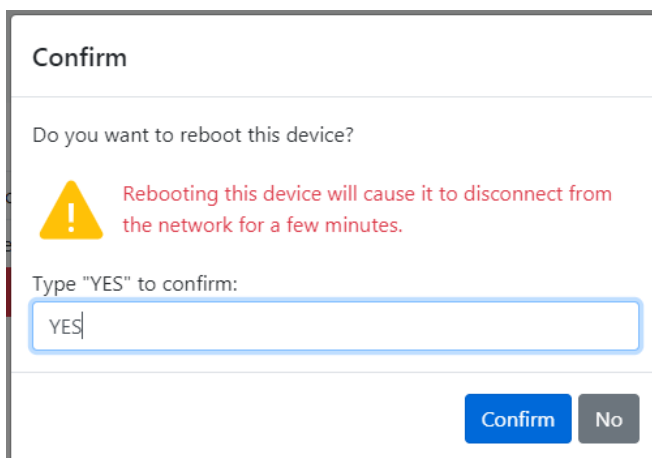
    RESULT: The device reboot takes place. Click **OK**.
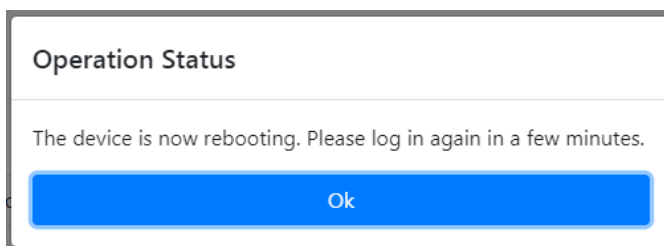
16. Upon G500 reconnect, you can access **MCP Web Interface** remotely via the newly-configured IP Address and a supported web browser. In the supported browser address bar, type in the new G500 device IP (ex.: **172.12.222.222**) as shown in figure below:
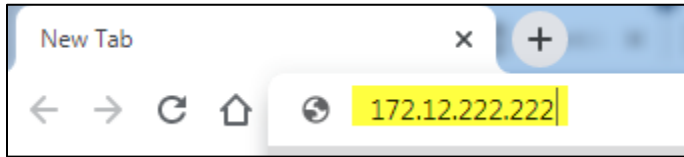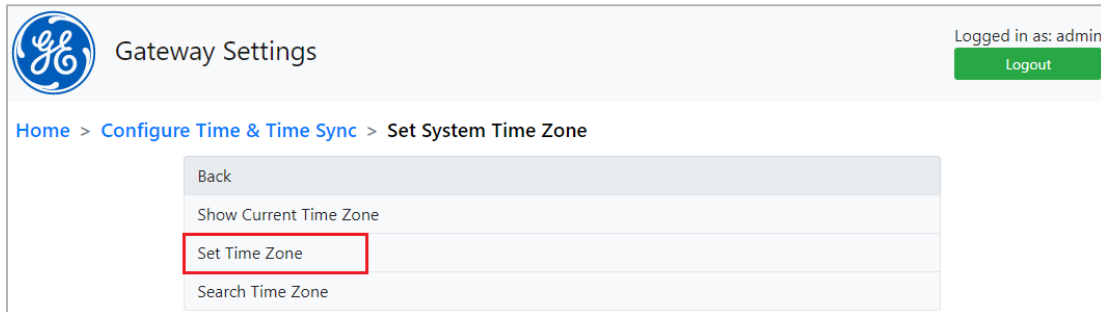
17. Press the **Enter key** and the **MCP Settings Login** page appears.

    Login using the newly-created admin username/password and click **Login**.

    Select the **Configure Time & Time Sync** tab.
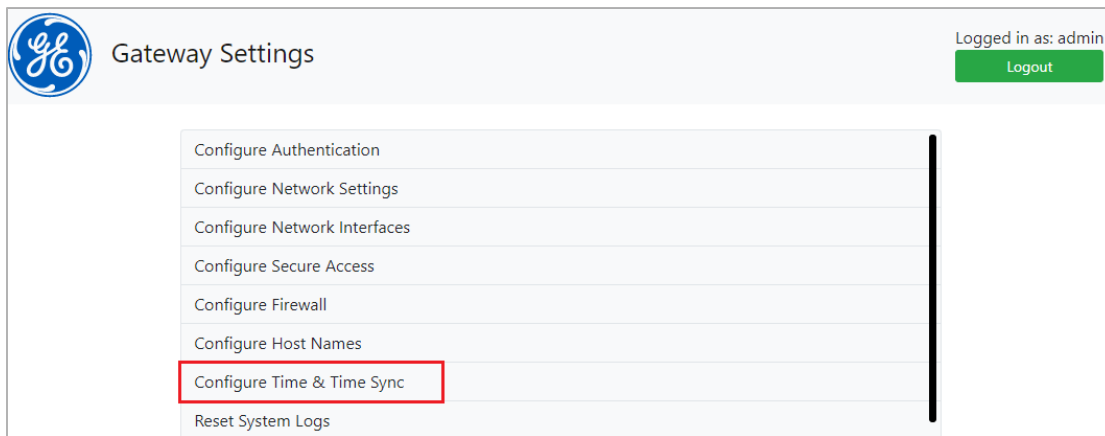
18. Select the **Set System Time Zone** tab.
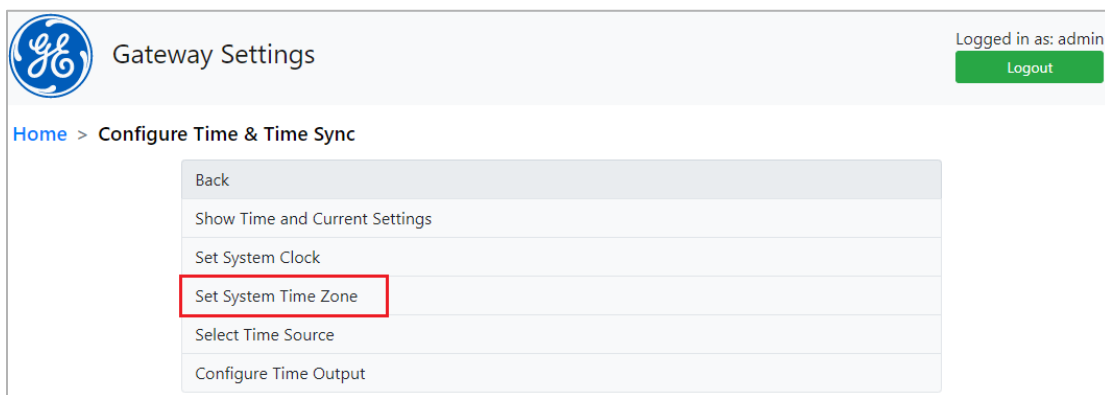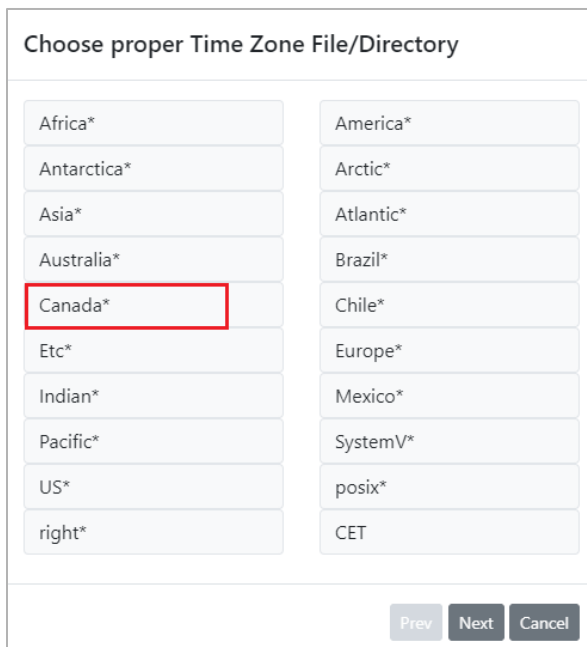
19. Select the **Set Time Zone** tab to configure the G500 to the same time zone as remote PC.
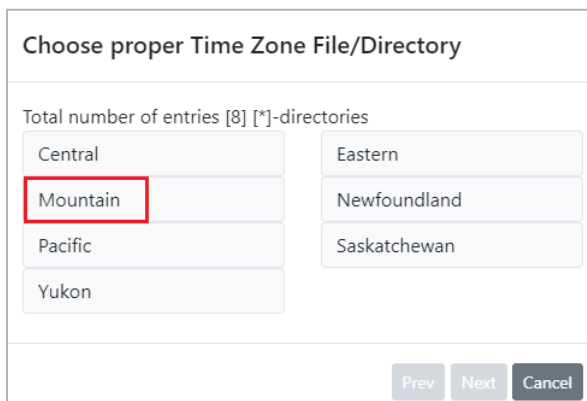
20. Select the applicable time zone. User can navigate the menu using the **Prev/Next** buttons.

21. Select the applicable region within the selected time zone.

RESULT: The Operation Status dialog shows success message. Click **OK**.

