OMRON

Fleet Simulator

User's Manual

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Revision History

Revision code	Date	Revised Content
01	January, 2020,	Original release
02	March, 2020	Update screen shots
03	July, 2020	Update for FLOW 2.0
04	May, 2021	Minor correction and revisions

Chapter 1: Introduction

Fleet Simulator is an operating mode of the EM2100 appliance, used to simulate fleets of OMRON AMRs. The Fleet Simulator can simulate up to three separate fleets with a combined total of up to ten OMRON AMRs. Various features and configurations impact the resources consumed by the simulation, which may result in a smaller number of total fleets and robots being simultaneously simulated.

This user's guide covers the basic procedures for setting up a Fleet Simulator.

Fleet simulation has many uses including:

- Estimating the number of AMRs needed for your facility

- Detecting and avoiding bottlenecks with your facility layout

- Providing practice for your users in the operation of the MobilePlanner software

1.1 EM2100 Operating Modes

The EM2100 can operate in any of the following modes, but only in one mode at a time.

- Fleet Simulator - The operating mode that the EM2100 is in when simulating a fleet of AMRs.

- Standalone Fleet Manager - The operating mode that the EM2100 is in when providing fleet management services, using a single EM2100.

- Paired Fleet Managers - The operating mode that uses one EM2100 (Primary) for providing fleet management services and a second (Secondary) EM2100 for providing backup to the Primary. The two EM2100 appliances are connected (paired).

   NOTE: In a simulated EM2100, the default Operating Mode is Stand Alone Fleet Manager. All other operating modes are disabled. In an actual EM2100, you can select any one of the four appliance modes; however, switching from one mode to another will disrupt the operating mode by rebooting the appliance and unsaved configured data will be lost.

1.2 Features Supported

- Up to three fleets with a combined total of up to ten AMRs can be simulated.

- Fleets of LD-60 AMRs

   The first fleet can run current or legacy software. Fleets 2 and 3 can only run current software.

   SetNetGo 4.x and earlier is legacy. SetNetGo 5.x and later is current.

   The first Simulator fleet can support legacy Mobile Software Suite 4.9.27 software, or current FLOW Core software.

- Fleets of LD-90 AMRs

LD-90 AMRs, which have a different top speed than LD-60 AMRs, can be simulated as LD-60 AMRs with reduced speed. Refer to LD-90 Configuration on page 30

- Fleets of LD-250 AMRs

- Fleets of HD-1500 AMRs

- CAPS (PrecisionDrive)

The Fleet Simulator license includes the CAPS license by default.

The PrecisionDrive task is covered in detail in the FLOW Core User's Manual.

- Advanced Fleet Manager capabilities including the Fleet Operations Workspace Core Integration Toolkit and FLOW iQ

Simulating advanced capabilities requires utilizing the Enterprise Manager version of SetNetGo. When you simulate an Enterprise Manager RunTime image, you can only create one fleet with five AMRs whereas the Robot RunTime image can support three fleets. Installation and operation of the Fleet Operations Workspace Core Integration Toolkit is covered in the *Fleet Operations Workspace Core Integration Toolkit User's Guide (Cat. No. I637)*

- Odometry

- Safety Scanning Laser

- Obstacle avoidance

- Path planning

- Localization

- Battery State of Charge

- Docking

- Job queuing

1.3 Features Not Supported

- Cart Transporters

- Fleet Simulator versions below 6.0.0 do not support the fleets with mixed model AMRs

  Fleet Simulator version 6.0.0 can contain either LD-60, LD-250, or HD-1500 AMRs or a mixture of different AMRs.

- Paired EM2100s (no Secondary EM2100 is supported)

- Acuity Localization

- HAPS (High Accuracy Positioning System)

- Sensors other than the Safety Scanning Laser

1.4 Fleet Simulator Licensing

If you already have an EM2100, and are switching it to Fleet Simulator operating mode, you need to purchase the Fleet Simulator license.

If you do not already have an EM2100, you will need to purchase the Fleet Simulator bundle, which includes an EM2100 with a Fleet Simulator license.

Contact your local OMRON representative or Sales Office for pricing.

Table 1-1. Available Fleet Simulator Licenses

Product	License Type	Product Description	Model
Fleet Simulator Bundle	Perpetual Feature License	EM2100 with Fleet Simulator USB license dongle installed	20271-903
Fleet Simulator License	Perpetual Feature License	Fleet Simulator License, (to be used with an existing EM2100)	20271-804

1.5 How Can I Get Help?

For details on getting assistance with your OMRON software or hardware, you can access the corporate website:

http://www.ia.omron.com.

If you need help beyond what is covered in the manual, contact your local OMRON representative.

Related Manuals

Manual Title	Description
Mobile Robot LD Safety Guide (Cat. No. I616)	Describes safety information for OMRON LD series AMRs.
Mobile Robot HD Safety Guide (Cat. No. I647)	Describes safety information for OMRON HD-1500 AMRs.
LD Platform OEM User's Guide (Cat. No. I611)	Describes the installation, start-up, operation, and maintenance of the LD-60 and LD-90 AMRs.
LD-250 Platform User's Guide (Cat. No. I642)	Describes the installation, start-up, operation, and maintenance of the LD-250 AMR.
HD-1500 Platform User's Manual (Cat. No. I645)	Describes the installation, start-up, operation, and maintenance of the HD-1500 AMR
LD Platform Peripherals Guide (Cat. No. I613)	Covers peripherals for LD AMRs, such as the Touchscreen, Call/Door box, and Acuity Localization options.
Mobile Robots - HD Platform Peripherals Manual (Cat. No. I646)	Covers peripherals for HD AMRs, such as HAPS.
EM2100 Installation Guide (Cat. No. I634)	Describes the installation and initial configuration of an EM2100 appliance.

Manual Title	Description
Fleet Operations Workspace Migration Guide (Cat. No. I636)	Describes the procedures for migrating your AMR from legacy to FLOW Core software, and from an EM1100 to an EM2100.
Fleet Operations Workspace Core User's Manual (Cat. No. I635)	Describes use of the EM2100 and the software that runs on it for managing a fleet of AMRs.
Fleet Simulator User's Manual (Cat. No. I641)	Describes the operation of the Fleet Simulator.
Fleet Operations Workspace/ EM2100 Migration Guide (Cat. No. I636)	Describes how to upgrade or downgrade a system between Legacy and FLOW Core solutions which includes software upgrade processes and tools as well as guidance on any necessary hardware changes.
Advanced Robotics Command Language Enterprise Manager Integration Guide (Cat. No. I618)	Describes the Advanced Robotics Command Language (ARCL) version for use with the EM2100 software. ARCL is a simple text-based command and response server used for integrating the Fleet Operations Workspace Core platform with an external automation system.
Advanced Robotics Command Language Reference Guide (Cat. No. I617)	Describes the Advanced Robotics Command Language (ARCL), which is a simple, text-based language from which you can control Omron's AMRs.
LD Platform Cart Transporter User's Guide (Cat. No. I612)	Describes the operation and maintenance of the Cart Transporter AMR.
Fleet Operations Workspace Core Integration Toolkit User's Manual (Cat. No. I637)	Describes specific tools to simplify integration with factory equipment and material-movement solutions such as manufacturing execution systems (MES) and equipment resource planning (ERP) solutions.

