Deployment Guide

RUCKUS WAN Gateway – Virtual Machine Installation

June 2023

Rev. 1

Table of Contents

Changes in Revision 1

- Added note about setting VLAN ID 4095 for the RWG LAN port group.
- Added slide about where to get the RWG .ISO images.
- Added slide about the Resource Calculator.
- Added slides around using Asset Manager to generate licenses.
- Minor changes on the slides text.

Intended Audience

This document provides an overview of how to configure a RUCKUS product for Virtual Machine Installation on a Hypervisor virtualization platform. Step-by-step procedures for configuration are demonstrated. Some knowledge of the VMWare Hypervisor is recommended.

This document is written for and intended for use by technical engineers with background in Wi-Fi design and 802.11/wireless engineering principles.

For more information on how to configure RUCKUS products, please refer to the appropriate user guide available on the RUCKUS support site at https://support.ruckuswireless.com/

Overview

This document describes how to prepare, install, and initially configure the RUCKUS WAN Gateway as a Virtual Machine on a VMWare ESXi Hypervisor.

The document includes the following sections:

- Hypervisor Infrastructure
- Virtual Machine
- Install RWG from ISO
- Licensing

Hypervisor Infrastructure

Supported Platforms

The RUCKUS WAN Gateway can be installed on the VMware ESXi Hypervisor platform. This guide will illustrate the installation on ESXi version 6.7u3.
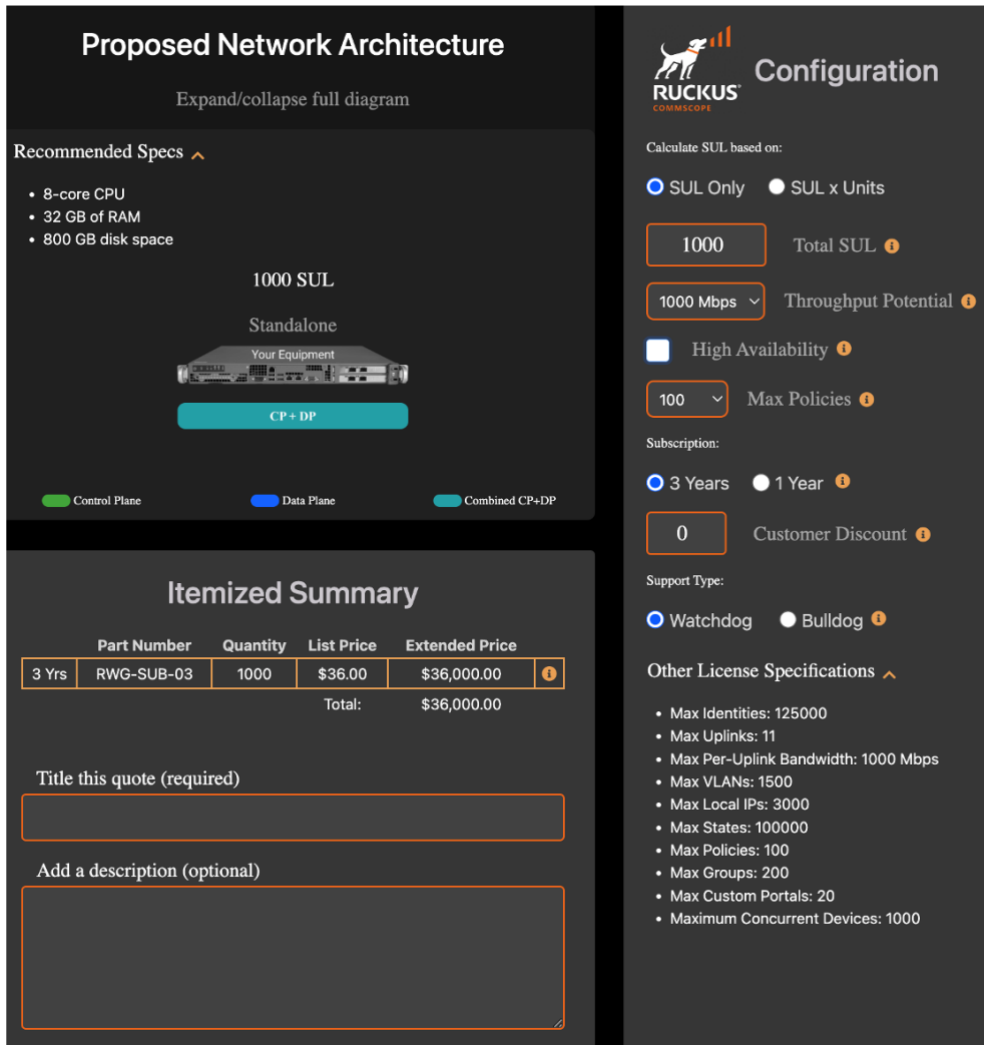
Key Considerations