Operation Status

Restarting the System Logger : Done
The System time zone is successfully set to
Canada/Mountain.
Please restart Local HMI if it is running

Ok

22. Select the **Back** tab.

Gateway Settings   Logged in as: admin
Logout

Home > Configure Time & Time Sync > Set System Time Zone

Back
Show Current Time Zone
Set Time Zone
Search Time Zone
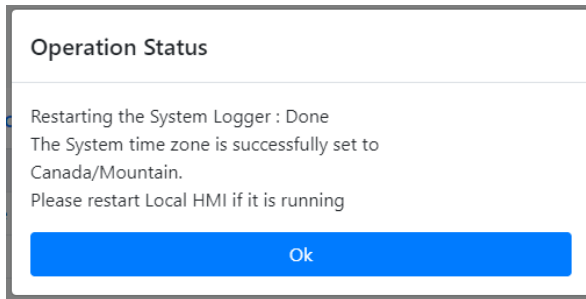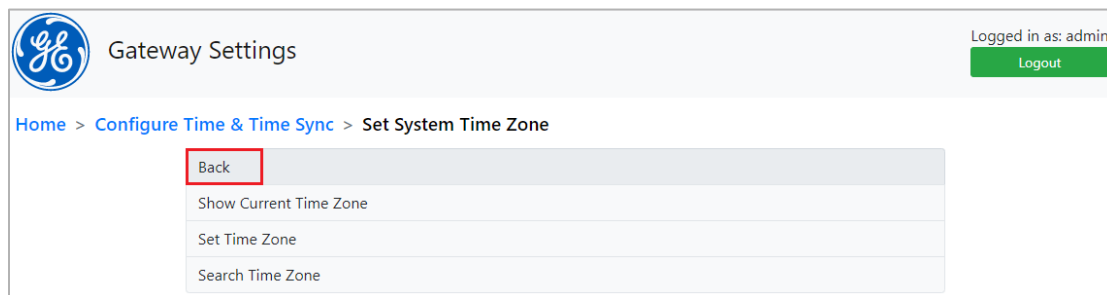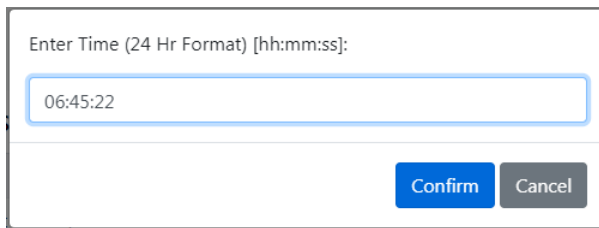
23. Select the **Set System Clock** tab.

Gateway Settings   Logged in as: admin
Logout

Home > Configure Time & Time Sync

Back
Show Time and Current Settings
Set System Clock
Set System Time Zone
Select Time Source
Configure Time Output
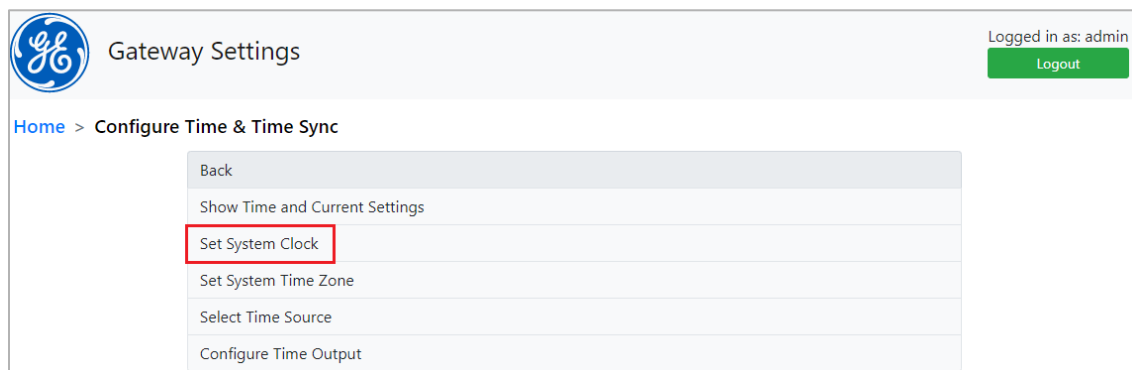
24. A dialog is displayed informing the user to enter a date using the format **YYYY-MM-DD**. Enter **today's date** and select the **Confirm** button.

Note: The Gateway system time is automatically set to the
firmware build time whenever the Gateway reboots and the
system time is less than the firmware build time during boot time.

Enter Date[YYYY-MM-DD]:

2020-02-14
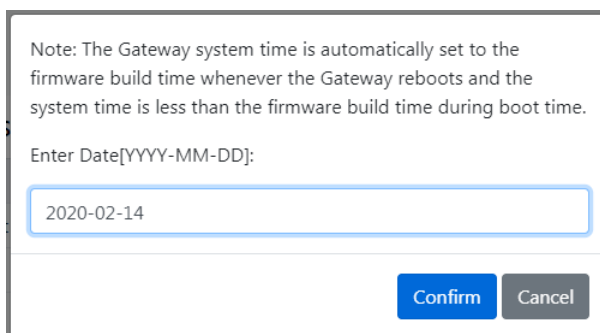
Confirm   Cancel

25. A dialog is displayed informing the user to enter time, using the **24 Hr Format hh:mm:ss**. Enter **remote PC time** and select the **Confirm** button.
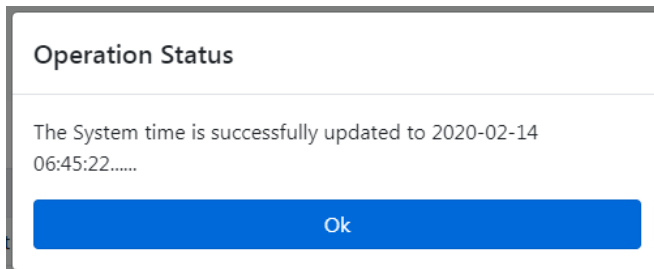
Enter Time (24 Hr Format) [hh:mm:ss]:

06:45:22

Confirm   Cancel

RESULT: The Operation Status dialog shows success message. Click **OK**.

Operation Status

The System time is successfully updated to 2020-02-14 06:45:22......

Ok

Logout

To **logout**, click the **Logout** link located at the upper right corner of the page as shown in the figure below.

When you have successfully logged-out of the system, the screen below will be displayed.
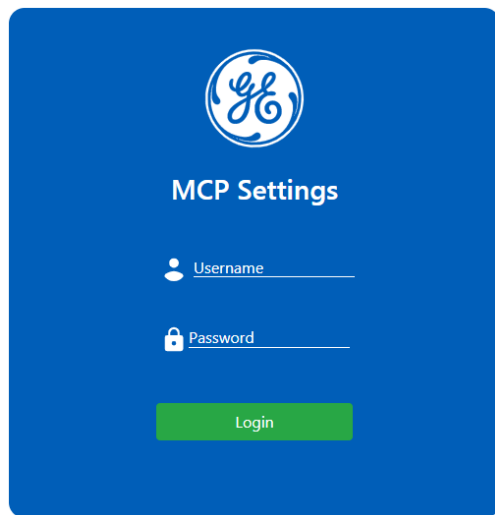
NOTE: After 20 minutes of inactivity, the session is automatically timed out and a message will be displayed as shown in below figure. In such cases, either click **OK** and login again or click on any of the links to be redirected to the login page.
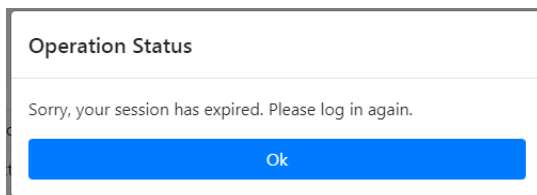
G500 Snapshot Compatibility

The below table shows the G500 Snapshot Compatibilities:

FULL "Clone" Snapshot compatibility Configuration+Settings (using DSAS 2.1 or later)		Restore snapshot (Configuration and Settings) <u>to target</u> device:			Restore snapshot (Only Configuration part) <u>to offline</u> device:			
		D400	G500		D400	G500		
Save snapshot <u>from</u> device:		Any version	1.00	1.10	2.00 or later	Any version	1.00	1.10	2.00 or later
D400	<= 5.20	YES ONLY same D400 and same version	N/A	N/A	N/A	YES Direct same version	N/A	N/A	N/A
	5.30 or later	YES ONLY same D400 and same version	N/A	N/A	N/A	YES Direct same version	Indirect Via Create G500	Indirect Via Create G500	Indirect Via Create G500
G500	1.00	N/A	YES ONLY same G500	N/A	YES ANY G500	N/A	YES Direct	Indirect Via Offline Upgrade	Indirect Via Offline Upgrade
	1.10	N/A	N/A	YES ANY G500	YES ANY G500	N/A	N/A	YES Direct	Indirect Via Offline Upgrade
	2.00 or later	N/A	N/A	N/A	YES ANY G500	N/A	N/A	N/A	YES Direct same version

G500 Snapshot Management

Snapshots are an archived image of the G500 configuration created using DS Agile MCP Studio, which include all settings required to completely recover a G500 device. This workflow greatly reduces time when replacing hardware, eliminating the need for additional manual configuration.