Chapter 2: Fleet Simulator Setup

Before you can start using your Fleet Simulator, there are a number of initial set-up and configuration steps that you need to complete.

What you need to have

- An EM2100 appliance

    - This must be physically installed. See the *EM2100 Installation Guide (Cat. No. I634).*
    - This must have a Fleet Simulator license.
    - This must have a version of Fleet Operations Workspace Core software 1.1 or later.
    - This must have SetNetGo 5.2 or later.

- IP addresses reserved for ten simulated AMRs and three simulated Fleet Managers

    These IP addresses must be static, consecutive, and in the same subnet as the management IP address. You should consult with your IT department on these addresses.

    > **NOTE:** You do not have to create all three fleets or all ten robots. The Fleet Simulator can run with as little as one robot in one fleet.

    > **NOTE:** Regardless of the Enterprise Manager 2100's installation and connections, you still need these IP addresses in the address pool to create simulated fleets.

- If the EM2100 is new to your system, you will also need a network IP address for it, in the same subnet as the management IP address.

- Confirm the timezone setting in the EM2100 is correct for the operating timezone.

- A PC that has access to the EM2100

    You will need the MobilePlanner 5.x software installed on this PC. If you are going to run legacy software for fleet 1, you will also need MobilePlanner 4.x.

    Refer to Install the MobilePlanner Software on page 17.

- A map or maps of the environment that you wish to simulate

    These are best if they are AMR-generated.

    You will need a map for each fleet that you are simulating.

    Refer to Scans and Maps on page 23.

What you need to know

You should have a working knowledge of MobilePlanner software.

You should have a working knowledge of SetNetGo software.

NOTE: Both of these are covered in the *Fleet Operations Workspace Core User's Manual (Cat. No. I635).*

2.1 Fleet Simulator Installation Overview

The Fleet Simulator runs under SetNetGo on an EM2100 appliance. It requires a Fleet Simulator license.

The next two sections provide instructions for setting up an EM2100 as a Fleet Simulator.

NOTE: This manual assumes that you have read and followed the instructions in the *EM2100 Installation Guide (Cat. No. I634).*

Preliminary Tasks

Before you can start using your Fleet Simulator, there are some initial set-up and configuration steps you need to complete.

- Install the MobilePlanner software on your PC.

  Refer to Install the MobilePlanner Software on page 17.

- Create a map for each fleet you are going to simulate.

  It is possible to use the same map for more than one fleet.

  Refer to the *Fleet Operations Workspace Core User's Manual (Cat. No. I635)* for instructions on the use of MobilePlanner and making maps.

2.2 Installation on a New EM2100

A new EM2100 appliance, purchased as part of a Fleet Simulator bundle, will come pre-loaded with all necessary software. You will need to download the MobilePlanner software onto your PC.

Refer to the *EM2100 Installation Guide (Cat. No. I634)* and the *Fleet Operations Workspace Core User's Manual (Cat. No. I635).*

Set the Static IP Address on Your Client PC

1. In the command field on the Windows taskbar, enter the following command to open the Network Connections dialog: **ncpa.cpl**.

2. Open the network properties of the PC ethernet network adapter, used to connect to the Maintenance Ethernet port on the EM2100 appliance.

3. Double-click TCP/IPv4 to open the Internet Protocol properties dialog.

4. Enter an IP address in the range 1. 2. 3. 1 to 1. 2. 3. 254, excluding 1. 2. 3. 4. (this is reserved for the Maintenance port).

5. Enter as the subnet mask: 255. 255. 255. 0.

6. Click **OK** to close the Internet Protocol dialog, and then click **OK** to close the Ethernet Adapter dialog.

Set the Management IP Address of the EM2100

1. Connect an Ethernet cable from the client PC's Ethernet port to the Maintenance Ethernet port (MAINT ETH0) on the EM2100 appliance.

2. Use a web user interface to access the SetNetGo interface.

3. Configure the Management Interface settings for the EM2100 MGMT ETH1 Ethernet port.

   a. Select **Network** > **Management Interface**.

   b. Enter a valid, available IP address for the EM2100 in the **IP Address** field.

      > **IMPORTANT:** You must assign a static IP address. Do not use a DHCP server.

      Do not use the IP address 1.2.3.4, because this would create a conflict with the IP address permanently set for the Maintenance Ethernet port.

   c. Enter the appropriate subnet mask for a host on your network in the **Netmask** field.

   d. Enter the IP address of the default **Gateway**. (This is the IP address of the device used to connect to your network, typically a router.)

   e. Enter the IP address of your Domain Name Server (**DNS1**), if applicable.

      Leave it at 0.0.0.0 otherwise.

   f. Click **Apply**.

      If you click **Reset** rather than **Apply**, it will restore the previous values, without your changes.

4. Connect the EM2100 MGMT ETH1 port to your network.

2.3 Installing on an Existing EM2100

This section assumes that you have an operative EM2100 that is connected to your network, that you already have a fleet, and that you have a map of the environment that you want to simulate.

If your Enterprise Manager 2100 was purchased as a preconfigured Fleet Simulator, it will already have the software and license, so this section can be skipped.

The setup for this type of installation consists of:

- Upgrading the Fleet Operations Workspace Core software to at least version 1.1.x on the EM2100

  Earlier versions of this software will not support the Fleet Simulator.

- Upgrading SetNetGo to at least version 5.2 on the EM2100

- Adding a Fleet Simulator license to your license dongle, which is inside the EM2100

Refer to Software Installation on page 17.

NOTE: Before starting this procedure, ensure that the MGMT ETH1 connection is configured and connected to your network.

NOTE: In the unlikely event that there are pre-existing fleets on the EM2100, they will need to be destroyed and rebuilt before the new license can be used.

Adding a Fleet Simulator License

This procedure requires you to generate a Customer-to-Vendor (C2V) file, send that file to your local OMRON representative, and receive a Vendor-to-Customer (V2C) file back.

