

# Load generators over a firewall LRE 2021 R1

## Installation Guide for Micro Focus SaaS Customers



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## 1 Document Purpose and Target Audience

The “Load generators over a firewall - LRE 2021 R1 Installation Guide” assists Micro Focus SaaS customers in performing new Windows-based load generators over a firewall setup located in their own networks. These setups are often also referred to as “On-premises Load Generators” (OPLGs).

Note that this guide does not attempt to include all potential setup situations. Instead, it focuses on the process and typical aspects of the OPLG installation.

The target audience of this document is technical personnel of Micro Focus SaaS customers who are involved with operating load tests within LRE or later and/or installing and maintaining load generators in their own network that are connected to Micro Focus SaaS LRE environments. The audience typically includes load test specialists, QA lab managers, and QA managers.

## 2 How to use this guide

The recommended installation procedure consists of 5 phases to be followed in sequence. This guide provides a chapter for each phase.

**“5.1 Prerequisites”** lists typical steps of preparation that are required before the actual load generator software can get installed. Performing these is crucial for a successful install later.

**“5.2 Micro Focus SaaS Request”** describes which pieces of information to give to and which to obtain from Micro Focus SaaS before the installation can commence. This request is used in deployment option 2, as outlined in chapter 5.2.

**“5.3 Installation”** walks through the actual installation of the load generator, including the latest patches.

**“5.4 Configuration”** guides through the parameters to be configured on the load generator after installation.

**“5.5 Notifying SaaS and Finalizing the Setup”** allows Micro Focus SaaS to finish the setup in LRE with you. For any potential troubleshooting at the end of the process please first refer also to our other document, “Load generators over a firewall - LRE 2021 R1 Troubleshooting Guide”.

### 3 Terminology/Glossary

#### **LoadRunner Enterprise (LRE)**

The new name for Performance Center (PC).

#### **OneLG**

The load generator installation package for all LoadRunner family products.

#### **Load Generator Over The Firewall**

A load generator that is located inside the customer's network and connected to a Micro Focus SaaS LRE instance for the purpose of performance testing. Most load generators get installed on Windows through the "Standalone Load Generator" setup. They are maintained by customer personnel rather than Micro Focus SaaS personnel.

#### **On-premises Load Generator**

Another term used for a standalone load generator in the customer environment.

#### **Private Load Generator**

Another term used for a standalone load generator in the customer environment.

#### **Host**

A machine that acts as a standalone load generator.

#### **Agent Configuration**

An application installed on the host that is used to configure the specific load generator. It is typically accessible through "Start/All Programs/Micro Focus/Load Runner/Advanced Settings/Agent Configuration".

#### **Agent Service (Agent)**

A Windows service ("LoadRunner Agent Service") that runs on the host to connect it to Micro Focus SaaS LRE. In rare cases, the load generator is alternatively installed as a process instead that needs to be started by a logged in user.

#### **Firewall**

In the context of this document, we refer to the firewall(s) in the customer's network that typically separate(s) the load generator hosts from the internet.

#### **MI Listener (MIL)**

An MI Listener is a server located in the Micro Focus SaaS network that acts as a proxy to connect the customer's load generators with LRE in the Micro Focus SaaS datacenters. Each host must be

configured in the Agent Configuration to point to that MIL (by entering the public DNS name of the MIL into the “MI Listener” field).

### **Standalone Load Generator**

This is the software package initially installed when deploying a load generator over a firewall. Application of the latest patches available for download on your LRE instance might also be required, as described in detail later in this document.

## 4 Start Here

### 4.1 Prerequisites

Before a successful installation and configuration of load generators over a firewall can take place, it is necessary to follow certain brief steps of preparation as outlined below.

#### 4.1.1 *Determining the location of your host(s)*

First, decide on the specific location of the load generator(s) you want to use, based on your testing objectives, network topology, and available hardware.

#### **SaaS Load generators vs. load generators over a firewall**

- Both types of load generators can be used simultaneously within an LRE customer, LRE project, or even load test.
- SaaS Load generators are hosted within SaaS or selected third-party clouds and can effectively provide load from outside your network, typically preferred to emulate load from the internet or from different office locations. This type of setup requires that the Application Under Test (AUT) is either directly accessible from the internet, or through the company firewall(s). For questions regarding SaaS load generators please contact Micro Focus SaaS directly. SaaS load generators are not discussed further in this document.
- Load generators over a firewall, in contrast, reside within your company's network(s), and therefore can access the Application Under Test more directly. Such setup is typically preferred if the test objectives are to emulate load from within the organization, such as for intranet applications. The installation process is described in this document.

#### **Network requirements between the load generators over a firewall and the AUT**

- The Application Under Test (AUT) needs to be accessible from the load generator over a firewall host(s), either directly in the same network or through firewall(s) inside your company network, or between physical data center locations through company VPN (recommended only for special cases).
- The closer the OFW hosts are to the AUT, the better, since firewalls, distance and especially VPN access can add latency and reduce potential bandwidth during load tests. Hence, we recommend selecting OFW hosts in the same network as the AUT if possible.

#### **Network requirements between load generators over a firewall and Micro Focus SaaS**

- The load generators over firewall need to have *outbound* access to the public Micro Focus SaaS MI Listener DNS name (alternatively, IP address).
- This access is typically for outgoing HTTP-based traffic on port 443 through the company firewall from the load generators to the public Micro Focus SaaS MI Listener DNS name.
- **No inbound ports must be opened in the company firewall** from the MI Listener to the load generators.
- The specific public DNS name (or potentially public IP address) of the MI Listener will be obtained later in the process by request from Micro Focus SaaS.

- Note that setting the necessary firewall rules for the MI Listener based on DNS name is preferred by Micro Focus SaaS over IP-address-based rules.
- If the rules cannot be set by DNS, you can obtain the MI Listener's IP address by performing a nslookup against the DNS name in the windows command shell from a host that already has internet access (eg. "nslookup <mildnsname>"), ping test (eg. "ping <mildnsname>"), or from Micro Focus SaaS directly.
- While we recommend using port 443 directly whenever the firewall can be opened, alternatively a proxy server may be used if available in your network. Often such proxies are already configured for allowing browser traffic to the internet and may be reused for tunneling outbound traffic from the load generators to the MI Listener as well.
- Which method of access is required for your load generators depends on the configuration of your network and firewall, to some extent determined by the security policies laid down by your IT organization.
- Hence, **we recommend that you contact your IT department or security team to determine if outbound traffic from the load generator's network/load generator hosts is allowed or can be allowed through the company's firewall on outbound port 443 towards a public DNS name in Micro Focus SaaS's network, or if proxy access has to be used instead and is available.** Note that outbound traffic on port 443 towards specific DNS names/IP addresses is typically permissible in most cases, though sometimes the firewall must be opened first.

#### 4.1.2 Host Hardware Requirements

Decide on the number of load generators and host hardware configuration you will provide, based on your available hardware and the load intensity during your largest planned tests.

The load intensity is influenced by the number of Virtual Users, the Load Runner protocols in use, and run-time settings, such as pacing and think time.

Below are some ballpark figures on typical VUser capacity per load generator, based on typical latest hardware when using proper think times and/or pacing. The numbers provided may not be specific to your case and do NOT GUARANTEE stable and unbiased setups in all situations. Multiple factors can play into the load intensity of a specific load test and change hardware requirements, so the information here is only to support your own estimates.

The objective is to provide hardware that does not only create a stable supply of Virtual Users during load tests but also supplies enough CPU and memory capacity available so that no bias of response times will be measured throughout the test.

- Web protocol (assuming that realistic think times in scripts are used):
  - Recent quad-core hardware, 8 GB RAM: Sometimes up to 2000 Vusers per host, and if 16 GB RAM are available, in some cases up to 4000 VUsers
  - Recent dual-core hardware, 8 GB RAM: Sometimes up to 1000 Vusers per host, in some cases up to 2000 Vusers
- Typical Web 2.0 protocols (e.g. TruClient protocols):



- Many Web 2.0 protocols have a much larger memory and CPU footprint than web Virtual Users.
- We recommend that you consult with Micro Focus SaaS for your specific situation.
- As a rough first data point:
  - Recent quad-core hardware, 12 or 16 GB RAM: Sometimes up to 30 Vusers per host
  - Recent dual-core hardware, 8 GB RAM: Sometimes up to 15 Vusers per host
  - Recent 8-core hardware with 16 GB recommended

*Load generator Calibration Test: How to find out precisely how much hardware capacity is required*

In case you plan a large-scale load generator setup or atypical tests and need to guarantee a reliably scaled environment in advance, we recommend that prior to scaling the hardware and conducting your tests, you conduct a *Load generator calibration test* as described in detail in chapter 6.5. This process requires that you make at least one host of the planned hardware configuration available early and run a modified version of your final test on it in order to determine how many VUsers can be run per given load generator and how many will be needed.

### 4.1.3 Host OS Requirements

Software component	Supported / Recommended
Operating system (See Windows Updates below)	<ul style="list-style-type: none"> <li>• Microsoft Windows 8.1 64-bit*</li> <li>• Microsoft Windows 10 64-bit versions 1803, 1809, 1909, 2004, Enterprise LTSC 2019, 20H2 - (Recommended)</li> <li>• Microsoft Windows Server 2012 R2 64-bit*</li> <li>• Microsoft Windows Server 2016 64-bit** (Recommended)</li> <li>• Microsoft Windows Server 2019 64-bit**</li> </ul>
Browser (used for recording and replaying protocols only)	<ul style="list-style-type: none"> <li>• Microsoft Internet Explorer 11 (Recommended)</li> <li>• Microsoft Edge</li> </ul>
Screen resolution	<ul style="list-style-type: none"> <li>• 1366x768 or higher</li> <li>• 1600x900 or higher (Recommended)</li> </ul>

\* Can only be used with Microsoft Internet Explorer 11.

\*\* We recommend enabling Desktop Experience when using this operating system

Please note that 32-bit Operating Systems are no longer supported.

**Note for Linux:** This document focuses on load generator installations for Windows only as supported by SaaS. Micro Focus SaaS does currently not support Linux load generators. For special requirements cases please contact Micro Focus SaaS directly.

### Windows updates

Before you install any components on a Windows machine, make sure that the full set of Windows updates has been installed, or install the Windows updates listed in the table below.

Note: Before you install any of the Windows updates, disable UAC (User Account Control) and restart the computer. For details on how to disable UAC, refer to the Microsoft Windows documentation.

Windows version	Required updates
<ul style="list-style-type: none"><li>• Windows 8.1 64-bit*</li><li>• Windows 2012 R2 64-bit*</li></ul>	<p>Install the following pack of updates:</p> <ol style="list-style-type: none"><li>1. KB2919442 x64 or KB2970551 x64 (one of these two updates)</li><li>2. KB2919355 x64</li><li>3. KB2932046 x64</li><li>4. KB2959977 x64 (if applicable)</li><li>5. KB2937592 x64</li><li>6. KB2938439 x64</li><li>7. KB2934018 x64</li><li>8. KB2999226 x64</li></ol>

\* The list of required updates might change due to Microsoft's update delivery policy or new Windows update releases. If you experience any issues, please contact Micro Focus Software Support.