Using DS Agile MCP Studio, Snapshots can be restored to the G500 using the **defadmin** default credentials.

Restoring a Snapshot updates the new G500 with the following hardware and software settings as were defined in the original G500, at the time when the snapshot was taken:

1. User Authentication
2. Network Settings
3. Network Interfaces
4. Secure Access
5. Firewall settings
6. Host Names
7. Time settings and time synchronization
8. Local HMI settings – except number of displays and displays resolution which are specific to the G500 being restored
9. Synch Manager
10. Redundancy (except paired keys when the G500 target is already paired as redundant)
11. Emulation of D20 IEC101 DPA Unbalanced Mode and quality event suppression at startup
12. Serial port modes (RS232/485, 2/4 wires)
13. Configuration implemented in MCP Studio:

    - Connections
    - Client and Server Map files
    - System Point Manager
    - Alarms
    - Calculator
    - Data Logger (storage may need to be re-adjusted if the target G500 has different storage sizes)
    - Load Shed
    - Systemwide (storage may need to be re-adjusted if the target G500 has different storage sizes)
    - Access (Local users, Automatic HMI login settings, VPN Client List)
    - ARRM
    - AI Text Enumeration
    - Oneline Screens
    - Analog Reports
    - IEC61850 Client
    - IEC61850 Server

- LogicLinx

Cyber security related certificates are not included in snapshots, and therefore cannot be restored. All certificates must be imported again after the snapshot restore. All secure connections using certificates must be re-associated with the new imported certificates (e.g. Secure Connection Relay, VPN Server, etc.)

License file (key) is not restored with the snapshot.

G500 enrollment in Predix Edge Manager Cloud and associated settings are not restored with the snapshot.

Default Users

G500 from the factory has two default users.

1. **Default Root User** – **root** (root has all permissions to the G500 but only available via the serial

   maintenance port).

2. **Default Administrator user** – **defadmin** (restricted permissions - used for initial setup).

NOTE: There are no other default users on a from factory G500.

Default Root User - root

G500 unit that comes from factory has below default **root** user credentials.

   Username: **root**

   Password: **geroot**

The default root user is a super user in G500 which can access all the settings and files. The **root** user access is restricted via:

- Front serial maintenance port

NOTE: For Cyber Security reasons, you are required to change this default root password using G500 Local Configuration Utility (**MCP Settings GUI**).

Warning: The User is responsible for the new root password. There is no back door, if lost, a factory reset is required to recover a unit. Contact customer support for a Return Materials Authorization (RMA) estimate.

Default Administrator User – defadmin

G500 unit that comes from factory has below default administrator**(defadmin)** user credentials.

   Username: **defadmin**

   Password: **defadmin**

G500 supplies a temporary default administrator user with limited access for initial hardware configuration. This **defadmin** user can perform only limited set of operations.

The default administrator (defadmin) user cannot perform other settings or gateway configuration changes, any operational workflows and login to runtime HMI. The default administrator (defadmin) user is intended to perform only below operations.

- To change or configure IP address to front and rear ethernet ports
- To add a nominated administrator-level user(s)
- To restore G500 Snapshots

Warning: The default administrator (**defadmin**) user will be deleted automatically once a nominated administrator user is created successfully. The local root user is required to recover the new administrator user if the credentials are lost.

Getting Started

Refer to *G500 Substation Gateway Instruction Manual* (994-0152) for details about powering up the G500. Once the G500 is powered up, use the below workflow(s) to prepare the G500 for operation.

1.   Minimum setup for a new G500 without a pre-existing **Snapshot**:

   - Setup_G500_First_time_setup

   - Task 1: Connect to the G500

   - Task 2: Create a New Administrator User

   - Task 3: Set the IP Address

   - Task 4: Change the Root Password

   - Task 5: Download existing G500 Configuration

2.   To restore an existing G500 Snapshot:

   - Task 1: Connect to the G500

   - Task 2: Connect to the G500 Snapshot

NOTE: In the following procedures/workflows, "**Enter**" indicates that the menu item number is typed in and then the Enter key is pressed.

Setup G500 - First Time Setup

Task 1: Connect to the G500

There are three methods to connect to a new G500:

   - Local monitor and keyboard via Local KVM interface (Keyboard Video Mouse).
   - Using a supported Web Browser, connect to the front maintenance LAN port - default IP address 192.168.168.81
   - USB Serial connection via the front USB type B maintenance port.

Connect to G500 via Local KVM GUI

1.   Connect the **Display Port** on the rear panel of the G500 to a monitor with a Display cable.

2.   Connect a keyboard and mouse to any of the USB ports.

3.   Once the G500 device is powered up and has a valid license installed, click on the **G500** name via the taskbar.

4.   Click **System Settings**.

5.   A default web browser will be opened showing **MCP Settings** Login screen.

     Enter the default **Username** (defadmin) and default **Password** (defadmin) and click **Login**.

Connect to G500 via Front Maintenance LAN Port

1. Connect a LAN cable between your computer and the G500 front maintenance LAN port.

   - The PC's network settings will have to be configured to the same subnet as the G500 to establish communications.

2. Using a supported web browser, type the Net0 (default IP 192.168.168.81) into the address bar and press the **Enter key**.

   - The destination port number is 8081 if is required

3. User is required to **confirm security certificate** exception.

4. The **MCP Settings** Login screen is displayed.

   Enter the default **Username** (defadmin) and default **Password** (defadmin) and click **Login**.

Connect to G500 via Front Serial USB Maintenance Port

1. Connect a USB 2.0 type B cable to your computer USB port and to the G500 front maintenance port.

   NOTE: First time users will have to install all the required Windows USB serial drivers, obtained from GE.

2. Launch the **Secure Terminal Emulator** from the DS Agile Studio folder in the start menu.

3. Select **File → Connect** and ensure the Protocol is set to **Serial Port.**

4. Confirm the settings before selecting Connect:

   - Serial Port: Select the simulated G500 serial port

   - Baud rate: **115200**

5. At the G500 command shell login prompt, enter the default admin credentials:

   - Username: **defadmin**

   - Password: **defadmin**
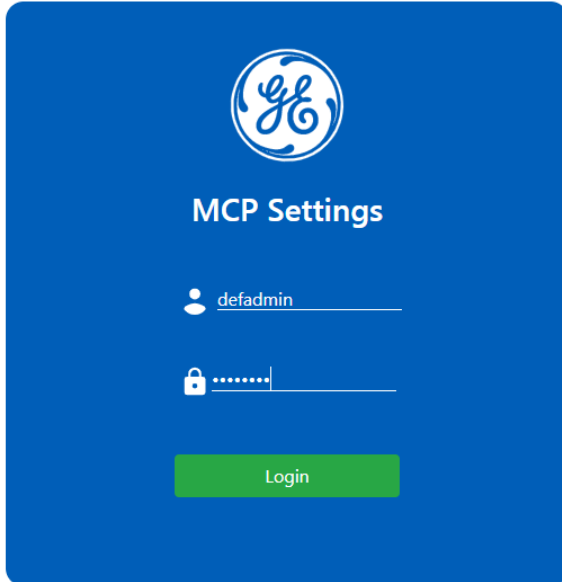
Task 2: Create a New Administrator User

The default administrator (**defadmin**) is restricted to prevent setting or gateway configuration changes. This is to force the creation of a new nominated administrator-level user account to continue the G500 Setup. New administrator-level user account(s) are created using G500 Local Configuration Utility (MCP Settings GUI). After completing this task, the defadmin user is removed automatically.
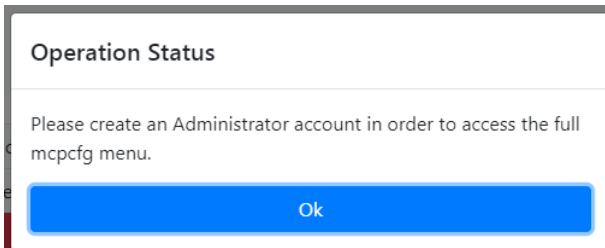
To create a new administrator-level user account, follow the steps below using Settings GUI.

NOTE: This section is identical between Local and Remote Settings GUI access.

1. Enter the default **Username** (defadmin), default **Password** (defadmin) and click **Login**.

2. If the defadmin account is used to login, you will be prompted to create an Administrator account to access the full Settings GUI menu. Click **OK**.

3. The **Gateway Settings** main menu appears.

    Select the **Configure Authentication** tab from the main menu.