1. In SetNetGo on your EM2100, click on the **Licensing** tab.
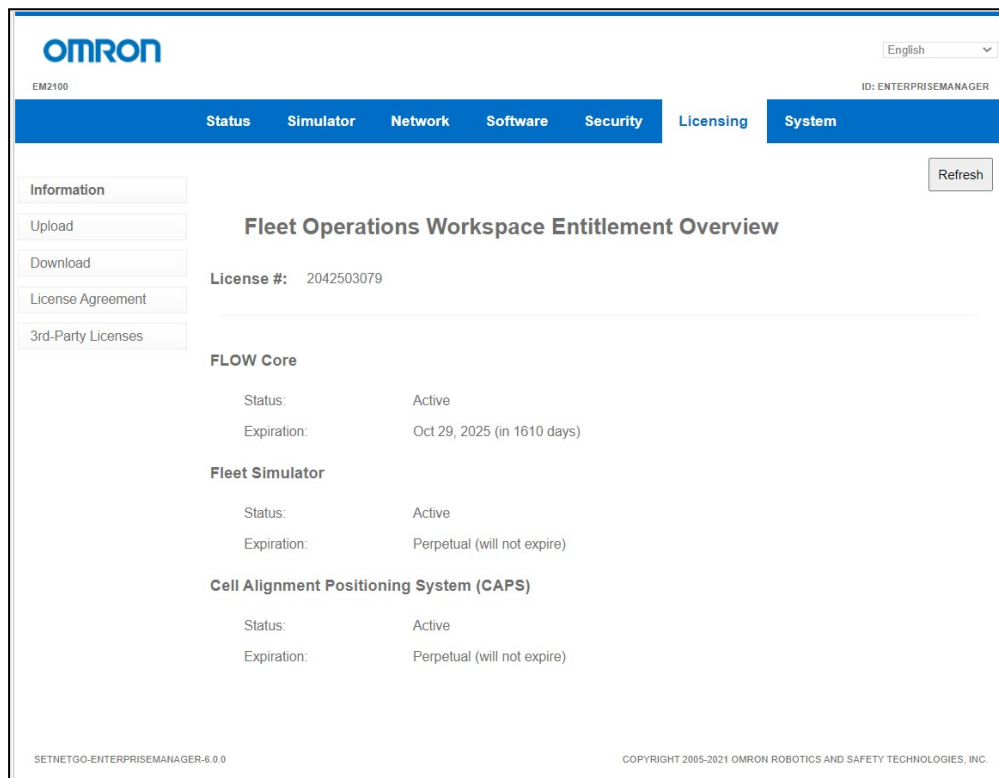

Figure 2-1. Licensing Tab, Information Section.

2. Click on **Information** if it is not already open, and make a note of the License #.

    The C2V file that you create next will be named with the format 1234567890-MMM-DD-YYYY.C2V (e.g. 7769436109-MAY-21-2019.C2V).

3. From the **Download** tab, click the **Download** button.

    This will initiate a download of the C2V file, which you will need for obtaining a V2C file from your local OMRON representative.

4. Contact your local OMRON representative with your C2V file. The representative will return a V2C file to you.

5. After you receive the V2C file, select **Upload** within the **Licensing** tab.

6. Click **Choose File**, then select the V2C file using the window that pops up.

   The text "Choose File" is browser-dependent, and may be different on your system.

7. Click **Upload File**.

   This will write the Fleet Simulator license onto your license dongle. The dongle is inside the EM2100.

8. If you will be supporting a legacy fleet, plug in the external Fleet Simulator dongle that is required to support those fleets.

Chapter 3: Software Installation

The Fleet Operations Workspace Core software runs on the EM2100 appliance.

The Fleet Simulator software is accessed through SetNetGo, and runs on the EM2100.

MobilePlanner runs on the user-supplied PC.

3.1 Install the MobilePlanner Software

Before running the Fleet Simulator, you will need to install MobilePlanner on your PC. This software is the primary interface to the simulated Fleet Managers and AMRs, and allows programming of the AMR fleet.

System Requirements

Verify that your PC meets the following requirements before installing MobilePlanner:

- **OS**: Windows 7 (32-bit/64-bit), Windows 8 (32-bit/64-bit), or Windows 10 (32-bit/64-bit).
- **CPU**: 1.5 GHz Dual-core minimum.
- **RAM**: 1.5 GB minimum, 4 GB recommended.
- **GPU**: 256 MB minimum.
- **HDD/SSD**: At least 250 MB available space.
- **Monitor**: XGA 1024 x 768.

Installing MobilePlanner

Ensure that your PC meets the system requirements, then install (or download and install) MobilePlanner.

> **NOTE:** The MobilePlanner software installs into a MobilePlanner5 directory. This allows you to have MobilePlanner 5.x and MobilePlanner 4.x installed concurrently to interact with fleets of both generations.

> **Version Information:** Only MobilePlanner software version 5 or higher is compatible with Fleet Operations Workspace Core. It is not compatible with earlier Omron fleets running on Mobile Software Suite version 4.X or earlier.

1. Use one of the following methods to download and/or install the MobilePlanner software:

    A. By **USB drive**: Insert the software media (USB drive that includes documentation) into your PC, and browse the USB drive to locate and install the software.

    B. From **SetNetGo:** When directly connected to the AMR via Ethernet, you can open SetNetGo, click the **Software** tab, and install MobilePlanner.

Go to **ManagedInstalledSoftware** > **MobilePlanner** and click the underlined "here" link.