#### 4.1.4 *Software recommendations and requirements*

- **We recommend dedicating load generators to that purpose only.** During load tests, ample availability of system resources including CPU, disk, memory, GDI resources and network bandwidth is crucial. In case of resource shortages introduced by other software running on load generator hosts, load bottlenecks may occur that may have an effect on the load generated and the system under test's behavior observed.
- Do not install any web server such as IIS or other on the same host.
- Do not install "Monitor over the Firewall" on the same host, as it directly interferes with the function of the load generator software.
- Do not install VuGen, Analysis or "Monitor over the Firewall" (MOFW) on the load generator hosts, since this is not supported.
- We recommend placing the load generators in a safe zone of your environment so that virus scanning software does not need to run during tests. Such software may severely interfere with the timing and amount of the generated load and the resulting measured response times.

#### 4.1.5 Downloading required components

At the time of writing of this document, for LRE 2021 R1, the OneLG installer and a patch are required.

The OneLG installer and the OneLG R1 patch are located in the download section of your LRE instance as explained below. Alternatively, feel free to contact Micro Focus SaaS at the time of installation to determine the latest service packs and patches if required.

**Important:** Do **not** use installers obtained from other sources than your Micro Focus SaaS LRE instance or the Micro Focus SaaS team.

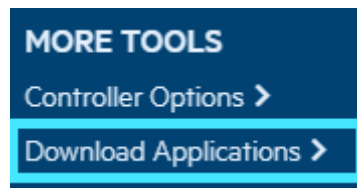
##### OneLG installer

This installer can be downloaded directly from inside the LRE Application:

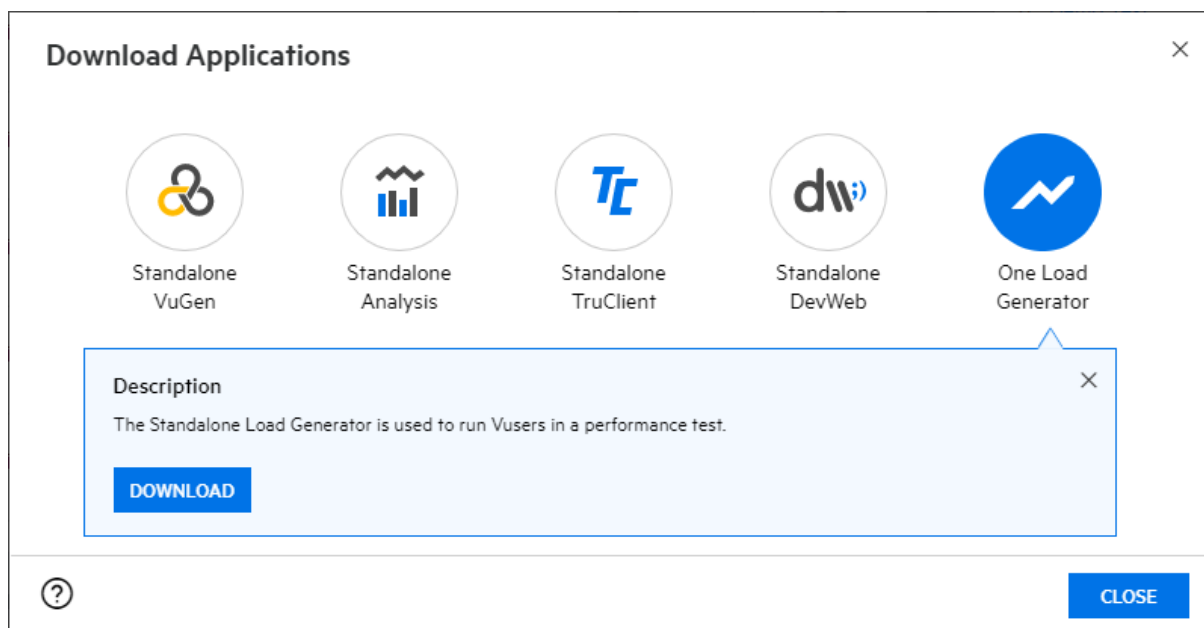
- Log into the LRE Application using your domain/project and user credential information.
- On the dashboard, top left, click the Dashboard icon:



- Select "Download Applications":



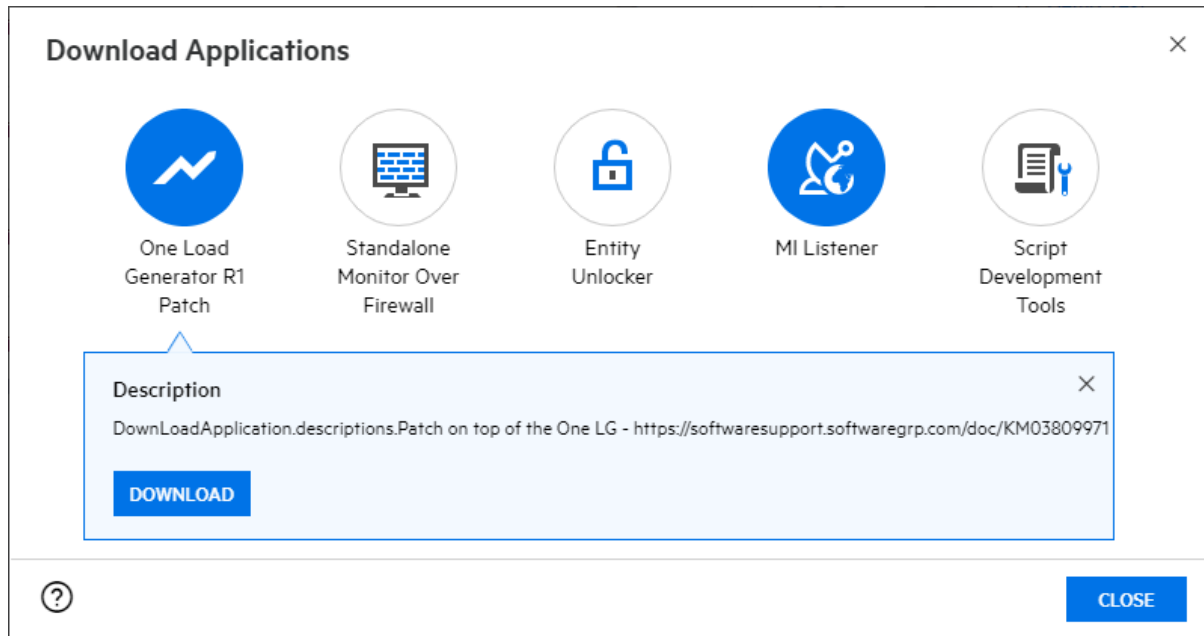
- In the popup window, select "One Load Generator" and click "Download":



- As soon as the Windows file download dialog shows, save the file on your hard drive.

## Patch installers

Install patches only if they can be found in that same “Download Applications” section of your LRE instance you downloaded the main installer from. At the time of writing, there is one patch available for the LRE 2021 R1 version.



- As soon as the Windows file download dialog shows, save the file on your hard drive.

## 4.2 Load Generator Self-Registration or Micro Focus SaaS Request

The setup of a load generator over a firewall requires not only the installation and configuration of the load generator itself, as described in the next few chapters, but also to register the load generator within the LRE instance.

You have two options to perform this step, either registering the load generator in your project's pool yourself, or otherwise requesting registration from Micro Focus SaaS as previously.

### Option 1. Registering load generators in your project using LRE

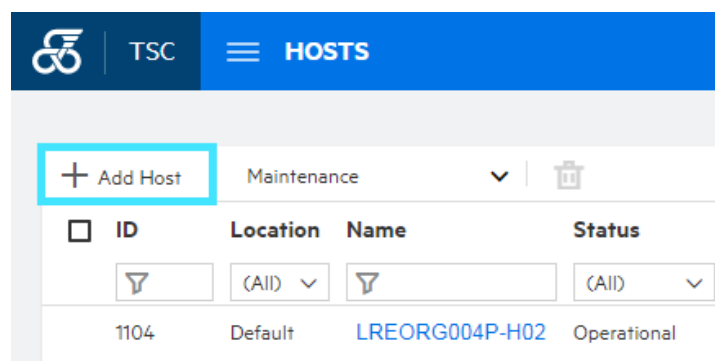
For this do-it-yourself method, the following requirements need to be met.

- You have access to your project as part of the LRE "Performance Tester" group. To validate, check if the "Add Host" button is accessible from the "Hosts" view in LRE as in the screenshot below as needed. Otherwise, the button is greyed out.
- Your requirement is to add the load generator only to the pool associated with your project, not into multiple pools. If you have multiple projects that also point to different pools and want to make the load generator available in those pools as well, use option 2.
- The location that the load generator will be associated with is already registered inside LRE.

If any of the above conditions does not hold, we recommend to file a support request with Micro Focus SaaS (option 2).

Let us assume that you want to register a load generator in your network named "**sii-west-lg-01**" in location "**ofw**". Hence, the load generator itself would later be configured with a local machine key of "**sii-west-lg-01\_ofw**".

To register this load generator in the pool of your LRE project, select "Resources/Hosts" in the menu, and click on "Add Host":



In the "Add Host" popup, as in the screenshot below.

×

Add Host

Name: \*

sii-west-lg-01

Installation: \*

OneLG

▼

Status: \*

Unavailable

▼

Location: \*

ofw

▼

MI Listener:

LREORG002P-M01

▼

Priority: \*

5

▼

☐

Enable SSL

Purpose\*

☐ Controller

☒ ⚡ Load Generator

☐ ⚙ Data Processor

Attributes

+

No Attributes Selected

?

OK

CANCEL

Enter the name of the load generator (without the “\_<location>” postfix) into the “Name” field. In our example, enter “sii-west-lg-01”. It is important that the string entered here will exactly match the local machine key that will be entered into the host’s configuration upon installation, without the “\_<location>” postfix. Please follow the SaaS naming policies described in the next chapter, “Policy for selecting valid load generator names”, and “Policy for selecting valid location names”.

Select “Installation” as “**OneLG**”, and “Status” as “**Unavailable**”. This is important, as it would otherwise not be possible to add this registration before the actual installation of the load generator has been successfully completed.

Select the location from the drop-down options. If you cannot find your desired location, request it to be added by Micro Focus SaaS, or use option 2.

Leave the “Enable SSL” tick box unticked. SSL will still be used with this option unticked, but we do not have to install any additional certificates.