4. Select the **Administrator Group Users** tab from the Configure Authentication menu.
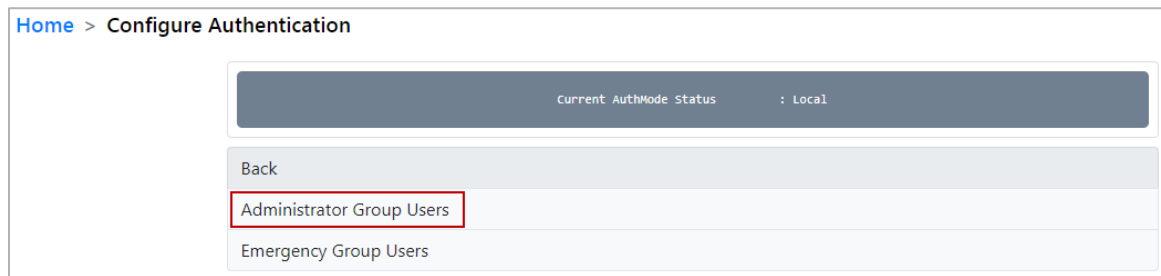

This function is used to perform the following actions:

- List Users

- Add User

- Change Password

- Remove User

5. Select the **Add User** tab to create administrator-level users.

- Enter the desired **Username**, conforming to the Username rules as listed below:

    o   Username must be between 2 and 31 characters.
    o   Username must start with a lowercase alphabetical character.
    o   Username must only contain [a-z][0-9][-,_] characters.

- Enter the **Full Name** of the User.

- Enter the **Password**, conforming to the password security rules as listed below:

    o   Password must be between 8 and 199 characters in length.
    o   Password must contain:

        ▪   1 character from [a-z]
        ▪   1 character from [A-Z]
        ▪   1 digit from [0-9]
        ▪   1 special character from the set [$%@!&]

- **Re-enter Password** and click **Confirm**.

RESULT: Pop-up window appears showing the **Operation Status**, click **OK.**

NOTE: defadmin account will be removed the next time you login with the newly created user and are signed out of all defadmin sessions.

6. Navigate back to the main menu by clicking on the **HOME** link located at the upper left corner of the page.

   NOTE:

   - The defadmin user will be deleted automatically once nominated administrator-level user is logged in and all the defadmin opened sessions are logged/signed out.
   - The root user is available to recover the new administrator password.

Task 3: Set the IP Address

G500 has the following Network Interfaces, which can be configured independently.

1. Front Network Maintenance Port (Net0)

2. Rear Network Maintenance Ports (Net1-Net6).

Follow the steps below using Settings GUI to set the IP Address of each required port.

Setting IP Address for Front Network Maintenance Port (Net0)

1. Go to the **Settings GUI** main menu by clicking on the **HOME** link located at the upper left corner of the page.
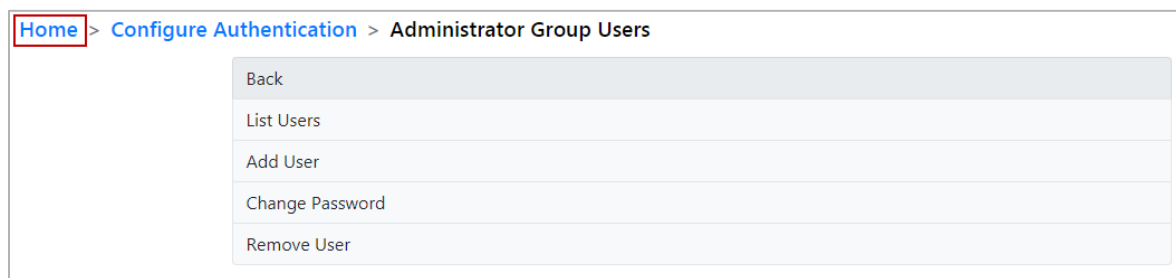
2. Select the **Configure Network Interfaces** tab from the main menu.
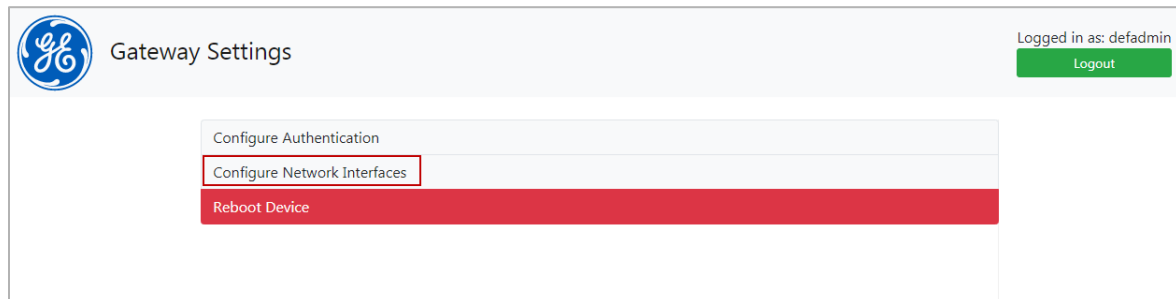
3. Select the Network port Net0 (**default IP 192.168.168.81**) which is connected to G500 device from the list.

4.   Select the **Static IP Address** tab.

5.   Select the **Configure Adapter IP Address** tab.

6.   Enter **IP Address** and **Subnet Mask**. Click **Confirm**.

Click **Yes** to confirm the newly configured static IP settings.

NOTE: Reboot the device for changes to take effect.

Confirm

Newly configured static IP settings

IP Address is: 172.12.222.222

Netmask is: 255.255.0.0

Broadcast Address is: 172.12.255.255

For these settings to take effect, reboot

Do you wish to accept this?

Yes   No

7.   Navigate back to the main menu and select the **Reboot Device** tab.

Gateway Settings   Logged in as: defadmin
                                                                      Logout

Configure Authentication
Configure Network Interfaces
Reboot Device

8.   Click **Yes** to confirm and the device is rebooted.

Confirm

Do you want to reboot this device?

Yes   No

9. Type "**YES**" and click **Confirm**.

    NOTE: Rebooting the device will cause it to disconnect from the network for a few minutes.

    Confirm
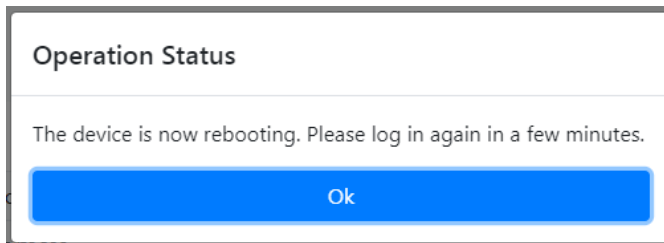
    Do you want to reboot this device?

    ⚠️ Rebooting this device will cause it to disconnect from the network for a few minutes.

    Type "YES" to confirm:

    | YES |

    | Confirm | No |

    RESULT: The device reboot takes place. Click **OK**.
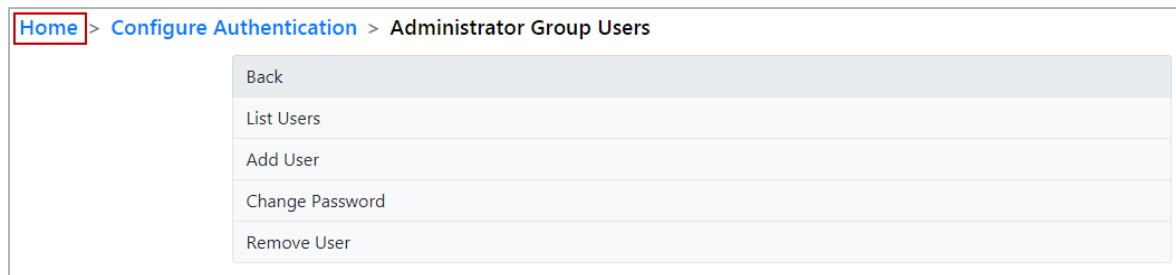
    Operation Status

    The device is now rebooting. Please log in again in a few minutes.

    | Ok |

Setting IP Address for Rear Network Ports (Net1-Net6)
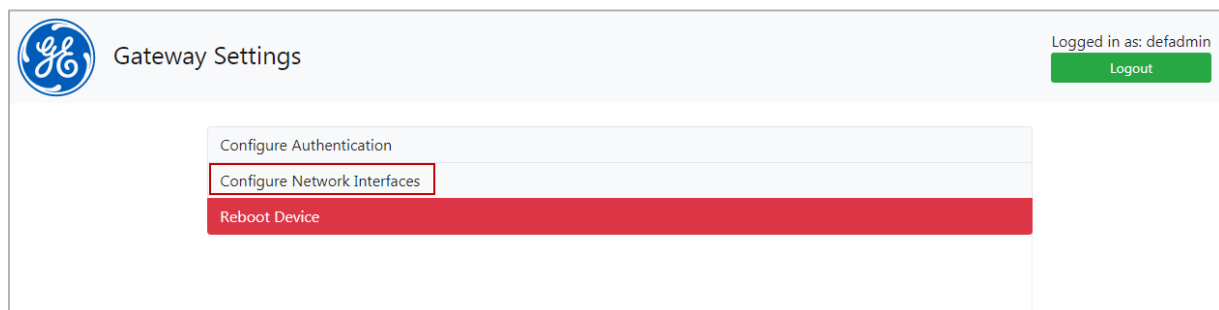
1. Go to the **Settings GUI** main menu by clicking on the **HOME** link located at the upper left corner of the page.