C. From your EM2100: Use **Software** > **Manage Installed Software** > **MobilePlanner** > **It can be downloaded here**. (Click on the "here" link in the EM2100 user interface, shown near the bottom of the following figure.)
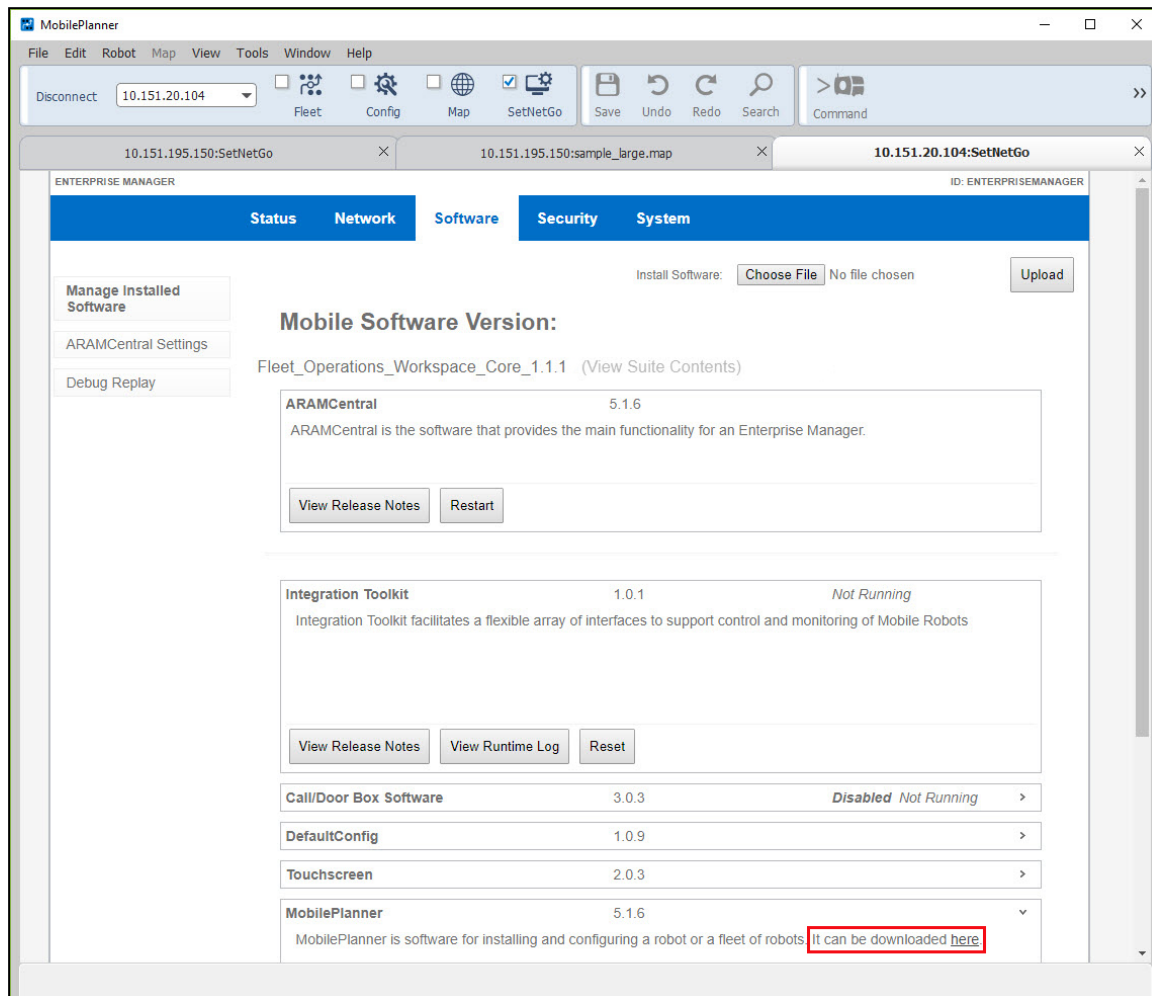

Figure 3-1. Manage Installed Software Screen, Showing "download here" prompt.

D. By **download:** Contact your local OMRON representative for assistance with downloading MobilePlanner software.

E. By **download:** From the internet

    a. Go to robotics.omron.com.

    b. Click on your region in the map.

    c. Hover over the **Support** tab.

    d. Click **Software Library**.

    e. Click **Mobile**.

    f. Click **Current** (or **Legacy** if you want 4.x).

2. Launch the installer and, when the welcome screen appears, follow the prompts in each installation wizard window to complete the installation.

   If you used SetNetGo or downloaded the software, this will usually be in your Downloads folder. The actual location is determined by the settings in the browser that you use.

3. Click **Finish** when done.

3.2 Fleet Simulator

The software that supports the Fleet Simulator runs under SetNetGo on the EM2100 appliance.

If you purchased the Fleet Simulator bundle, including the EM2100 appliance, this software will already be loaded onto the EM2100.

If you already have a fleet, and are switching to Fleet Simulator operating mode, you may need to update your Fleet Operations Workspace Core software and SetNetGo on the EM2100 to have support for the Fleet Simulator. You will also need to have the Fleet Simulator license installed in the Enterprise Manager 2100.

1. Install SetNetGo 5.2 or later in the **System**> **Upload SetNetGo OS** tab.

2. Boot into the SetNetGo that you installed in the previous step.

3. Install Fleet Operations Workspace Core 1.1 in the **Software**> **Manage Installed Software** tab.

Updating the Fleet Operations Workspace Core Software

1. Contact your local OMRON representative for an updated Fleet Operations Workspace Core package.

   You can also download this from our web site. Refer to Installing MobilePlanner on page 17.

2. From your browser of choice, connect to SetNetGo on the EM2100, click the **Software** tab, then click **Manage Installed Software** from the left side list.

   This connection is preferably through the maintenance port at 1.2.3.4, though connecting through the network is also possible.
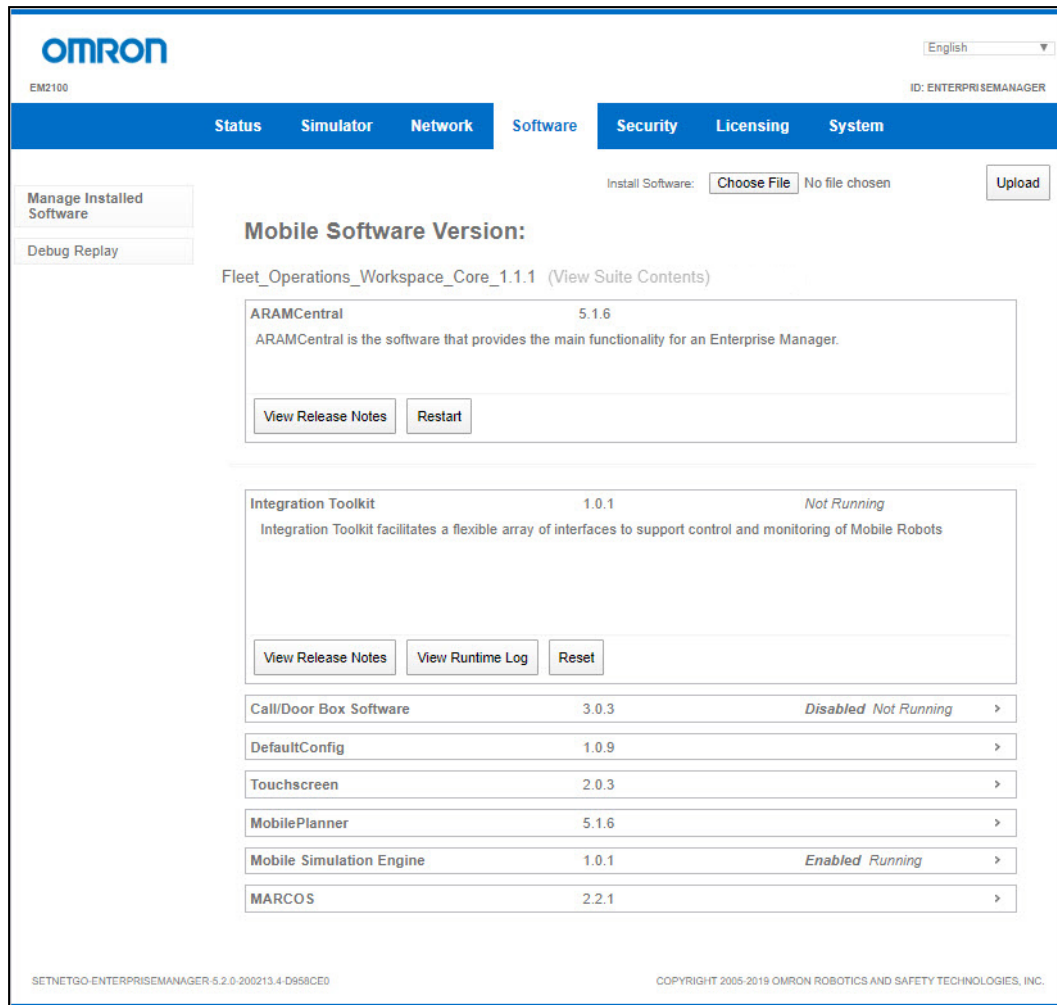
Figure 3-2. Software, Manage Installed Software.