- RWG is a router, and it is designed to be the default gateway for the end users.

- The physical hardware in the host must exceed the license requirements.

- An additional hardware resource margin is highly recommended.

Host Recommendations for Production

- Multiple physical ethernet network host adapters (NICs)
  - RWG requires at least two virtual interfaces.
  - Large scale dynamic VLAN assignments using RWG may require a dedicated physical LAN port.
- Two physical persistent storage devices
  - Boot drive: This is a small SSD. The hypervisor will be installed here and boot off this device.
  - Primary datastore: This is a large SSD, rated for high endurance (DWPD/DPD 10 is recommended)
- Hardware compatibility
  - Installation may not complete if device drivers are missing.
- Required resources
  - Use the Resource Calculator Tool to calculate the required resources.

The required resources can be calculated using the **Resource Calculator Tool** available at https://store.stage.rgnets.com/configure

You need an user account and password to login.

FIGURE 1 – THE RESOURCE CALCULATOR

Hypervisor Networking

A minimum of two vNICS, two vSwitches and two Port Groups are required for a RWG virtual machine deployment. Four or more are recommended for larger scale, broader RWG deployment scenarios.

Note: The RWG licenses are tied to the VM resource configuration. Removing or adding resources (CPU, DRAM or vNICs) after the RWG is deployed will invalidate the RWG license, and a new one will need to be obtained.

Hypervisor Network Topology

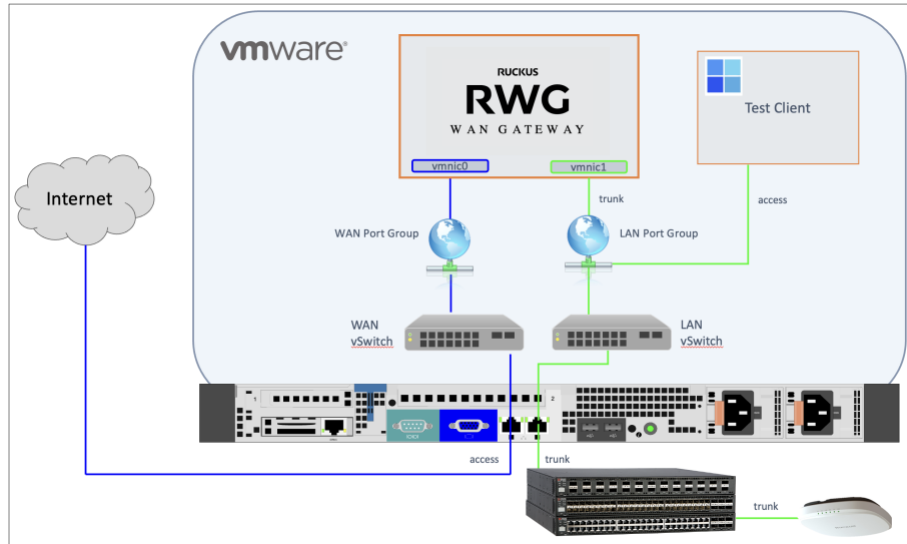The diagram below shows the network topology for a basic RWG VM deployment.