    Home > Configure Authentication > Administrator Group Users

    | Back |
    | List Users |
    | Add User |
    | Change Password |
    | Remove User |

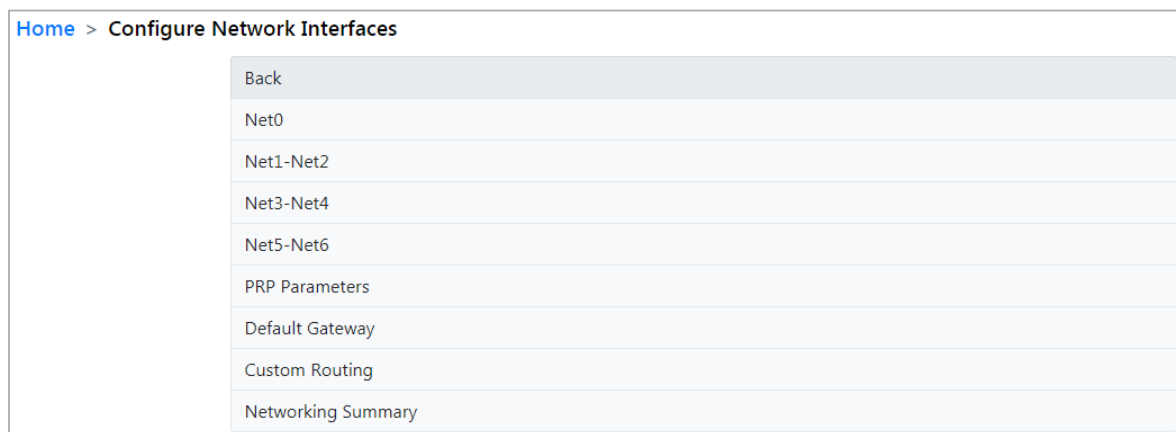2. Select the **Configure Network Interfaces** tab from the main menu.

    Gateway Settings   Logged in as: defadmin
                                                                    Logout

    Configure Authentication
    Configure Network Interfaces
    Reboot Device

3. Select the network interfaces **Net1-Net2** or **Net3-Net4** or **Net5-Net6.**

4. Choose the network mode: **Single** or **Redundant** or **PRP**.

5. Select the specified option as per your requirement and enter the **IP Address** and **Subnet Mask** credentials and select the **Confirm** button to proceed.

6. Navigate back to main menu and select the **Reboot Device** tab.
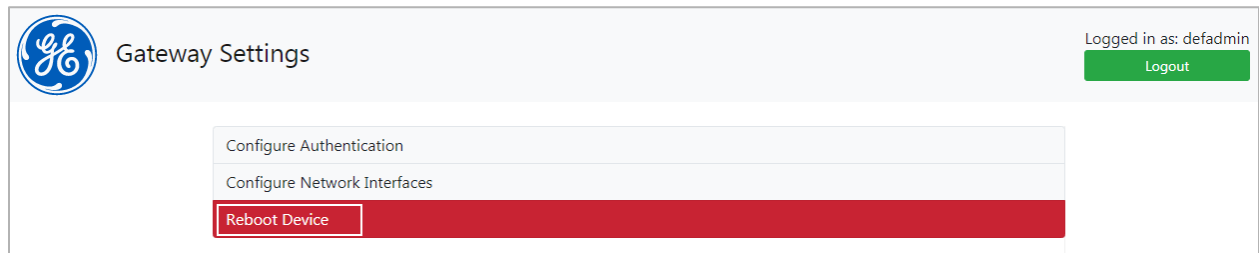
7. Click **Yes** to confirm and the device is rebooted.
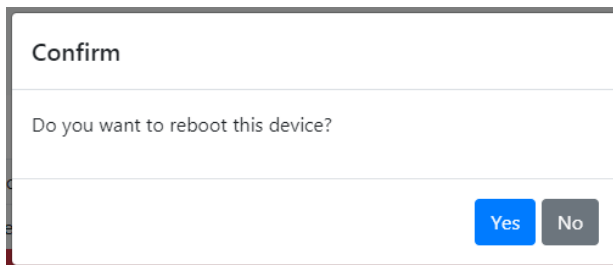
8. Type "**YES**" and click **Confirm**.

    NOTE: Rebooting the device will cause it to disconnect from the network for a few minutes.
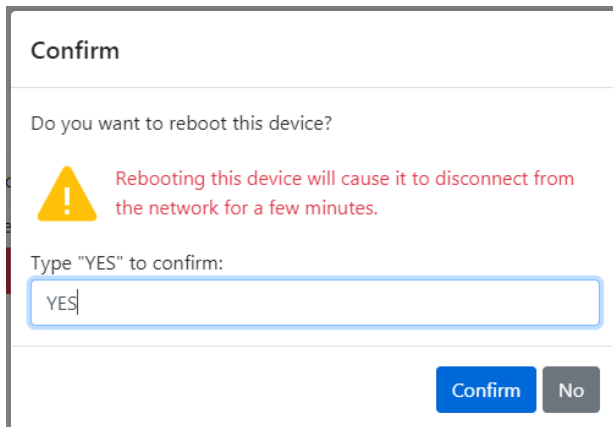
    RESULT: The device reboot takes place. Click **OK**.
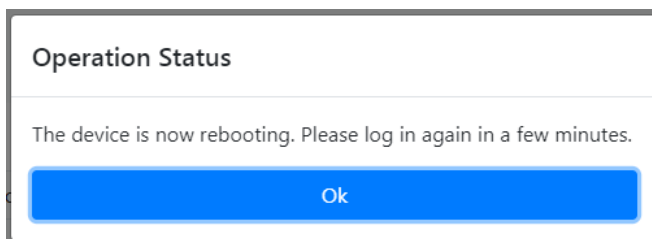
Task 4: Change the Root Password

1. Go to the **Settings GUI** main menu by clicking on the **HOME** link located at the upper left corner of the page.

2. Click **Root Administrator Settings** tab.

Home > Configure Authentication

Current AuthMode Status   : Local

Back

Root Administrator Settings

Pass-Through Authentication

Administrator Group Users

Emergency Group Users
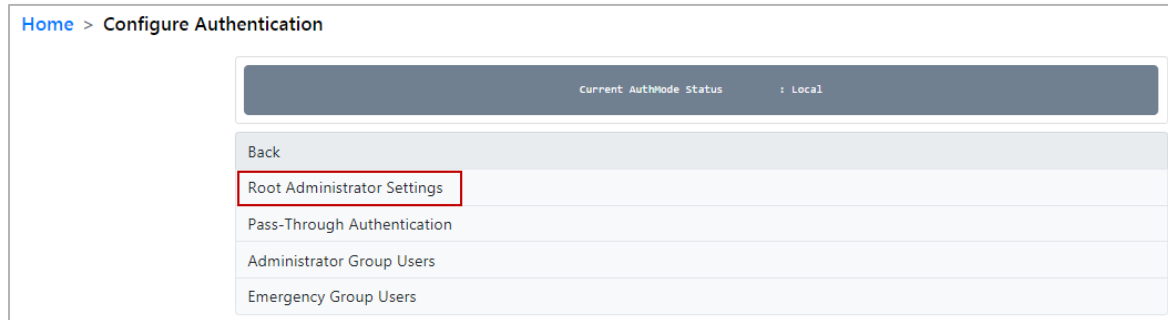
3. Click **Change Root Password** to change the password associated with the system root user account.

Gateway Root User Menu

Back

Change Root Password
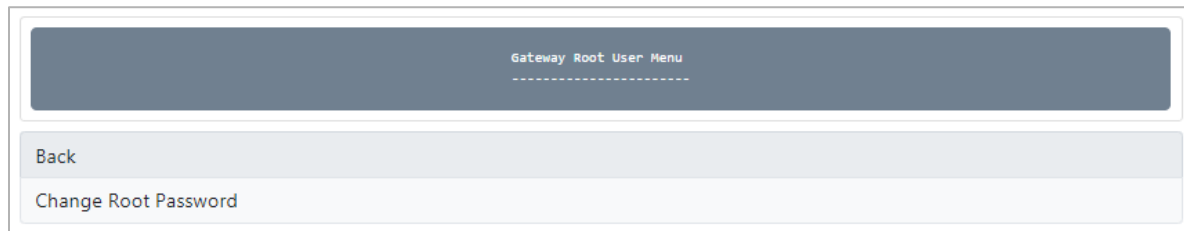
4. Change Password:

    - Password cannot contain the user's account name or parts of the user's full name that exceed two consecutive characters.
    - Password must be at least 8 characters in length.
    - Password must contain characters from all the following four categories:

        o At least 1 character from [a-z]
        o At least 1 character from [A-Z]
        o At least 1 digit from [0-9]
        o At least 1 special character from set [$%@!&]

- **Re-enter** password.

5.   Click **Confirm**.

RESULT: Pop-up window appears showing the **Operation Status**. Click **OK**.

Task 5: Download existing G500 Configuration

Follow the steps below to download the G500 project in DS Agile Studio:

1. Launch **DS Agile MCP Studio**.

2. Connect to the G500 from the front ethernet port (default: 192.168.168.81)

   See **Task 3**.