3. Click the **Choose File** button to access the folder where the update file is located, and click Open.

   The prompt "Choose File" is browser-dependent, and may be different on your browser.

4. Confirm that the correct file name is listed next to the **Choose File** button, then click **Upload**.

5. If you are certain you want to proceed, click **OK**.

If the installation was successful, the new Mobile Software version appears in **Manage Installed Software**.

3.3 Configure Fleet Simulator Settings

Set the EM2100 Operating Mode to Fleet Simulator

1. Using a web browser, access the SetNetGo interface.

2. Click the **System** tab, select **Mode**, then select **Fleet Simulator**.

3. Click **Apply,** which will display two warning pop-ups.

   > **IMPORTANT:** The two warning pop-up windows inform you that EM2100 will reboot and interrupt the Fleet Management, and any unsaved configuration data will be lost. EM2100 does not run the two operating modes at the same time. When setting the EM2100 operating mode to the Fleet Simulator mode, read both warnings and save any configuration data before pressing OK to continue. Responding OK to both warnings will reboot EM2100.

   At this time, **Status** > **Home** > **Mode of Operation** should show Fleet Simulator.

4. Configure the IP Address Pool settings, described in the following section.

Configure the IP Address Pool

1. Select **Network** > **IP Address Pool**.

   This will display **IP Settings** for simulated Fleet Managers and AMRs.

2. Enter the lower and upper IP addresses in the range that you reserved for the Fleet Simulator in the **IP Range** fields.

   > **IMPORTANT:** These must be consecutive, static IP addresses. Do not use a DHCP server.

   The Netmask and the Gateway values will default to the Management Interface values. You cannot change them here.

3. Click **Apply**.

   If you click **Reset** rather than **Apply**, it will restore the previous values, without your changes.

A message dialog informs you of the status of the change, and whether there is any impact on operations, such as a restart or a time delay before the change takes effect.

Chapter 4: Fleet Simulator Operation

The Fleet Simulator software is configured through SetNetGo, while the individual simulated fleets are controlled with MobilePlanner.

The SetNetGo user interface that supports the Fleet Simulator cannot be accessed through MobilePlanner. You need to access the SetNetGo user interface that supports the Fleet Simulator through a web browser. You will need to enter the previously-configured IP address of the EM2100 Management Interface in a web browser to get access to the Fleet Simulator software.

4.1 Scans and Maps

Map Overview

The Fleet Simulator software requires a map of the environment in which each fleet will operate. These should be generated by an AMR. The Fleet Simulator software comes with a sample map to get you started, but it will not represent your AMR operating environment.

When fleets are created a default map is assigned to each fleet. After the fleet is created and running, then you can change the map.

If you do not have access to an AMR, contact your local OMRON representative.

Maps are one of the most important features of fleet management. In MobilePlanner, a map is a scanned representation of the floor plan in the AMR's operating space. Maps contain the static features in the AMR's environment, such as walls, doors, permanent shelving, etc. They also contain user-definable sectors, lines, and areas that help the AMR perform its job.

Scan Overview

If you have a real fleet and are going to simulate an area for which you already have a map, you can use that map.

The procedure for creating a scan using an AMR and converting that into a map for use with your fleet is covered in the *Fleet Operations Workspace Core User's Manual (Cat. No. I635)*.

If you do not have access to an AMR, it is possible, with assistance from your local OMRON representative, to use a CAD model of your facility.

4.2 Running the Fleet Simulator

The Fleet Simulator configuration is accessed through the Simulator tab in SetNetGo.

> **IMPORTANT:** This tab is only displayed when the EM2100 is in Fleet Simulator operating mode. In this mode, MobilePlanner cannot access SetNetGo.

1. In your web browser, enter the IP address of the EM2100. SetNetGo will open.
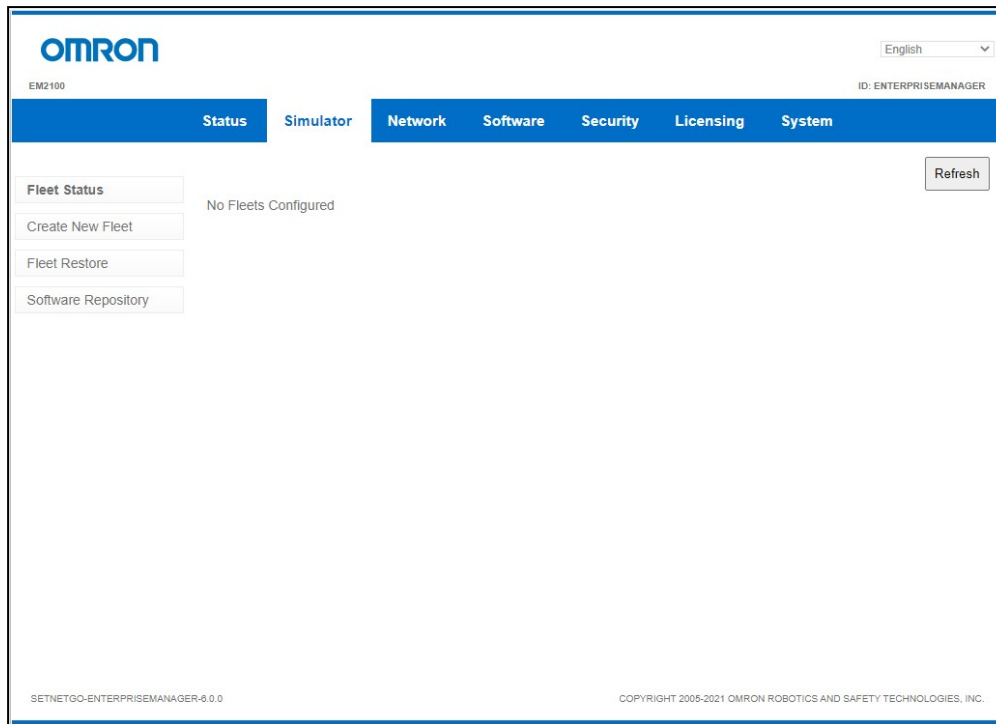
2. Click on the Simulator tab.