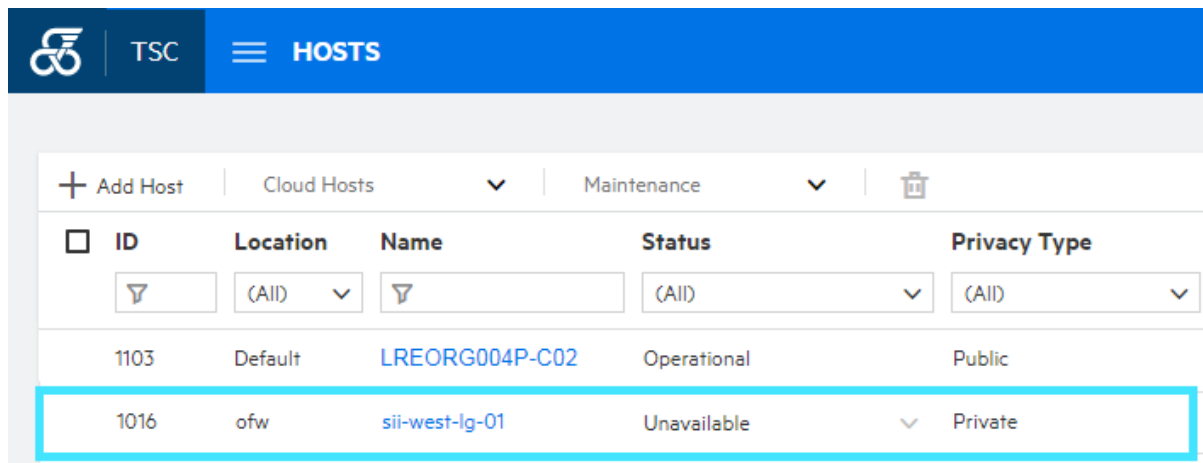
Select the MI Listener that you have configured in the load generator’s agent configuration. If there is only one choice, select that one. Note that in case multiple MI Listeners are available, you will have to select the correct one by name. This name may not match the DNS name configured in the

Agent configuration. In this case, contact your LRE Administrator within your organization or your Micro Focus SaaS Customer Success Manager to obtain that piece of information.

We recommend not changing any other defaults in this dialog.

Finally, hit “OK”.

The “Hosts” view should now reflect your added load generator in an “Unavailable” state.



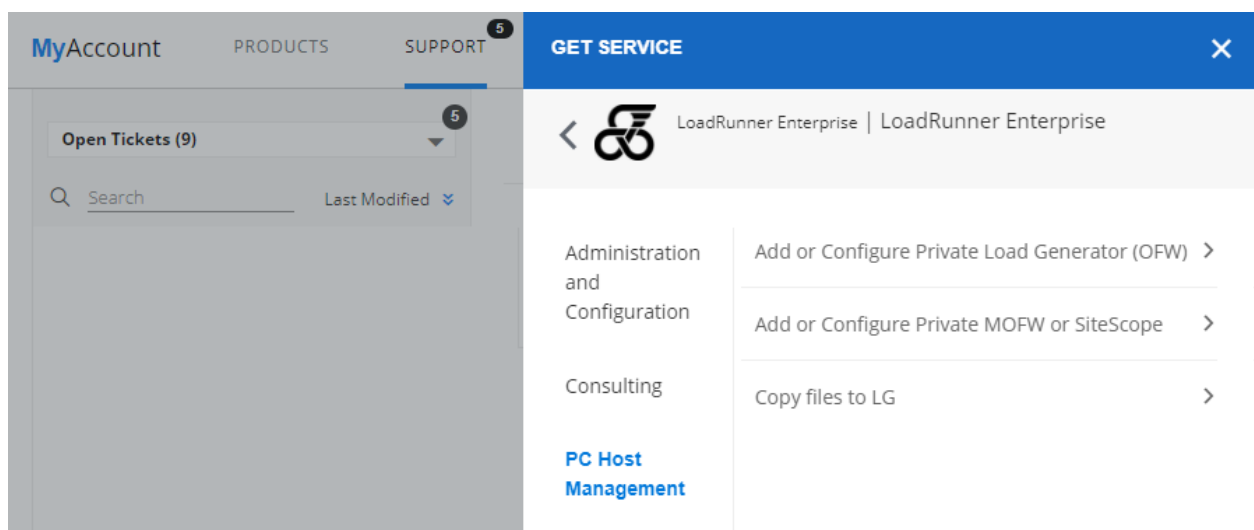
TSC HOSTS					
+ Add Host   Cloud Hosts   Maintenance					
<input type="checkbox"/>	ID	Location	Name	Status	Privacy Type
	(All)		(All)	(All)	(All)
	1103	Default	LREORG004P-C02	Operational	Public
	1016	ofw	sli-west-lg-01	Unavailable	Private

This indicates that the load generator has been registered and is ready for later re-configuration after you have completed its installation and local configuration.

### Option 2. File a case with Micro Focus SaaS to register locations and load generators

Alternatively, file a case with Micro Focus SaaS support to register the load generator (and, if not yet existing, its location as well) within LRE. To start that process, you will need to exchange certain minimal information with Micro Focus SaaS. We recommend doing this before the actual installation commences.

Open a new support case through the Micro Focus SaaS portal for an “Add or Configure Private Load Generator (OFW)” service request for LoadRunner Enterprise in the category “PC Host Management”.



In your request, please provide the following information so that we can process your information with minimal delay:

1. Mention that you request registering load generators over a firewall and how many.
2. The name of the LRE instance, domain and project (or alternatively the name of the pool in case you have it). With this option, you can specify to add the load generator even to multiple pools (for multiple projects linked to different pools).
3. For each load generator to be registered, the exact spelling of the *unique* name of the load generator, without its location. Please see below for the policy for selecting load generator names. *In case you would prefer Micro Focus SaaS to provide load generator name(s) to you, please specify so in your request.*
4. For each load generator to be registered, provide the exact spelling of the location name. Please see below for the policy for selecting location names.  
All load generators in the same location (e.g. data center) have to use the same location name. Hence, if the load generator(s) are to be hosted in the same geographic or logical location as load generators already in existence from previous requests, then please provide the existing location name, otherwise choose a new one.  
*In case you would like Micro Focus SaaS to specify a new location name for you, please specify so in your request.*

If not sure which load generators in which locations already exist for your project, you can open the “Resources/Hosts” view LRE to display them. The “Name” and “Location” columns refer to load generator name and location for each load generator available to your project.

#### **Policy for selecting valid load generator names**

Note: In your request, you can always opt for SaaS to pick load generator names for you.

If choosing one on your own, a valid load generator name must meet all of the following criteria:

- Only alphabetical and numeric characters as well as dashes ‘-’.
- We encourage the use of numbers, as long as prefixed with names.
- The name must start with a letter.
- Load generator names must be unique (across the LRE instance). Hence, the name must be descriptive, contain customer-specific information and cannot be generic (“lg01” or “generator” are not valid examples).
- We recommend starting the name with an abbreviation of the customer name.

Here some typical examples of valid load generator names for customer “Sample Industries, Inc.”:

- “sii-lg-01”, “sii-west-lg-01”, “siinyork-4”

#### **Policy for selecting valid location names**

Note: In your request, you can always opt for SaaS to pick location names for you.



If choosing one on your own, note that load generators in the same location (e.g. data center) have to use the same location name. Hence, if the load generator(s) are to be hosted in the same geographic or logical location as load generators already in existence from previous requests, provide that location name.

A new valid location name must meet all of the following criteria:

- Only alphabetical characters, numbers and dashes.
- The location cannot start with a number or a dash.
- The location has to be unique (across the LRE site). Hence, the location must be descriptive, include customer-specific information, and cannot be generic (“location1”, “south” are not valid examples).
- We recommend starting the name with an abbreviation of the customer name.

Here some typical valid examples of location names for customer “Sample Industries, Inc.”:

- “sii”, “sampind”, “siinyork”, “sii-south”

#### **What happens after you have filed your request with Micro Focus SaaS**

- Micro Focus SaaS will first validate the information and ask for further detail if necessary.
- As soon as the information is complete and correct, we will process the request:
  - If noted, we will define unique load generator names and a location name.
  - We will register the location and load generators in LRE as necessary.
- We will inform you of the completion of the task.
- For each load generator added, we will provide/confirm the precise spelling of the following parameters that you will later need for the “configuration” step of the process:
  - The **MI Listener Name** (see chapter “Configuration”)
  - The **Local Machine Key** (see chapter “Configuration”).

Note that the Local Machine Key is composed of  
`<injectorname>_<locationname>`

E.g. for four load generators requested in two different locations we may provide

- `sii-lg-01_siinyork`
- `sii-lg-02_siinyork`
- `sii-lg-03_siisfo`
- `sii-lg-04_siisfo`

NOTE: Immediately after the request is filed, you can immediately proceed to the next step (installation). However, you will need the information above for the configuration later in the process before you can continue with to final phase (notifying SaaS and testing).

## 4.3 Installation

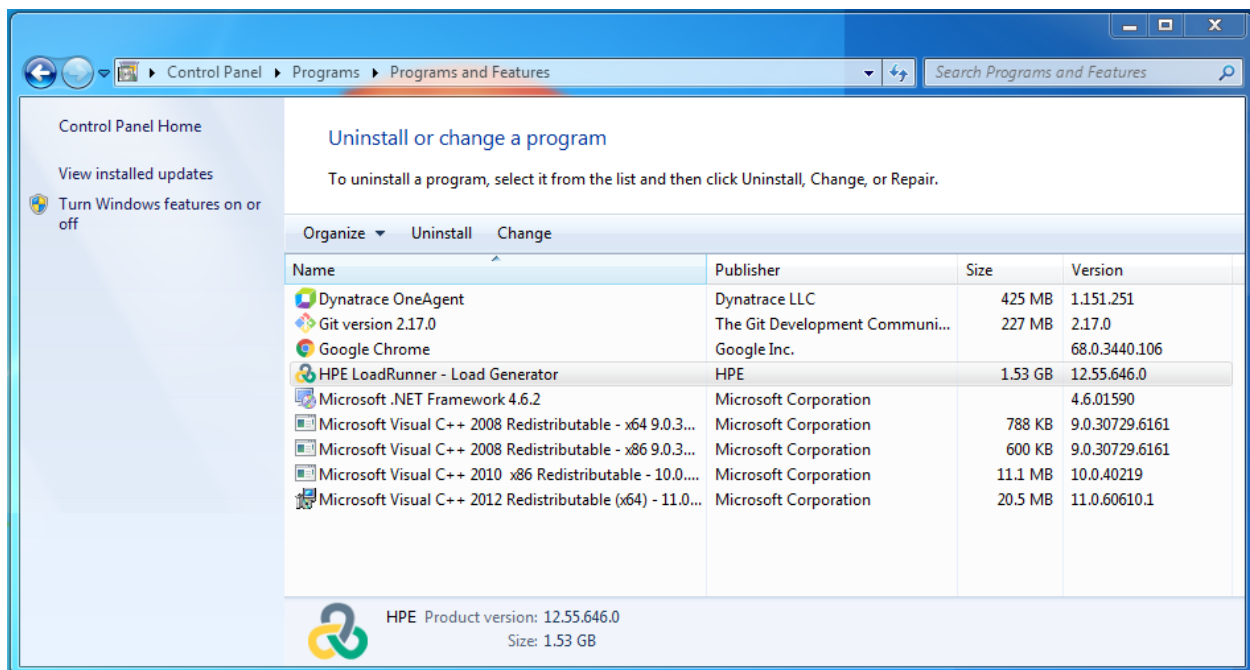
The load generator installation on the host is straight-forward, using the base installer obtained in the preparation phase earlier and any required patches on top.