3. Login with the new nominated administrator user and password.

   See **Task 2.**

4. Select the desired G500 configuration and select the **Sync To** button. Follow the steps as prompted on the screen.

Converting D400 configuration to G500

DS Agile MCP Studio can restore D400 archives created in **SGConfig**.

D400 devices with v530 configuration can be directly converted to G500. Previous D400 versions need to be first upgraded to v530 using the D400 Upgrade Manager. Launch DS Agile MCP Studio.

1. If you need to obtain the D400 configuration from an existing operational unit - connect to D400 device and use **Sync From** to upload the configuration.

   Alternatively, select the existing D400 offline configuration to be converted.

2. With the D400 device selected, select the **Create G500** button in the menu. Follow the prompts.

3. When the conversion is complete, the new configuration can be saved and downloaded to the G500 using the **Sync To** option.

Setup G500 - With a Snapshot

Task 1: Connect to the G500

1. Connect a **LAN cable** between your computer and the G500 front maintenance LAN port.

2. Launch command prompt and use the command **ping 192.168.168.81** to ensure the G500 is connected.

   • The PC's network settings should be configured to the same subnet as the G500 to establish communications.

Task 2: Connect to the G500 Snapshot

1. Launch the **DS Agile MCP Studio** on the local configuration PC.

2. Restore your G500 snapshot to a device in a project in DS Agile MCP Studio (**Archive > Restore Snapshot to Device**).

3. Edit the IP address in the projects device properties to match the default G500: 192.168.168.81

4. Select this device, initiate **Synch To Device** > **Restore Snapshot to Device**.

5. Select all Restore options

   • Restore Configuration Data

   • Restore Network Settings

   • Restore information required to clone a device

6. If used, enter the Optional Password - This is the password selected when saving the snapshot, not the password on the G500. This feature will verify the Snapshots authenticity, but not prevent the Snapshot sync if lost.

7. Login with the default admin user:

    - Username: defadmin

    - Password: defadmin

    Refer to **DS Agile Studio User Manual** for more details. Follow the steps as prompted on the screen.

    Result: After successfully restoring the snapshot, the G500 will restart and finish applying the changes.

    G500 runs with the same settings and configuration created for previous snapshot.

You can now change the Projects device properties IP address set in *Step 3* as desired, to match the restored configuration running in G500.

Checking Licenses

G500 units are factory licensed.

To check the provided licenses, two workflows are provided:

1. Shell access-based workflow (read only)
2. DSAS Based Workflow

Shell access-based workflow (read only)

1. Start a **terminal session** and log into the G500 with an Administrator-level or root user account.

2. At the G500 #>> prompt, enter the following commands:

    - cd /home/MCP_APPS/

    - sudo ./swlic-report

    Result: The application output shows the G500 ownership information and a list of available features.

    Each item under **Application License** represents an application or feature that can be licensed.

    They are shown in the format: 3-digit application ID number: Description of feature | License status

```
License Report Utility v01.000

License Information

===========================================================
Target Unit                    : MCP
Serial Number                  : G500_114
Customer                       : GE GRID SOLUTIONS SAS
License created from           : License Utilities V1.0.3
```

```
Application License              Status

============================================================
000 : G500 Core                  Unlocked
002 : ARRM                       Unlocked
004 : 61850 Client               Unlocked
008 : 61850 Server               Unlocked
016 : LogicLinx                  Unlocked
064 : D2x Legacy                 Unlocked
```

If the G500 unit does not contain a license file, perform the following steps:

1. Start a **terminal session** and log into the G500 with an Administrator-level or root user account.

2. At the G500 #>> prompt, enter the following commands:

   - cd /home/MCP_APPS/

   - sudo ./swlic-info

3. Provide the information shown to GE Technical Support.

Refer to the G500 Substation Gateway Manual (GE Part Number SWM0101) for additional details.

DSAS Based Workflow

Users have the possibility to **read/extract/apply** licenses to G500 using the Licensing option available in the DSAS Configuration Tool.

To access these options:

1. Open **Device Properties** for your DSAS offline device in your project. If one was not created, follow the

   normal workflow to create one.

2. Go to the **Licensing** Tab.
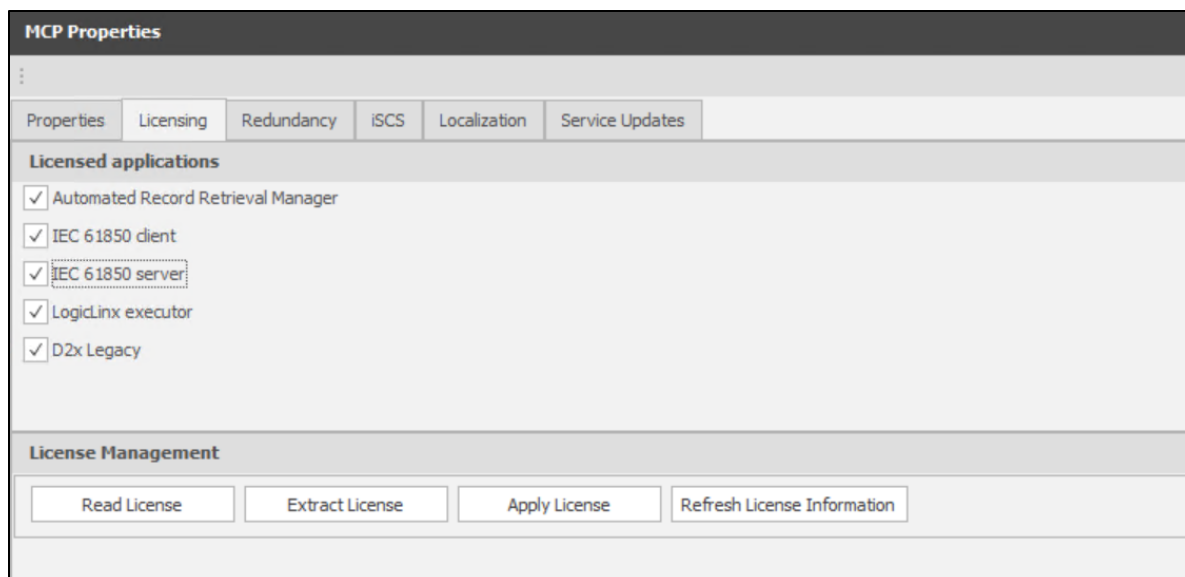
3. Under **License Management**, there are four buttons:

    a. Read License

    b. Extract License

    c. Apply License

    d. Refresh License Information

4. When the user clicks on any of the four buttons, a login dialog is prompted to connect to G500 with **Administrator privileges** (this role is required to access any of the licensing information).

5. After successful authentication, the user is authorized to access the license information. If the user stays within this tab, subsequent button actions will not prompt again to login.

Read License

This option displays the license information of the live target unit (connected G500 device).

Displayed information may be copied to the Windows Clipboard with regular actions (mouse click and drag or CTRL+A to select, right-click or CTRL+C to copy).
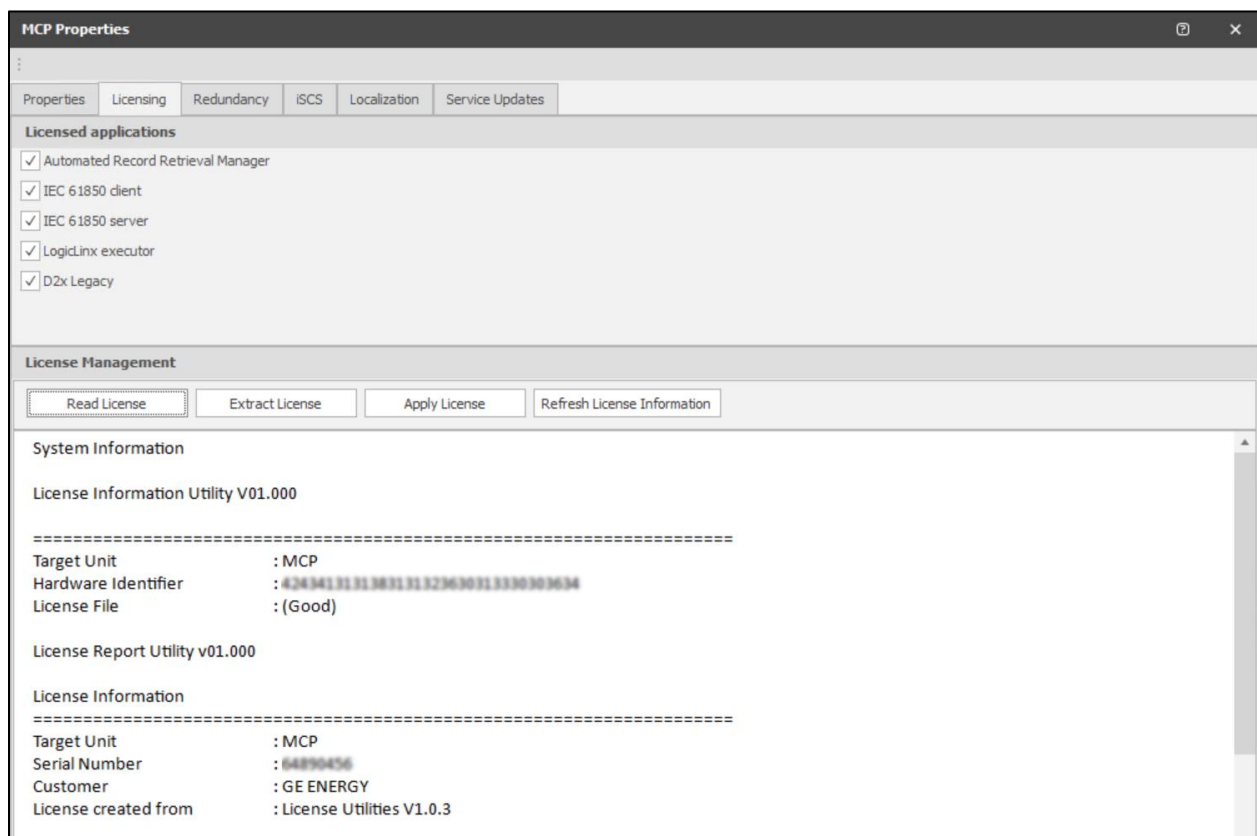
Extract License

This option allows user to extract the current license file from the live target unit to a specified PC location, for example to archive a copy.