Figure 4-1. SetNetGo, Showing Simulator Tab.

Fleet Status

This will show the names of all virtual fleets that have been created and configured. If no fleets are configured, the Fleet Status page will display "No Fleets Configured."

- Status: Displays one of the following:

    - RESERVED - The fleet has been created, but not Started.
    - RUNNING - The fleet has been created and Started.
    - STOPPED - The fleet was RUNNING and then Stopped.

- Created: Shows the date and time that each fleet was created.

- Name: Shows the name that the creator assigned to the fleet.

- Fleet Manager IP Address: The address that was assigned to this virtual Fleet Manager.

- Robots: Shows the number of virtual AMRs in this fleet, their assigned names, and IP addresses.

- Control Fleet lets you Start, Stop, Destroy, or Save a fleet.

    Save (and Restore) are covered in Fleet Save and Restore on page 27.

    Refer to Figure 4-6.

Start

The **Start** button in the Fleet Status window applies the changes that you have made to the fleet. The fleet Status will change from RESERVED to RUNNING.

Stop

The **Stop** button in the Fleet Status window stops the fleet, and changes the fleet status from RUNNING to STOPPED.

Destroy

The **Destroy** button in the Fleet Status window will destroy the selected fleet, and the destroyed fleet will no longer appear on the Fleet Status page. This function can be applied to a fleet in RESERVED, RUNNING or STOPPED status.

Create New Fleet

You will need to:

- Select the number of AMRs to simulate in this fleet.

- Name the fleet.

  The fleet name can contain alphanumeric characters as well as dash, underscore, and period. It cannot contain spaces or other special characters.

- Select the type of AMR to be simulated.

Figure 4-2. AMR Selection Dropdown

Available Fleets

This displays fields that let you choose from the available fleets and robots, name the new fleet, and choose the robot type for this fleet.

Next Available Fleet: This shows the next fleet number available for creation. If this is blank, It displays "No Fleets Available" when all three fleets have been created.

Name: Type in a name for this fleet.

Initial Software Packages: (Fleet_Operations_Workspace_Core_1.1.x.tar.gz or later)

This is the package that will be used by fleets when created. This is installed in the **SimulatorSoftware** > **Software RepositoryManage Installed Software**tab of the host EM2100.

Robots: LD-60 or LD-250 (for LD-90 fleets, use LD-60), and HD 1500

LD-90 AMRs can be simulated by selecting LD-60 AMRs, and modifying certain parameters. Refer to LD-90 Configuration on page 30

Figure 4-3. Available Fleets Screen.

Localizing Robots

After you have started your fleet and connected to the simulated Fleet Manager through MobilePlanner, you can localize the simulated AMRs at parking standbys on the map with the following command:

- In MobilePlanner, select **EnterpriseManagerFleetLocalizeAtParking** from the **Command** drop-down bar.

- You can add a string prefix in the input window in front of the command, which will limit the parking standbys chosen to those that begin with that prefix.
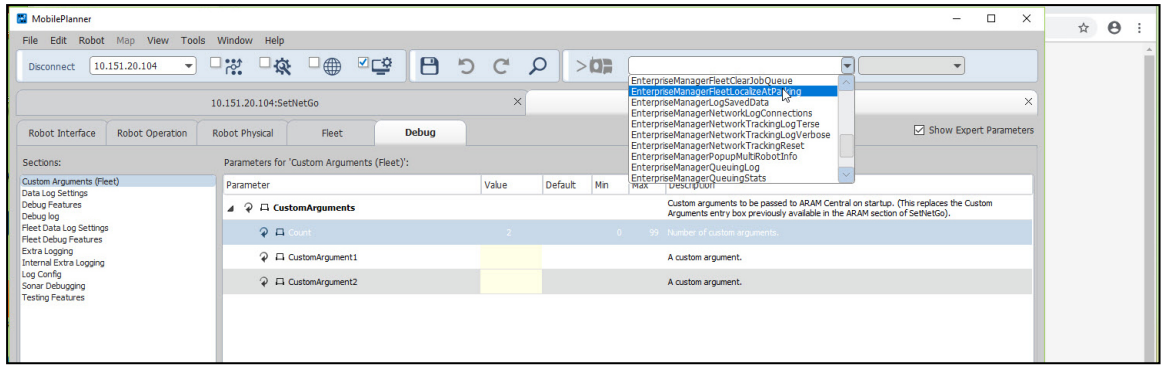
Figure 4-4. Command Drop-down.

> **NOTE:** You can hide or un-hide the Command portion of this bar by right-clicking in the bar, then checking or un-checking Custom Commands.

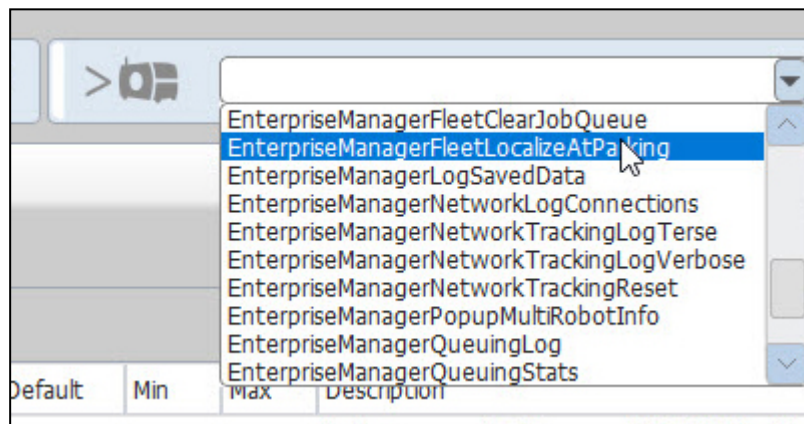This command will continue until it runs out of either AMRs or parking standbys.