### 4.3.1 Checking for pre-installed components

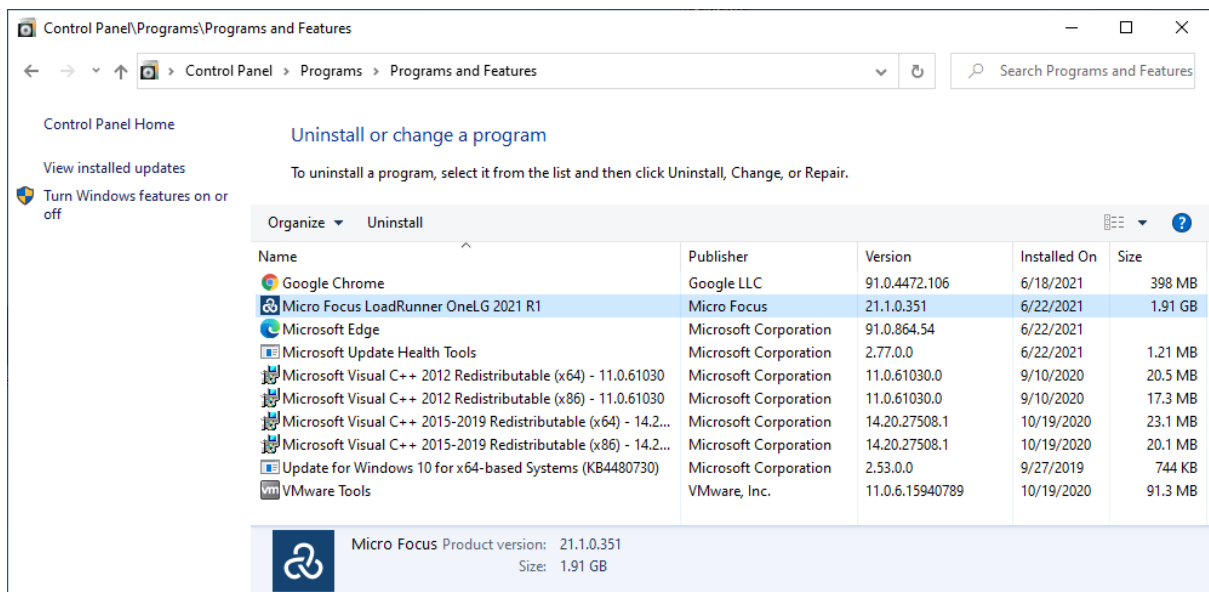
The installation of the OneLG installer requires that no previous version of the Load Generator software be present, and that no other LRE components such as VuGen, Analysis or MOFW are installed. **None of those components can exist on the machine where the Standalone Load Generator is installed.** Hence, as a first step, make sure that no old versions of LoadRunner or Standalone Load Generator are present, and uninstall them in case.

You can check for pre-installed components through the Windows Control Panel/Add or Remove Programs.

In the example below, an older installation of Standalone Load Generator is already present unexpectedly. Hence, before a desired reinstallation, the “HPE Load Generator 12.55” program would have to be removed, in turn automatically removing any linked patches (if any) as well.



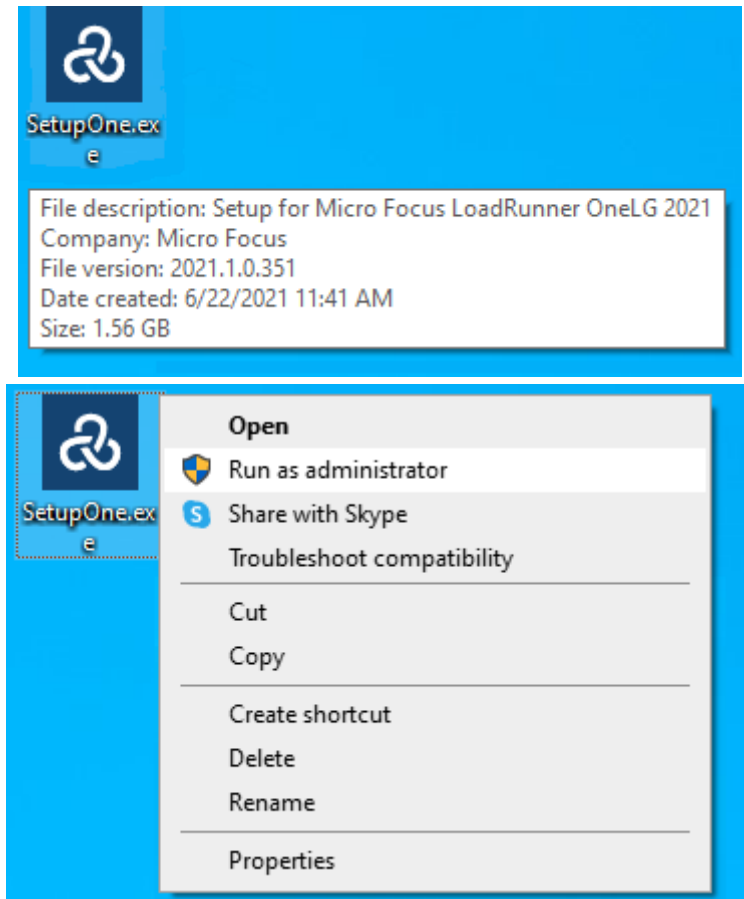
In another example, the latest OneLG version (matching to LRE 2021 R1) is already installed:



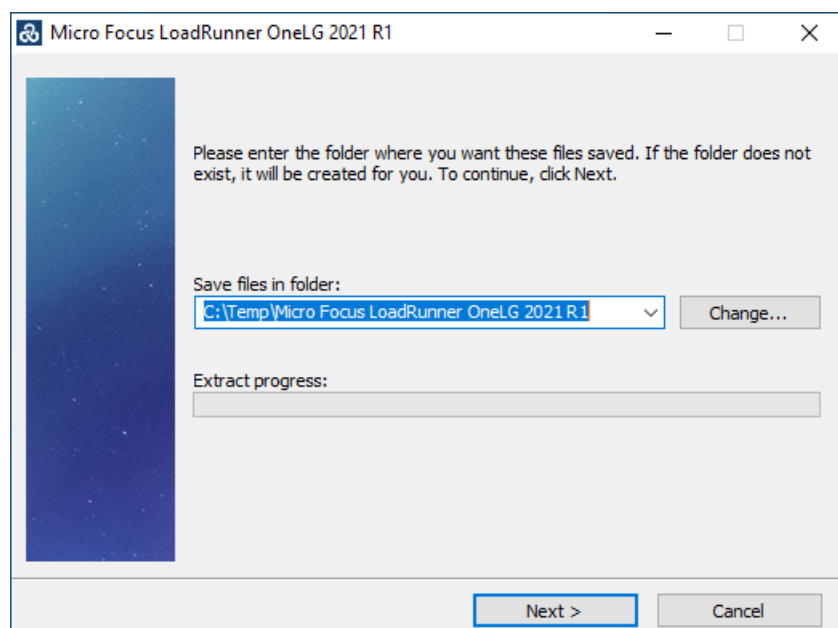
In this case, only required patches should be installed if necessary.

### 4.3.2 Base installation

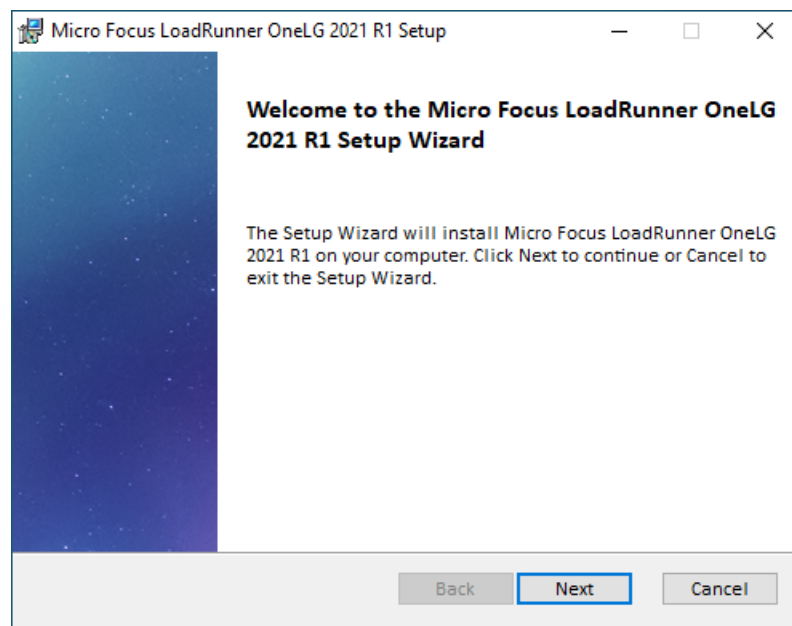
- After making sure that no previous load generator software is present, start the installation by starting your “SetupOneLG.exe” base installer **using a local or domain administrator login, then Run as administrator**:



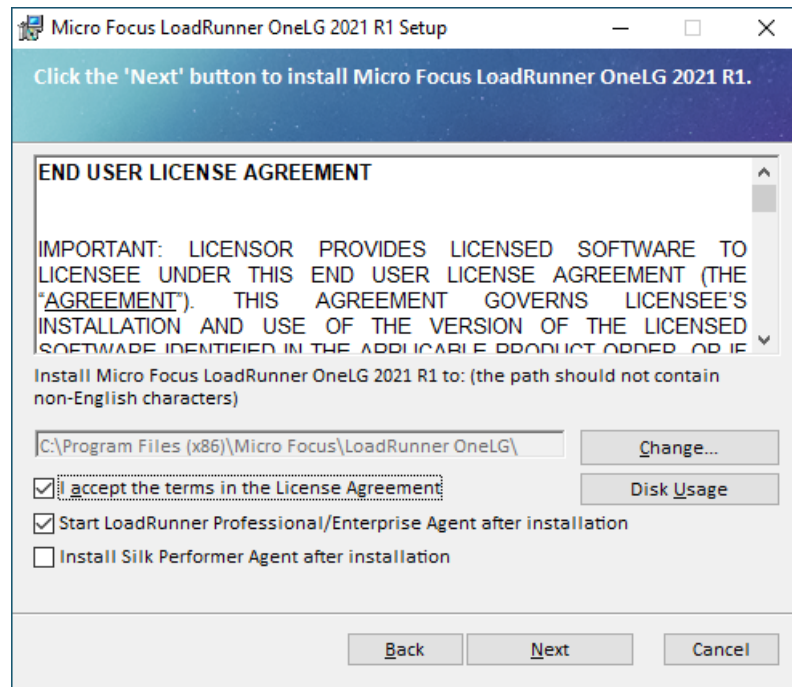
- Find a temporary location for the installer to decompress the files, or accept the default location:



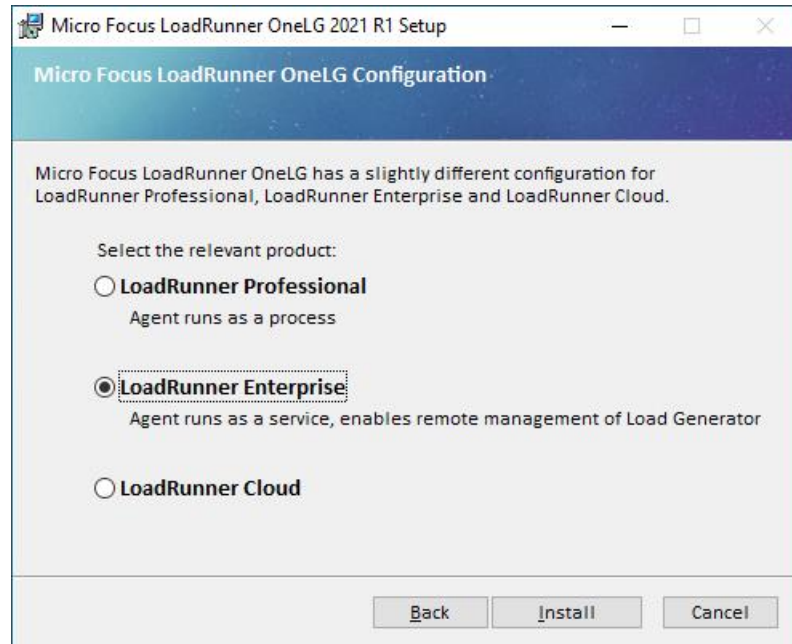
- The installer will extract the necessary files into the given folder.
- Accept any host reboot requests. Any reboot should also restart the installer automatically. If not, open “setup.exe” inside the temporary installation folder to kick off the installation.
- Accept any requests to install prerequisite programs that have been determined to be missing.
- You may also be asked to install missing Windows updates. Such can be obtained either through the Windows Updater or manual download from Microsoft. If you download manually, make sure to pick the correct download for your operating system version.
- Once the prerequisite installation has completed, in the OneLG installer, follow the instructions on the screen and provide the requested information. First click “Next”.



- You will now see the license dialog.

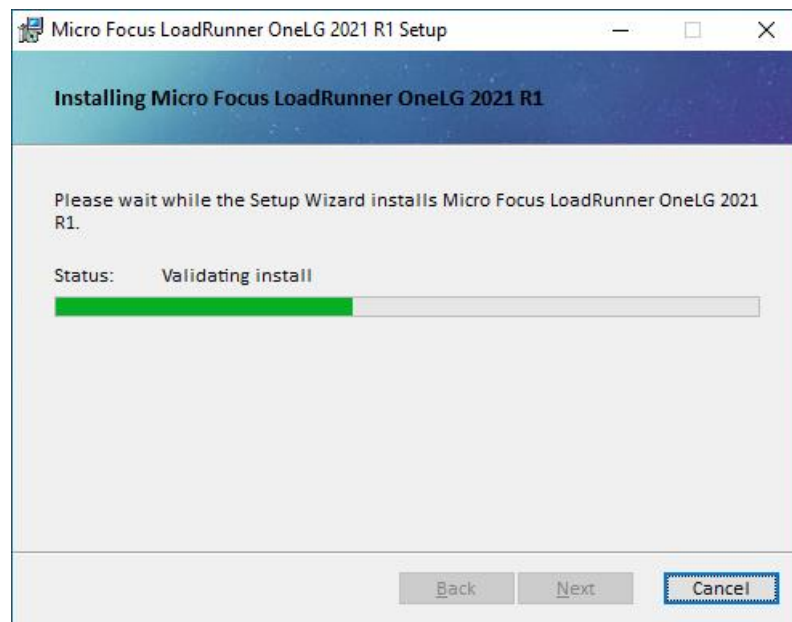


- Check available disk space using the “Disk Usage” button and select a different installation folder if necessary.
- Select “Start LoadRunner Professional / Enterprise Agent after installation” and accept the terms in the license agreement and hit “Next”.
- Next, select the “LoadRunner Enterprise” product:

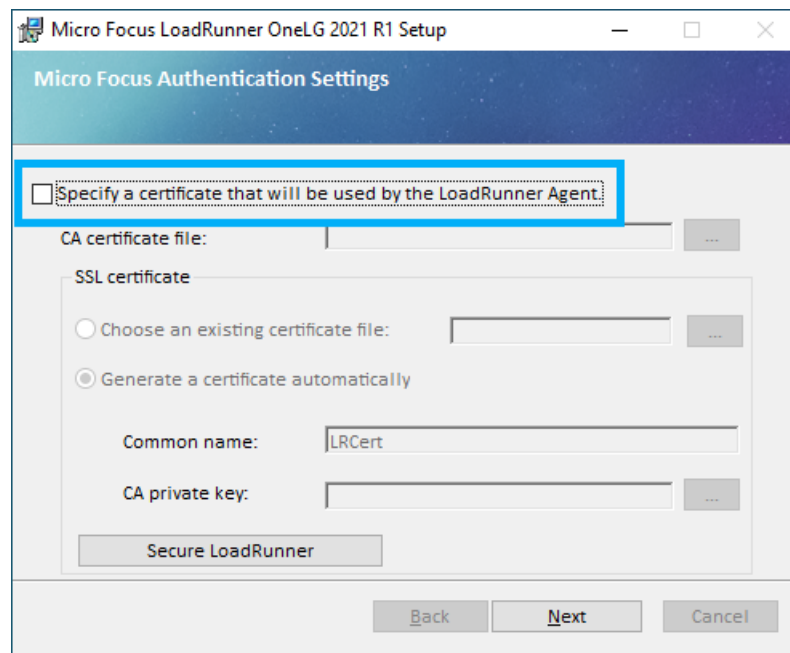


- In SaaS, for most installations we highly recommend choosing “LoadRunner Enterprise”. This leads to installing load generators as a service, providing multiple advantages, including permanent and immediate availability (hosts listed as “Operational” automatically) and the resulting reliability of the setup.

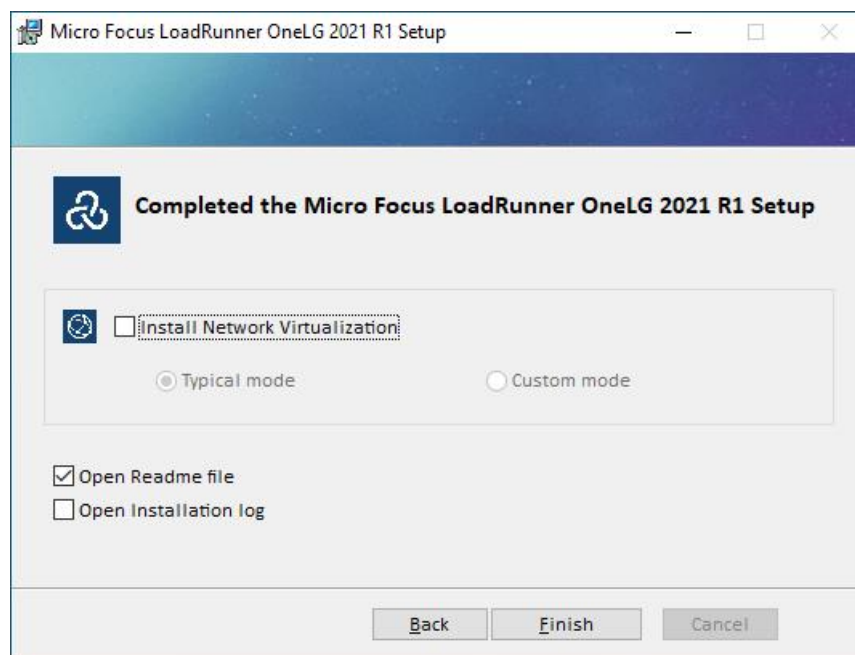
- Selecting “LoadRunner Professional” instead would require that before starting a load test session, the LoadRunner Agent process on each load generator will have to be started manually after logging into the hosts. This also can mean that if a load generator’s agent is not started up before a load test as expected, the load test may either fail to start or move on to different load generators as long as available.
    - Hence, we recommend the “LoadRunner Professional” option only for the special case of load generators used rarely and installed on laptops.
  - In case that a load generator was installed in one way and needs to be changed to the other, please consult Appendix “Configuring the LG Agent as either Service or Process” for instructions.
  - Do **not** select “LoadRunner Cloud” since that installation is not compatible with LRE.
- Continue with “Install”. Now the installation is in progress.



- After installation, make sure to un-check the flag “Specify a certificate that will be used by the LoadRunner Agent” and click Next.



- The load generator installation itself is now complete, and now a final dialog asks if you want to install the Network virtualization feature on this load generator. Unless you want to install the NV feature, uncheck the “Install the HP Network Virtualization” checkbox and press “Finish”, ending the installation.



- Otherwise, if you are interested in enabling NV on your load generator, please review the notes on NV below carefully before continuing the installation.

**If you choose to NV installation at the end of the Load Generator installation**



You can install the NV feature on your load generator at any time. You can either choose to do so at end of the LG installation process (by keeping the checkbox in the load generator installation process in the dialog above), or use a separate NV installer at a later point that can be obtained from Micro Focus SaaS. You can also use the current load generator installer by first uninstalling the load generator, then reinstalling it with NV option enabled at the end.