The extracted license file is saved as a *****.key file (default name is license but can be changed as desired).

Apply License

This option allows user to apply a compatible license key, from a location in the PC, to the live target unit.

NOTE: The live target unit is restarted at the end of this process, not immediately, and only if a hardware compatible license file was selected.
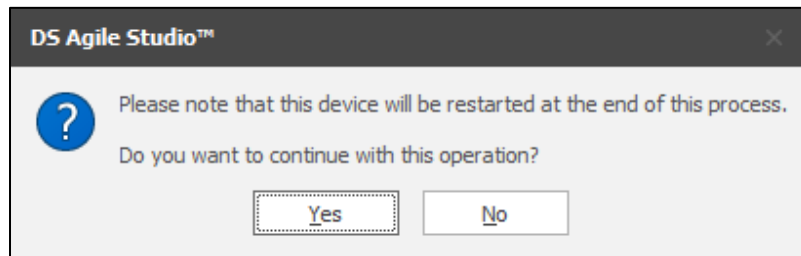
When browsing for the license files, user must select the folder containing one or more license files. The action does not include sub-folders of the selection.

In the resulting dialog only the license files (any filename) that match the Hardware Identifier of the live target unit are displayed for selection. This is the reason why users must first login to the live device as Administrators.
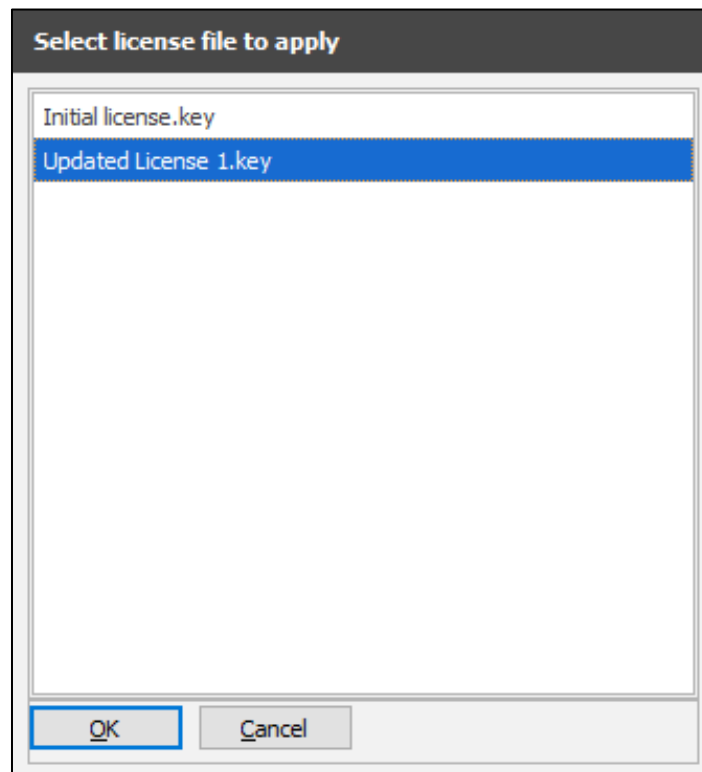
If the selected folder has no license compatible with the connected live unit, an information dialog is presented to this effect:
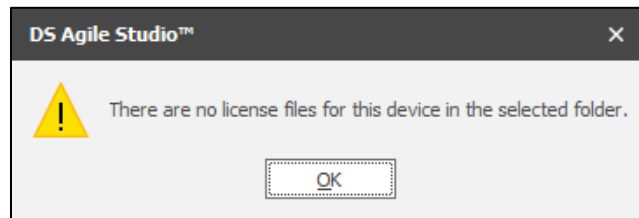
If a valid license file has been selected, it will be applied and the device restarts.
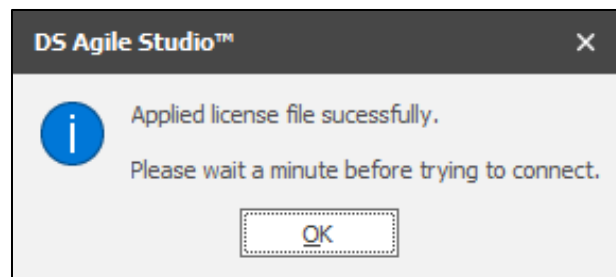
The workflow to apply a license can be cancelled at any time before selecting a valid license and click **OK**.

G500 Runtime HMI

G500 Runtime Human Machine Interface (HMI) is available to view the real time information on G500. With the HMI, a user has the option to monitor the status of a substation network, view data, execute control commands and change the system set-up.

G500 Runtime HMI is available on a local monitor (via the display ports on the rear panel of the G500) and on remote PC's as a standalone application.

The remote G500 Runtime HMI runs as a standalone application.

Install G500 Runtime HMI

The remote G500 Runtime HMI requires **Windows x64** bit OS. This is available via GE support channels and consists of a single installation file named **G500HMI_x64_v.*abc*.exe** – where *abc* represents the version (this must match your G500 firmware version).

Note: Installation of Java/JRE on the Windows PC is not required.

To install the G500 Runtime HMI:

1. Double-click the **SetupG500HMI_x64_*vab*c.exe** install file.

2. Select **OK** at the Windows security prompt.

3. Select **Next** in the installation wizard.

4. Select **Finish** to complete the install.

5. Launch the G500 HMI from the Start Menu or open from the install folder.

Install Location: C:\Program Files\G500 Runtime HMI*abc*\G500HMI_x64_v*abc*.exe

Refer to G500 Substation Gateway Software Configuration Guide (GE Part Number SWM0101) for more details.

Accessing Remote HMI

1. Double-click the **G500HMI_x64_v1.0.exe** file <shortcut> or launch from the start menu.

2. Enter the **IP address** of the G500 (assigned in Task 3).

   - The TCP port of the G500 HMI is always 443. If you need to use a different TCP port, due to the routing rules existing between the PC and G500, you may enter it in the form of IP: TCP, for e.g. 10.10.11.50:30500

3. Login with the user credentials created in Task 2: Create a New Administrator User.

4. Click **Login**.

NOTE: Users can be assigned with different HMI access levels. Refer to G500 Substation Gateway Manual (GE Part Number SWM0101) for additional details.

Remote HMI Auto Login

By customizing a G500 Runtime HMI shortcut, the user can predefine the Login User, IP Address, or Remote Port.

1. Locate the G500 Runtime HMI shortcut.

2. Copy the shortcut to the desktop, or a desired location, or pin it to Taskbar or Start Menu.

3. Right-click on the shortcut and select **Properties**.

4. Add the below parameters to the shortcut at the location **Target** as shown in the below table:

Target Parameters	Shortcut Target content
IP Address	C:\Program Files\G500 Runtime HMI\1.0\G500HMI_x64_v1.0.exe -host 192.168.168.81
IP address & Port (e.g. for local port re-direct) Default port is 443	C:\Program Files\G500 Runtime HMI\1.0\G500HMI_x64_v1.0.exe -host 127.0.0.1 -port 30500
Only Username	C:\Program Files\G500 Runtime HMI\1.0\G500HMI_x64_v1.0.exe -username admin1
Shortcut with All Parameters	C:\Program Files\G500 Runtime HMI\1.0\G500HMI_x64_v1.0.exe -host 192.168.168.81 -port 30500 -username admin1
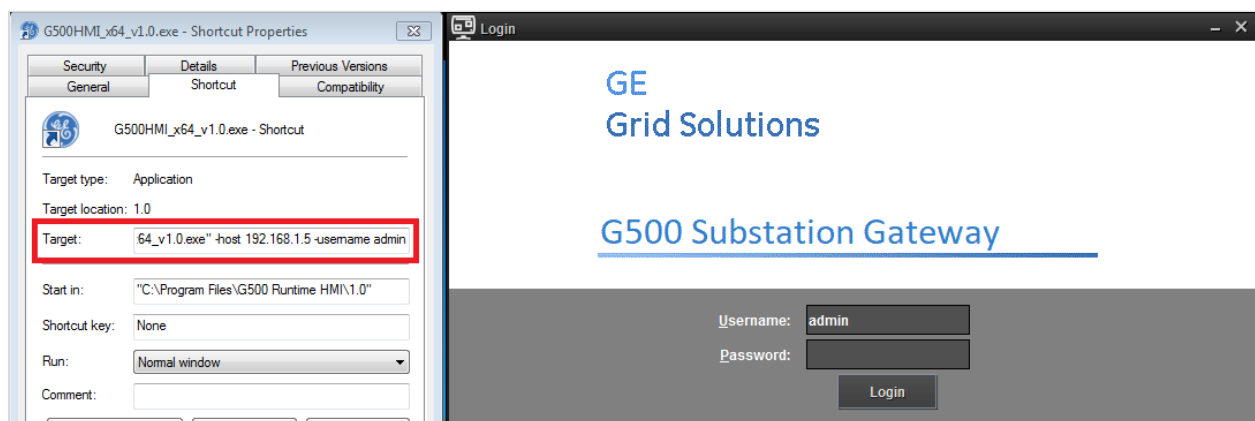
The shortcut properties will display the updated **Target** data that launches the HMI with the IP and pre-defined Username.