Figure 4-5. EnterpriseManagerFleetLocalizeAtParking in Command Drop-down.

Fleet Save and Restore

The Fleet **Save** and **Restore** functions allow you to Save and Destroy a fleet without permanently losing the fleet configuration.

> **NOTE:** A fleet can only be saved if it has STOPPED status.

Save

You can save the configuration for your fleet by clicking the **Save** button in the **Fleet Status** > **Control Fleet** section, shown in the following figure.
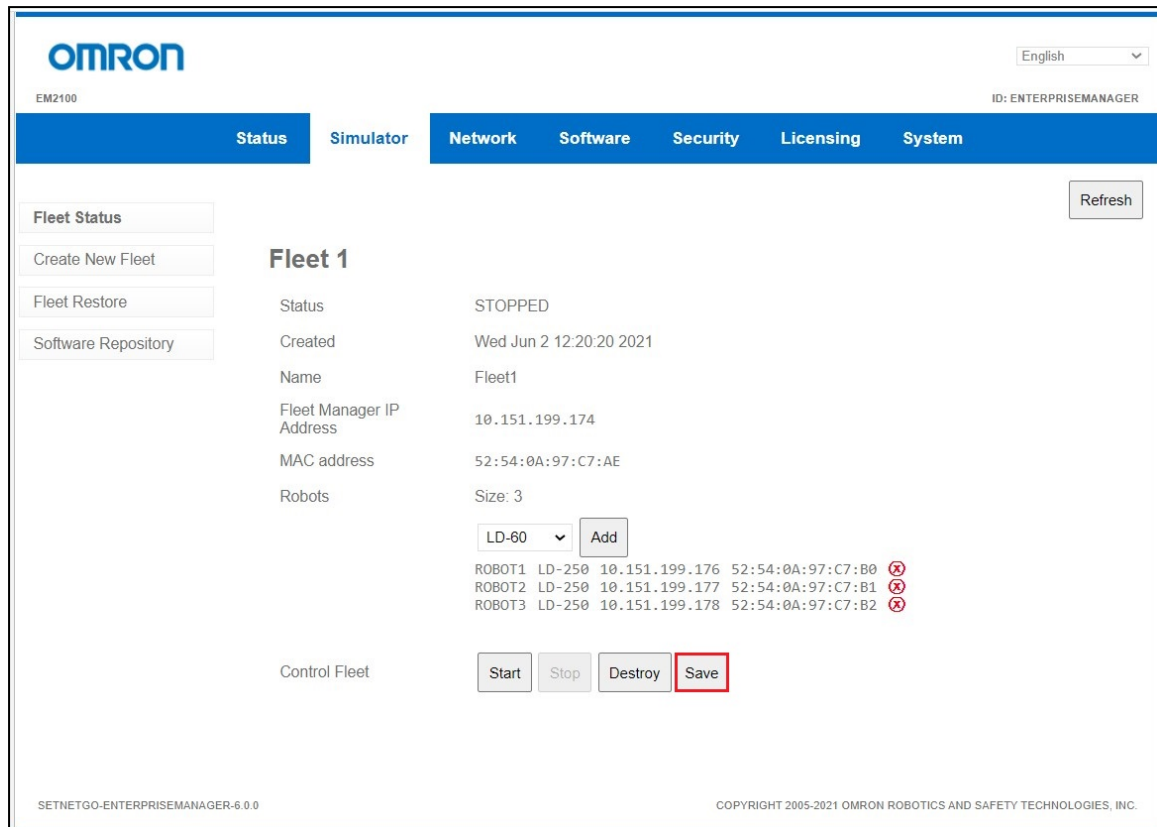
Figure 4-6. Save Button.

Restore

If you have previously saved a fleet, you can restore it with **Simulator** > **Fleet Restore**.

This requires that you have an available fleet and enough available AMRs for the fleet that you are restoring.

1. Click **Choose File**.

2. Select the desired FleetSave-<date>.tar.gz file.

3. Click **Upload File**.

Software Repository

This is where the OS image (SetNetGo version and Fleet Operations Workspace) that will be used for the simulated AMRs and Fleet Managers is stored.

To install a new image:

1. Click **Choose File**.

2. Select the intended SetNetGo runtime.

3. Click **Upload File**.

The EnterpriseManager RunTime image is larger than the Robot RunTime image, which can cause problems when using large maps. If you will not be using the Integration Toolkit, you can use the Robot RunTime image to conserve memory. If you will be using the Integration Toolkit, you need to use the EnterpriseManager RunTime image.

> **NOTE:** The two RunTime files, EnterpriseManager RunTime and Robot Run-Time have one key difference. The EnterpriseManager RunTime supports the Fleet Operations Workspace Core Integration Toolkit whereas the Robot Run-Time does not support the Fleet Operations Workspace Core Integration Toolkit. If you simulate a fleet using the EnterpriseManager RunTime, there is slightly more RAM and it can run Fleet Operations Workspace Core Integration Toolkit, but after SNG 6.0.0, you will be limited to only running one fleet.

If you are using a large or complex map, it can limit the amount of memory available for simulation, and you may not be able to simulate all ten robots and three fleets. You can use different images to simultaneously simulate different software versions. This is also needed if you want to simulate legacy software on fleet 1.

Changing Software Packages

You can install a different software version on a fleet that has been generated by uploading the desired software package to the virtual Fleet Manager with the **Software** > **Manage Installed Software** tab of the virtual EM2100. This version will also be applied to the simulated AMRs in this fleet. If this is done, it will only change the version on the selected simulated Fleet Manager, not the host EM2100.

The note about 4.x software in the red rectangle in the following figure is regarding special capabilities of Fleet 1. For all three simulated fleets, you can generate and start the fleets with the previously discussed 'initial software package'. You can, with these three fleets, install any given version of Fleet Operations Workspace Core by doing so directly on the simulated Fleet Manager. For Fleet 1, you can also install versions 4.9.27+ of the Mobile Suite directly to the simulated Fleet Manager of Fleet 1. Only Fleet 1 is capable of this feature, due to licensing limitations.