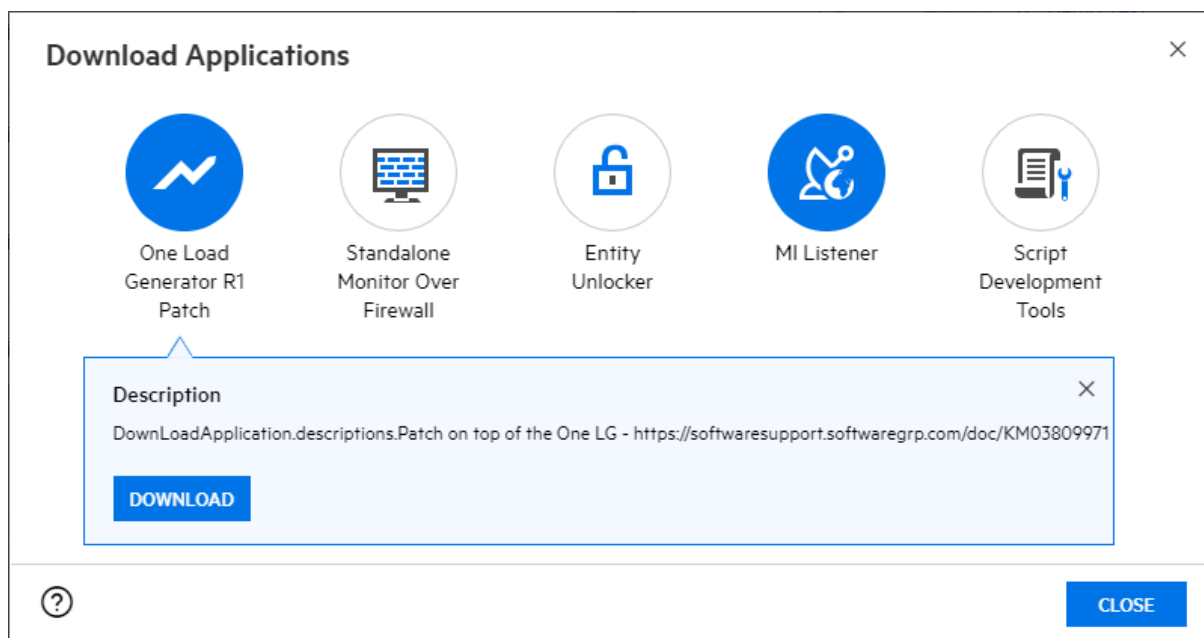
**Warning:** Note that the NV installer modifies network driver settings on the host it installs on. As a result, if you are logged into that host through RDP/Remote Desktop Client while you perform the NV installation (or a later uninstallation), you may experience a loss of RDP connection during the installation process on some Windows OS versions that will require a reboot of the host at a later point to recover.

Hence, if you experience this condition, you can replace the lost connection by rebooting the host after a recommended 15-minute wait period (to assure that the installation has finished in the background) and then logging in again.

Alternatively, you may prepare your RDP connectivity settings on the Windows host before the NV installation commences, to prevent this condition. The required host-side RDP settings vary by Windows OS and are not explained in this document.

#### 4.3.3 *Installation of the latest patches*

Patches are to be installed if and only if present in the Downloads section of your LRE instance. At the time of writing this document, there is one patch available for LRE 2021 R1.



## 4.4 Configuration

### 4.4.1 *Prerequisite #1: Agent Configuration parameters obtained*

You will need the following information.

- The **MI Listener Name**.
  - An example: “almrwc1645p-mil1.saas.microfocus.com”
  - This name is typically the public DNS name, and in some cases the public IP address, of the specific MI Listener in the Micro Focus SaaS network that the load generators will communicate with.
  - In some cases, when large amounts of load generators are to be configured, you may have been provided with multiple MI Listener names. During configuration, for each host please use the MI Listener name we associated specifically with that host only.
  - If you chose option 2 (registration through Micro Focus SaaS), the ticket response should contain the MI Listener name. If you chose option 1 (self-registration), you can contact your LRE administrator or your Micro Focus Customer Success Manager to obtain the MI Listener name.
- The **Local Machine Key**.
  - The Local Machine Key is composed of <injectorname>\_<locationname>
  - E.g. for four load generators requested in two different locations, it could look like:
    - sii-lg-01\_siinyork
    - sii-lg-02\_siinyork
    - sii-lg-03\_siisfo
    - sii-lg-04\_siisfo
  - In case you chose option 1 (self-registration), you would have defined the load generator name yourself. In case of option 2 (support case), we would have provided it to you in our ticket response.

### 4.4.2 *Prerequisite #2: Outbound Network Access from the LG(s) to the MI Listener(s)*

As mentioned in the prerequisites chapter under “Network requirements between Load Generators and Micro Focus SaaS”, in order to function properly, load generator hosts need to have network access to reach the MI Listener from your network. Network access can be provided through one of two means:

#### **Case A (typical, preferred): Direct communication on port 443, and Firewall Request**

In order for this to work, the firewall between load generators and the internet needs to be open for outbound communication on port 443 against the MI Listener DNS name (or, less preferable, IP address).

*At this point, make sure to test if the firewall is open from your load generator hosts, using the simple test described in Appendix "Test if the firewall is open for LG to SaaS Communication".*

In case the firewall is not open yet, you will need to file a specific firewall request to your security team to open the firewall for:

*Outbound communication for the specific host IP addresses of the load generator hosts (or their subnet) on port 443 towards the MI Listener DNS name(s) or MI Listener IP address(es) provided by Micro Focus SaaS.*

Note that the firewall rule does not need to be bidirectional, as incoming connections can still be blocked safely without functional impact on LRE. Only outbound connections on port 443 need to be allowed.

Make sure to repeat the test in Appendix "Test if the firewall is open for LG to SaaS Communication" after the firewall rule has been implemented.

### **Case B (alternate): Proxy Communication**

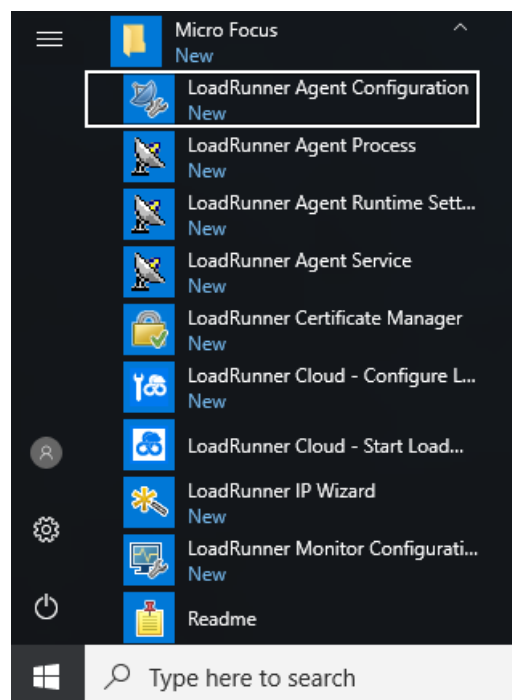
In this case, please contact your IT or security team to provide proxy configuration details, mainly the proxy's DNS name or IP address, and its port. Proxy credentials and/or protocol information may be required as well.

Alternatively, you may also log on to the load generator, open a browser and check its settings if a proxy is active and which parameters are used. If a proxy is present in the browser and browsing to the internet works, in most cases you should be able to use the same proxy settings for the load generator configuration as well.

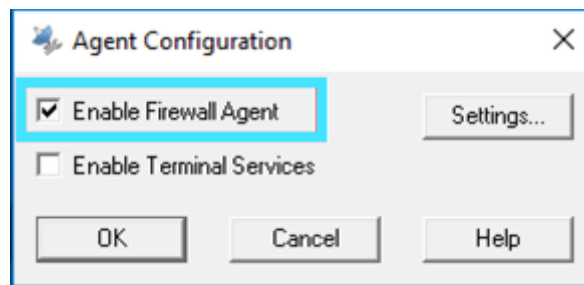
### **4.4.3 Agent Configuration**

To configure the agent, start the agent through:

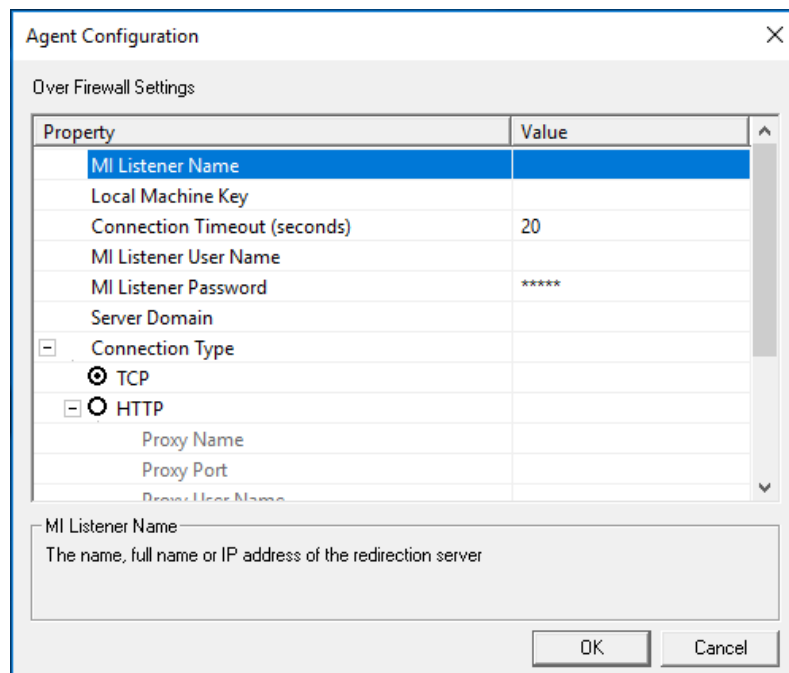
*Start button / Micro Focus / LoadRunner / Advanced Settings / Agent Configuration*



Select the “Enable Firewall Agent” checkbox:



Click “Settings”. The “Agent Configuration” dialog appears:



Enter the MI Listener Name, as provided to you by Micro Focus SaaS, and the Local Machine Key.

Agent Configuration

Over Firewall Settings

Property	Value
MI Listener Name	almrwc1645-mil1.saas.microfocus.com
Local Machine Key	sii-west-lg-01_ofw
Connection Timeout (seconds)	20
MI Listener User Name	
MI Listener Password	*****
Server Domain	
[-] Connection Type	
<input checked="" type="radio"/> TCP	
[-] <input type="radio"/> HTTP	
Proxy Name	
Proxy Port	
Proxy User Name	

Local Machine Key  
A string identifier used to establish a unique connection from behind the firewall, via the MI Listener machine

OK Cancel

In this example, the public DNS name of the MI Listener Name is used:

`almrwc1645p-mil1.saas.microfocus.com`

The Local Machine Key is:

`sii-west-lg-01_ofw`

Local Machine keys have to be spelled in lower case characters exactly as provided, and have the format:

`<injectorname>_<locationname>`

Finally check the **“Use Secure Connection (SSL)”** box to enable SSL between the load generator and the MI Listener, which is required due to security concerns, **but set the “Check Server Certificates” to “None”**. The latter is due to the certificate is offloaded on the load balancer and not on the MIL.

Agent Configuration

Over Firewall Settings

Property	Value
<input type="checkbox"/> Connection Type	
<input checked="" type="radio"/> TCP	
<input type="radio"/> HTTP	
Proxy Name	
Proxy Port	
Proxy User Name	
Proxy Password	*****
Proxy Domain	
<input checked="" type="checkbox"/> Use Secure Connection (SSL)	
Check Server Certificates	None
Private key password	*****

Check Server Certificates  
Authenticate SSL certificates that are sent by the server. Medium - Verifies that the server certificate is signed by a trusted Certification Authority. High - verifies that the sender IP matches the certificate information.

OK Cancel

**For proxy configurations only (case B above):**

Enter the proxy parameters as provided by your IT or security team. This typically includes at least Proxy Name and Proxy Port, sometimes also credential information.

Check also the “Use Secure Connection (SSL)” box and set the “Check Server Certificates” to “None”.