5. Double-click the newly created shortcut to launch the G500 Runtime HMI using the parameters configured in the Target.

Accessing Local HMI

1. Local HMI starts automatically when a monitor is connected to the G500 display port on startup.

    If the G500 is configured for **Auto Login**, then the G500 Home Page is launched with the configured user privileges on startup.

2. When prompted, login with the user credentials created in Task 2: Create a New Administrator User.

3. Click **Login**.

> **NOTICE** When you have finished your work, it is suggested to logout from the G500 Local HMI to secure the system. Logging out terminates the respective user session with the G500 and closes all G500 Local HMI displays and windows.
>
> The internal G500 alarm buzzer or alarm audio output is active only when the Local HMI runs. Create a default auto logged on Observer user if the internal alarm buzzer is required to operate in an un-attended mode, and to ensure the Local HMI is not shut down.

Configure Screen Layout

1. Screen Layout and resolutions may be configured using the Screen Layout utility in the Local HMI.
2. The utility can be launched from the Local HMI start menu using G500 → **System** → **Screen Layout.**
3. The minimum resolution supported in the Local HMI is 1280 × 1024 resolution and the recommended resolution is FHD (1920 × 1024) or higher.

Configuring Monitor Layout

G500 Local HMI supports up to 2 monitors using two of its display ports. Display Port 1 (DP1) and Display Port 2(DP2).

When a single monitor is connected, the connected monitor becomes the Primary. Display Port DP1 is primary by default when two monitors are connected, and the desktop is extended to the secondary monitor.

Refer to G500 Substation Gateway Manual (GE Part Number SWM0101) for more details.

Runtime HMI User Preferences

HMI Runtime (Remote/Local) supports the following features. These features are available from the **User** tab of G500 the Power Bar.

Mode of Operation:

- Docked → All windows open within the parent frame.

- Single → A single window is opened at a time in the parent frame, new window replace the previous page.

- Floating → All windows open as independent windows in the desktop area (no parent frame).

Persistency

Windows Persistency is a default feature in Runtime HMI (Remote/Local) which maintains the following independently for each user:

- Persistence of sorting order of the columns, column filters, column width in all the tabular screens or windows.

- Vertical and horizontal re-sizing of all layout boundaries between screen areas of same screen.

- Size and position of all windows in floating mode, except location of child pop up dialogs.

NOTE: Use Reset Persistency option in the Runtime HMI Preferences to clear the persistency state of the windows for the current or all users, or when changing to a lower screen resolution and your persisted windows exceed the screen space. Refer to G500 Substation Gateway Software Configuration Guide/Manual (GE Part Number SWM0101) for more details.

List of Factory Default Open Ports - TCP and UDP

Refer to the following tables for a complete list of TCP/UDP ports opened for inbound and outbound traffic on interfaces of the indicated network zone. Factory default open ports are indicated by a "**Yes"** in the "Enabled by default?" column.

List of Factory Default Open Ports for Inbound TCP/UDP Traffic

Port Numbers	TCP/UDP	Allowed Interfaces*	Enabled by default?	Used for...
443	TCP	Internal	Yes	Sync to/from, Online Editor, PETC, Remote runtime HMI.
22	TCP	Internal	Yes	Snapshot save/restore, shell access to gateway, file transfer with Gateway.
922	TCP	Internal	No	Emergency administrator access, open only when remote authentication configured.
80, 8081	TCP	Internal	Yes	Settings GUI.
8082	TCP	Internal	Yes	Sync to/from, Online Editor
123	UDP	Internal	No	NTP, if configured.
Configurable, default 502	TCP	Internal	No	MODBUS, if configured.
Configurable, default 2404	TCP	Internal	No	IEC 60870-5-104, if configured.
Configurable, default 102	TCP	Internal	No	IEC 61850 MMS Server, if configured
514	UDP	Internal	No	Rsyslog, if configured.
10514	TCP	Internal	No	Rsyslog, if configured.

Port Numbers	TCP/UDP	Allowed Interfaces*	Enabled by default?	Used for...
Configurable, default 20000	TCP/ UDP	Internal	No	DNP3, if configured.
Configurable, default 8001 – 8020	TCP	Internal	No	Pass-through or terminal server, if configured.
Configurable	TCP	External or Internal	No	TLS tunnel for pass through, terminal server or secure connection relay, if configured.
54000	TCP	Internal	No	LogicLinx, if configured.
162	UDP	Internal	No	SNMP, if configured.
Configurable, default 1194	UDP	External or Internal	No	OpenVPN, if configured.
51003	TCP	Internal	No	Standby pointing to active tunnel, if configured (not supported in G100).
51194, 51195	TCP	Internal	No	Secure Tunnel ports for Hot-Hot, Hot-Standby and Warm-Standby redundancy modes (not supported in G100).

*This is the default "Allowed Interfaces" for the indicated port(s). The "Allowed Interfaces" is configurable from the firewall settings.

List of Factory Default Open Ports for Outbound TCP/UDP Traffic

Port Numbers	TCP/UDP	Allowed Interfaces*	Enabled by default?	Used for...
All	TCP/UDP	Internal	Yes	Any outbound traffic on interfaces assigned to internal zone.
22	TCP	External	Yes	Sync manager and ssh/sftp access to remote servers.
922	TCP	External	Yes	Alternate port for ssh/sftp access to remote servers.
389	TCP	External	Yes	Remote authentication requests to LDAP server.

*This is the default "Allowed Interfaces" for the indicated port(s). The "Allowed Interfaces" is configurable from the firewall settings.

List of Factory Default Open Ports for Inbound TCP/UDP Traffic on Predix Edge OS Interfaces

Port Numbers	TCP / UDP	Allowed Interfaces	Enabled by default?	Used for...
22	TCP	Host Net 0 and Edge Manager Interface*	Yes	Predix EdgeOS host shell
80	TCP	Host Net 0 Host and Edge Manager Interface*	Yes	Predix Edge Technician Console (PETC)
443	TCP	Host Net 0 and Edge Manager Interface*	Yes	Predix Edge Technician Console (PETC)
4789	UDP	Host Net 0 and Edge Manager Interface*	Yes	Not Used.

*The Edge Manager Interface is not enabled by default, but can be enabled on any one of the interfaces Net 1, Net 2, Net 5 or Net 6. The Host Net 0 interface is always enabled.

Additional Documentation

For further information about the G500, refer to the following documents:

- G500 Substation Gateway Instruction Manual (994-0152)
- MCP Substation Gateway Software Configuration Guide (SWM0101)
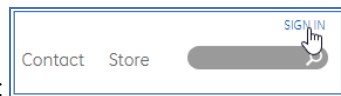
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Modification Record

Version	Revision	Date	Change Description
1.00	0	25th March, 2019	Created.
	1	11th June, 2019	Updated the "Default Root User" section.
1.10	0	14th February, 2020	Updated for G500 V1.10 release. Replaced Initial Setup using mcpcfg to Settings GUI.
	1	4th March, 2020	Added "List of factory default open ports – TCP and UDP" section.
2.00	0	30th March, 2020	Added G500 Snapshot Compatibility section.
2.50	0	20th Sep, 2021	Replaced the GE logo on the first page. Changed the screen showing Maintenance IP to Adapter IP. Updated list of ports.
2.60	0	15th Nov, 2021	Removed Secret Signature content.
	1	17th Dec, 2021	Updated "List of factory default open ports – TCP and UDP" section.
2.80	0	15th June, 2022	Updated the "Checking Licenses" section. Updated the screenshots in DSAS Based Workflow section. Added "IEC 61850 MMS Server" in the table List of Factory Default Open Ports for Inbound TCP/UDP Traffic.
	1	13th July, 2022	Added "List of Factory Default Open Ports for Inbound TCP/UDP Traffic on Predix Edge OS Interfaces" section in List of Factory Default Open Ports - TCP and UDP.