> **NOTE:** If you will be simulating a legacy fleet, you need to change the Smooth-ingWt parameter to 0.0 to avoid odd behavior under legacy. 1.0 is the default for this parameter under FLOW. If you have imported the configuration from a real 4.x fleet, this will overwrite the FLOW defaults with the correct values for 4.x.

If you want to simulate a fleet running legacy software (MSS 4.9.27-A or later), an additional physical license dongle is required. If you purchased the Fleet Simulator bundle, that additional license dongle is already programmed and inserted in an external USB port of your EM2100.
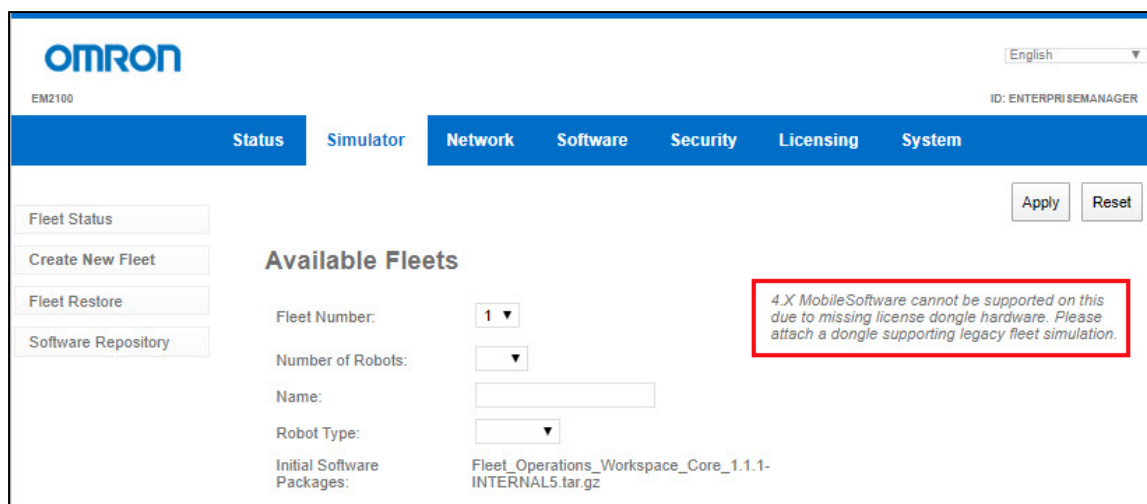
Figure 4-7. Available Fleet, Showing Legacy Software Note.

4.3 LD-90 Configuration

This section gives the parameter settings needed to simulate an LD-90 AMR, starting with an LD-60 AMR.

The only two parameter sections that need to be modified are Section Robot Config and Section Absolute Movement Maximums.

The number that immediately follows each parameter is the default value.

Section Robot Config

TransVelMax 1350 ; range [1, 2500]

Maximum translational speed (in mm/sec) of the robot. This value cannot exceed the physical limitations of the platform. The *TransVelMax values in other sections will be quietly capped at this value.

TransNegVelMax -210 ; range [-280, -1]

Maximum negative translational speed (in mm/sec) of the robot. This value cannot exceed the physical limitations of the platform. The *TransNegVelMax values in other sections will be quietly capped at this value.

TransAccel 500 ; range [1, 2000]

Default translational acceleration (in mm/sec/sec) of the robot. The *TransAccel values in other sections can override this value.

TransDecel 500 ; range [1, 2000]

Default translational deceleration (in mm/sec/sec) of the robot. The *TransDecel values in other sections can override this value.

RotVelMax 140 ; range [1, 180]

Maximum rotational speed (in deg/sec) of the robot. The *RotVelMax values in other sections will be quietly capped at this value.

RotAccel 270 ; range [1, 360]

Default rotational acceleration (in deg/sec/sec) of the robot. The *RotAccel values in other sections can override this value.

RotDecel 270 ; range [1, 360]

Default rotational deceleration (in deg/sec/sec) of the robot. The *RotDecel values in other sections can override this value.

Section Absolute Movement Maximums

AbsoluteMaxTransVel 1350 ; range [1, 2500]

Absolute maximum forward translational speed (in mm/sec) of the robot platform. This value will not be exceeded by the robot under any operating conditions.

AbsoluteMaxTransNegVel -210 ; range [-2500, -1]

Absolute maximum backward translational speed (in mm/sec) of the robot platform. This value will not be exceeded by the robot under any operating conditions.

AbsoluteMaxTransAccel 1000 ; range [1, 2000]

Absolute maximum translational acceleration (in mm/sec/sec) of the robot platform. This value will not be exceeded by the robot under any operating conditions.

AbsoluteMaxTransDecel 2000 ; range [1, 2000]

Absolute maximum translational deceleration (in mm/sec/sec) of the robot platform. This value will not be exceeded by the robot under any operating conditions.

AbsoluteMaxRotVel 180 ; range [1, 180]

Absolute maximum rotational velocity (in deg/sec) of the robot platform. This value will not be exceeded by the robot under any operating conditions.

AbsoluteMaxRotAccel 360 ; range [1, 360]

Absolute maximum rotational acceleration (in deg/sec/sec) of the robot platform. This value will not be exceeded by the robot under any operating conditions.

AbsoluteMaxRotDecel 360 ; range [1, 360]

Absolute maximum rotational deceleration (in deg/sec/sec) of the robot platform. This value will not be exceeded by the robot under any operating conditions.

Chapter 5: Glossary and Definitions

The following table lists acronyms and abbreviations, and defines key terms found in this user guide:

Term	Definition
AMR	Autonomous Mobile Robot
ARCL	Advanced Robotics Command Language. A simple, text-based, command-and-response operating language. Used with the Fleet Manager, ARCL can help manage a fleet of AMRs.
Dock	Map location where the AMR "looks for" the charging station. Dock map icon should be 1 to 1.5 meters in front of the charging station, with the dock icon's black line pointing to the charging station.
EM2100	A network appliance that hosts the Fleet Operations Workspace Core software.
Fleet	A group of AMRs that operate in the same area, share the same map, and are controlled by one Fleet Manager.
Fleet Manager	The set of capabilities within the Fleet Operations Workspace Core software that executes all fleet management activities. These include the management of maps, AMR configuration, job queue management, and traffic coordination.
Goal	Map-defined virtual destination(s) for AMRs (e.g., pickup or drop-off points).
Job	An AMR activity, usually consisting of either one or two "job segments". (either PICKUP or DROPOFF).
License Dongle	A USB device that contains the software license key required to run a licensed program.
MobilePlanner	The primary software application for programming AMR actions.
SetNetGo	Software OS, resides on AMRs and the EM2100 appliance. Used to configure AMRs' communication parameters.

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