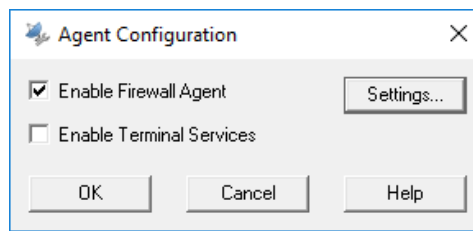
Agent Configuration

Over Firewall Settings

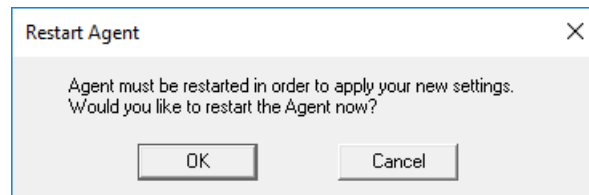
Property	Value
<input type="checkbox"/> Connection Type	
<input type="radio"/> TCP	
<input checked="" type="radio"/> HTTP	
Proxy Name	myproxy.example.com:8080
Proxy Port	
Proxy User Name	
Proxy Password	*****
Proxy Domain	
<input checked="" type="checkbox"/> Use Secure Connection (SSL)	
Check Server Certificates	None
Private key password	*****

OK Cancel

Click “OK” when done. The small “agent configuration” popup reappears.



Click “OK” again. You will be asked to restart the agent:



Confirm with “OK”.

The agent configuration is now complete. Please proceed to the next chapter, “Notifying SaaS and Finalizing the Setup”.

## 4.5 Finalizing the Setup

### In case you chose option 1 (self-registration)

Go back into the “Hosts” view inside LRE and select the line that contains the newly registered host, in our example “sii-west-lg-01”.

Now click the “Reconfigure Host” button, as marked below, to perform the reconfiguration operation:

The screenshot shows the LRE Hosts management interface. At the top, there's a blue header with the LRE logo and 'SaaST...' followed by a menu icon and 'HOSTS'. Below the header, there's a toolbar with buttons: '+ Add Host', a trash icon, a checkmark icon labeled 'Check Host', and a document icon labeled 'Reconfigure Host' which is highlighted with a red box. To the right of the toolbar is a 'Maintenance' dropdown menu. Below the toolbar is a table with columns: ID, Location, Name, Status, Privacy, Runtime State, Purpose, Installation, and Priority. The table contains five rows of host data. The last row, with ID 1180, Location 'ofw', Name 'sii-west-lg-01', Status 'Unavailable', Privacy 'Private', Runtime State 'Idle', Purpose 'OneLG', Installation 'OneLG', and Priority '5', is highlighted in blue. The 'Reconfigure Host' button for this row is also highlighted with a red box.

ID	Location	Name	Status	Privacy	Runtime State	Purpose	Installation	Priority
1106	Default	LREFRA002P-C7	Operational	Public	Idle	Windows Host	Windows Host	5
1146	ofw	UniLGTest	Operational	Private	Idle	Windows Host	Windows Host	5
1157	ofw	UniLGTest02	Non-Operational	Private	Idle	Windows Host	Windows Host	5
1179	Default	LREFRA002P-H6	Operational	Public	Idle	Windows Host	Windows Host	5
1180	ofw	sii-west-lg-01	Unavailable	Private	Idle	OneLG	OneLG	5

Soon after, a dialog should confirm that the load generator is now Operational, hence ready to use.

This table shows a single row of host data, which is the same row as in the previous screenshot but with the status updated to 'Operational'.

1180	ofw	sii-west-lg-01	Operational	Private	Idle	OneLG	OneLG	5
------	-----	----------------	-------------	---------	------	-------	-------	---

Should an error message appear, e.g. one indicating that the load generator cannot be reached, then re-attempt the reconfiguration button three times in one-minute intervals. If the issue persists, please continue with section “Troubleshooting” below.

### In case you chose Option 2 (case with Micro Focus SaaS)

Simply update your support case briefly to notify Micro Focus SaaS that you have completed the load generator installation and configuration on your end.

Our team will continue to move the load generators into an operational state. We will be notifying you of the outcome through the support case, and in case that the load generators are now in operational state as expected, we will resolve the ticket, completing the process.

You can now start utilizing the load generators in load tests. We recommend that you perform a brief “smoke test” with the new load generators to make sure that everything works as expected.

In case that at least one of the load generators cannot be placed in operational state by Micro Focus SaaS, we will inform you through the ticket that basic technical troubleshooting on your end will be required.

## Troubleshooting



Please follow the basic troubleshooting instructions outlined in the support case and/or in chapters 1 and 2 of our other document, the “Load generators over a firewall - LRE 2021 R1 Troubleshooting Guide”. After the load generators has become operational, please make a note in the support case that that installation succeeded so that we can resolve the case.

### **Troubleshooting with Micro Focus SaaS**

Should the recommended steps in the “Load generators over a firewall - LRE 2021 R1 Troubleshooting Guide” not suffice to resolve any technical issues, please inform us through the (still open) support case. Our team will reach out to you to help you resolve the matter directly.

Please add at least the following information to the existing case to ensure fastest possible resolution:

- A short description of the issue, including any observations you find helpful that you may have made while troubleshooting the issue yourself.
- If applicable, which steps from the guide have already been attempted?

Further details on troubleshooting can be found in the “Load generators over a firewall - LRE 2021 R1 Troubleshooting Guide”.

Note that during the troubleshooting process, the Micro Focus SaaS engineer may find it necessary to conduct in your presence a live remote diagnosis session on the load generators.

## 5 Appendix

### 5.1 Configuring the LG Agent as either Service or Process

**The LG Agent can be run either as service or as a process.**

The load generator Agent can be run either as service, or process. Micro Focus SaaS recommends running the Agent as a service for most (permanent) setups, as the Agent becomes ready immediately after the host is started, then idling with minimal system resources.

*NOTE: It is crucial that the Agent only runs through one of these two means, not both, at the same time. Otherwise, operational errors will occur.*

As a service, the 'LoadRunner Agent Service' service runs automatically even if the user does not log in to the system. The user can login to the machine and go to Administrative Tools -> Services -> 'LoadRunner Agent Service' to verify or change which user account is running the service, since this might have an effect on the user's rights to pass through proxies. The service should run under administrative privileges, or user "IUSR\_METRO".

While installing, make sure to have administrative privileges (domain or local).

As a process, the Agent runs through 'magentproc.exe' from the <LG>\launch\_service\bin folder. This requires a user to login to the machine in order to start this Agent and stay logged in during the use of the load generator. The Agent will run with the same user rights as the logged in user.

After installing the LG Agent, the user can switch the Agent to run as either service or process by performing the following steps.

#### 5.1.1 To run the LG Agent as a service (recommended by Micro Focus SaaS for permanent setups):

1. Remove the "LoadRunner Agent Process" shortcut from the Start -> Program Files -> Startup group if present, to avoid the process from starting when the computer is rebooted.
2. Launch the command prompt using **Run as Administrator** and go to <LG>\launch\_service\bin. (If started erroneously as a non-administrative user, the installed service will not work properly later).
3. Type in "magentservice.exe -install<enter>"
  - Note: If you want to set a different account:  
Type in "magentservice.exe -install <user\_domain>\<user\_name> <password>"
4. Go to the Window's Services view and change its properties to start it as "Automatic".
5. If you wish to modify the login details after installation of Agent Service, do the following:
  - Go to Start -> Control Panel -> Administrative Tools -> Services and look for the LoadRunner Agent Service.
  - Right-click and select Properties->Log On and change the information from there.

### 5.1.2 *To run the LG Agent as a process (if needed):*

1. Launch the command prompt using **Run as Administrator** and go to <LG>\launch\_service\bin
2. Uninstall LoadRunner Agent Service by typing in:
  - magentservice.exe -remove<enter>
3. Verify that the service 'LoadRunner Agent Service' is no longer running.
4. Start the LG Agent process by running magentproc.exe from <LG>\launch\_service\bin
5. If desired to start the process automatically after login, add a shortcut to the magentproc.exe into the Start -> Program Files -> Startup group.

### 5.1.3 *To run the LG Agent service under a different account:*

If an installed load generator Agent service runs under incorrect credentials that do not have proper administrative permissions, you can correct this by uninstalling and reinstalling the service:

1. Launch the command prompt using **Run as Administrator** and go to <LG>\launch\_service\bin
2. Uninstall LoadRunner Agent Service by typing in:
  - magentservice.exe -remove<enter>
3. Type in "magentservice.exe -install <user\_domain>\<user\_name> <password>"
4. Go to the Window's Services view and change its properties to start it as "Automatic".

## 5.2 **Reinstalling the Load Generator Software**

In some cases, it may be required to redo the Standalone Load Generator software installation completely, e.g. if other LRE standalone products were installed on the host, or if the installation got corrupted. Please see steps for reinstallation below.

### **Note for multi-component installation**

With some previous versions of the standalone Load Generator software, it has been possible to install multiple standalone components on the same host. That is no longer supported meaning that ONLY the load generator software can be installed on the host.

### **Uninstalling and reinstalling the load generator:**

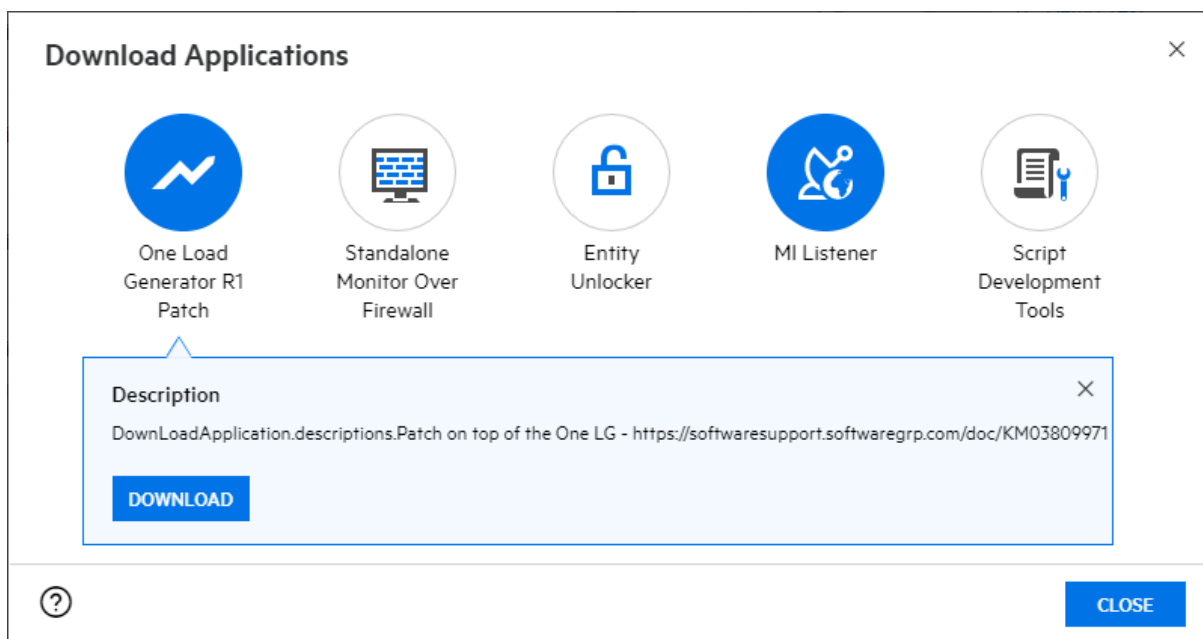
- Make a note of or take screenshots of the agent configuration parameters.
- Obtain the Standalone Load Generator software by downloading it through the LRE application ("Standalone Load Generator"), using the "Download applications" button.
- Make sure your Windows account on the load generator has administrative privileges.
- Now uninstall the existing Standalone Load Generator software.
- Reinstall the latest load generator software using *Administrative* privileges (e.g. by right-clicking on the installer and selecting "Run as Administrator"), and during the setup choose the "LoadRunner Enterprise" and "as a service" (in contrast to as a process) options.

- In the Agent Configuration application, enter the configuration parameters as previously, and restart the agent as requested. This typically includes at least the MI Listener Name and the Local Machine Key.
- Verify through the Windows “services” view that the service is now present in Windows.
- Allow the host to restart.
- Make sure that the service is running.
- After 10 minutes, check in LRE if the load generator is connected.

### 5.3 Applying the Latest Patch Upgrades

- **Any patches for your Standalone Load Generator installations that are required to match your LRE 2021 R1 instance are available for download from your LRE instance, certified for use by Micro Focus SaaS.**
- Regarding the installation order of patches, please follow any instructions provided in the download section itself.
- Alternatively, feel free to contact Micro Focus SaaS to inquire about the latest proper patch levels and installers.
- At the time of writing, there is one SaaS-certified patches specifically for Standalone Load Generator versions LRE 2021 R1. Patches are required if and only if shown in your download section.

**Accessing Micro Focus SaaS Standalone Load Generator installers in the LRE application:**



### 5.4 Test if the firewall is open for LG to SaaS Communication

Load generators can connect to the MI Listener in Micro Focus SaaS in one of two ways: Either directly through your company's firewall through outbound port 443 (typical setup), or through a proxy in your network (less typical setup). If both possibilities are given, direct communication is to be preferred over proxy communication.

The following chapter describes how to test if the company's firewall is open for a load generator to communicate outbound to its MI Listener through port 443.

In many cases, outbound communication on port 443 is permitted already before load generator installation, for example for browsing the internet from the host, though in cases of higher security, even outbound communication may be blocked by default.

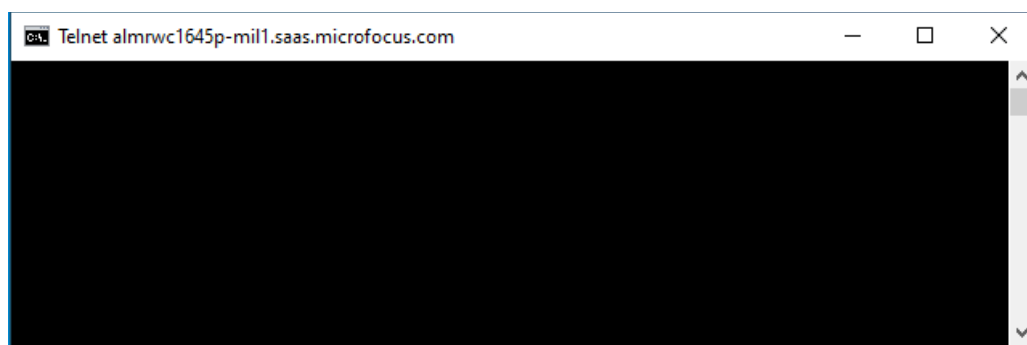
Steps:

- Log in to the selected LG, e.g. through Remote Desktop Client (RDP).
- Open a Windows command shell (e.g. by Start/Run, typing “cmd”).
- Enter “telnet <MI Listener DNS name> 443” and check the response.
- The MI Listener DNS name is provided by Micro Focus SaaS and needs also to be entered identically in the Agent Configuration’s “MI Listener” field (see cause 2.2.2).

E.g. for MI Listener “almrwc1645p-mil1.saas.microfocus.com”, the command is

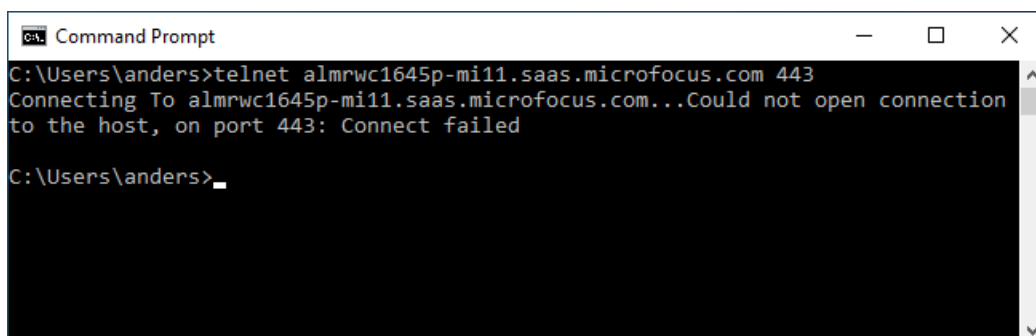
**telnet almrwc1645p-mil1.saas.microfocus.com 443**

- **Case 1:** If the response looks like this (blinking cursor on empty window):



- Then the firewall is open from the load generator to the MI Listener on port 443, as it needs to be for direct communication. You can click the “X” close icon to close the window and log off.
- Test completed.

- **Case 2:** If the response looks like this (“could not open connection ...”):



- Then the firewall is not open and is in need to be opened by your IT Security team unless you used proxy configuration instead.
- Please contact your IT Security Team to open the firewall from the list of IP addresses of load generators you use to the MI Listener DNS name/IP address

outbound on port 443. Note that the firewall rule does not have to be bidirectional, as incoming connections can still be blocked safely without functional impact to LRE. Only outbound connections on port 443 need to be allowed.

- Test completed.
  
- **Case 3 – telnet is not enabled:**
  - If the response instead indicates that telnet is not enabled on this computer, then you can try enabling the telnet feature on the load generator through Windows, as long as not forbidden by your IT organization or prevented by Windows security policy. Enabling telnet works slightly differently in various versions of Windows, though it is typically done through “Start/Control Panel/Programs and Features/Turn Windows Features on or off” or similar and make sure that the “telnet” checkbox is checked. After installation, repeat the test above.

**If the telnet test cannot be performed:**

- We recommend asking your IT Security team to check if the firewall is open outgoing from the LG IP address(es) to the MI Listener DNS name (or if given alternatively, the MI Listener IP address) on port 443.
- As an alternative, you may try to open a browser on the load generator. Check in the browser settings if a proxy is configured. If not, browse an extranet URL of your choice that starts with “<https://>”. If you can access that site without proxy, in most cases it means that port 443 is open to ANY public DNS names and IP addresses (unless the specific site has been white-listed for you), and hence the load generator should be able to reach the MI Listener also.

## 5.5 Load Generator Calibration Test (Advanced)

In case you have to plan a larger scale load generator setup or atypical test setups and need to get the best-possible sizing information for your load generator hardware ahead of time, you may conduct a load generator calibration test. The idea of this test is that you run one of your largest or most challenging load tests in some specific manner, though scaled down to only one model load generator, in order to determine how many Virtual Users per load generator can safely be operated in a stable manner without introducing bias to the load and measured transaction response times.

As a result, you will obtain a reliable account of required load generators for the planned full-scale load test. Feel free to contact Micro Focus SaaS in case you would perform such load generator calibration test and have questions.

### Prerequisites

- Only one of the load generators need to be ready, set-up with the hardware configuration that you expect to use for all load generators.
- You need the actual load test setup, including the System under Test, scripts, target VUsers, think times/pacing, ramp-up speed, and potentially other runtime settings as planned.

### **Load generator Calibration testing process (full-scale validation with 1 load generator available)**

This process determines if a specific amount of load generators of given hardware will be sufficient for the test while only one host is present.

#### **Preparation**

Our example: We assume that a 36000 web VUser test with realistic think times needs to be ramped up to peak in 1 hour and held at peak load for 1 hour before stopping the load. We want to determine if a number of ten two-year old quad-core hosts with 16 GB RAM each is up to the task.

- Create a copy of the full-scale load test, and work on that copy.
- Divide the total amount of VUsers in the test by the target number of load generators you want to use in the final test and make that the new total amount. (e.g.  $36000/10=3600$  VUsers)
- Reduce the number of load generators to 1 (selecting only the one you have already available)
- Divide the target ramp-up speed by the target number of load generators (e.g. a 100 VUsers/10 second ramp-up becomes a 10 VUsers/10 second ramp-up). Keep the total ramp-up time and step time the same (in our case, 1 hour of increments every 10 seconds)

#### **Execution**

- Log into the load generator (e.g. by using RDP), and open up Task Manager in the “Performance” tab, so that you can judge CPU utilization as well as memory available during the load test. Alternatively, any other performance monitor including Perfmon can be used if it gives you reliable CPU and memory readings.
- Now execute the test from beginning to end and observe CPU utilization and physical memory utilization during the ramp-up and peak phase.
- If you see that CPU utilization stays close to 100% for a prolonged period of time, or if physical memory utilization gets higher than 80%, or if the test appears unstable, then your test has already passed its scalability limit, and you need to stop the test after noting the amount of VUsers in the test when the issues started.

#### **Observations during the run**

The load generator setup with the target amount of load generators will only be large enough if:

- No significant amount of errors occurs during the test that are unrelated to the Application Under Test
- CPU utilization safely stays below 80% for most time during ramp-up phase (short 100% spikes are acceptable but should to resolve moments later).



- CPU utilization safely stays below 50% for most time during peak phase (short 80% spikes are fine but should to resolve moments later).
- Memory utilization throughput peak load should not be higher than 80% of the available *physical* (not virtual) memory at any time.

### **Tweaking**

- *If any of the above criteria is violated for more than 15 seconds at a time*, re-run the test with lower targets (requiring resizing the test parameters accordingly), until the criteria are met. This will result in an increase of the total amount of load generators required for the final setup.
- If CPU utilization almost always stays below 40% during ramp-up and below 25% during peak, and memory utilization is never higher than 40%, you may consider doubling the load per load generator (e.g. by 50%) and testing again, effectively shrinking the final amount of load generators needed.
- Keep in mind though that even while a setup close to 80% CPU or memory is possible, often lower utilization is desired, especially if you expect some significant parameters of the test to change later during your load testing process, such as think times, target VUsers, etc. Hence, it may be better to target somewhat lower CPU and memory utilization to allow some headroom for test flexibility.