LAN vSwitch

In a web browser, navigate to **Networking/Virtual switches**. Click on **Add standard virtual switch**.
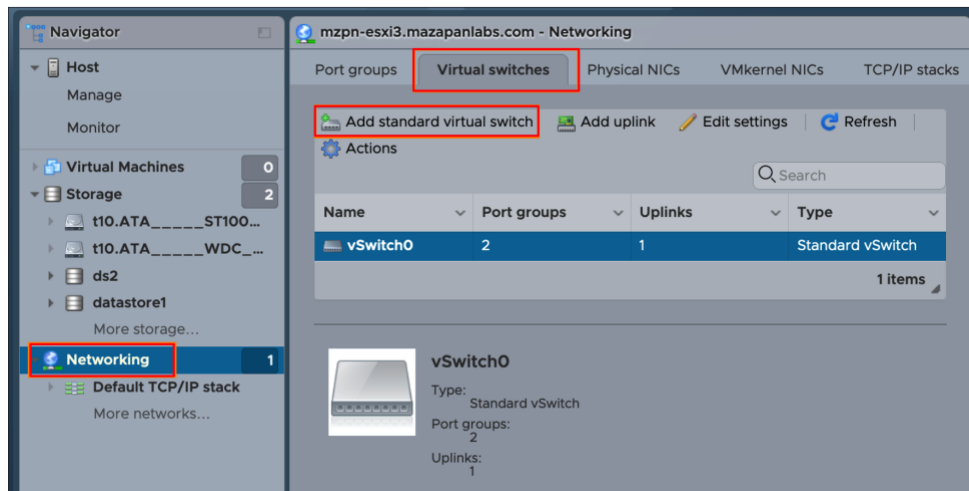

FIGURE 3 - ESXI: VIRTUAL SWITCH TAB

Enter the following information:
- **vSwitch name**: vSwitch1
- **Uplink 1**: vmnic1
- **Promiscuous mode**: Accept for Promiscuous mode (required to pass DHCP traffic)
- **MAC address changes**: Accept
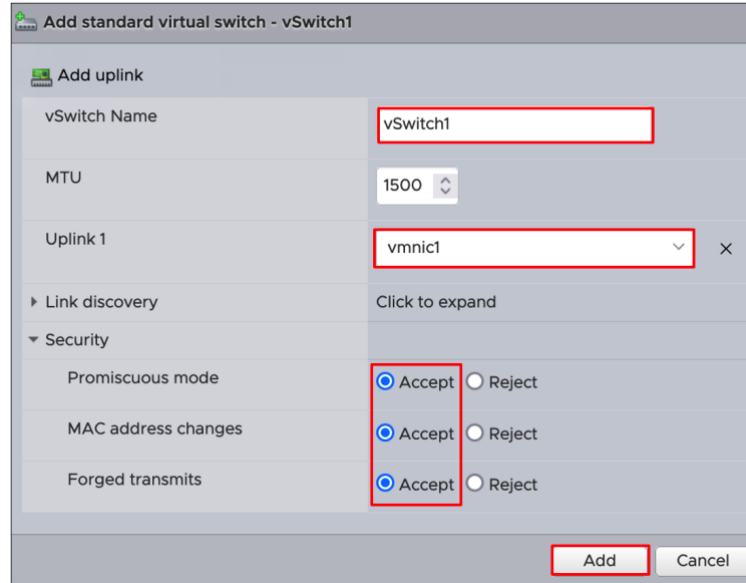- **Forged transmits**: Accept

FIGURE 4 – LAN VSWITCH CONFIGURATION

- Click **Add** to finish.

Port Groups

Port groups are used to set up traffic management for the RWG virtual machine. We need to create at least two port groups. Navigate to the port groups tab and click on **Add port group** to create a new port group.
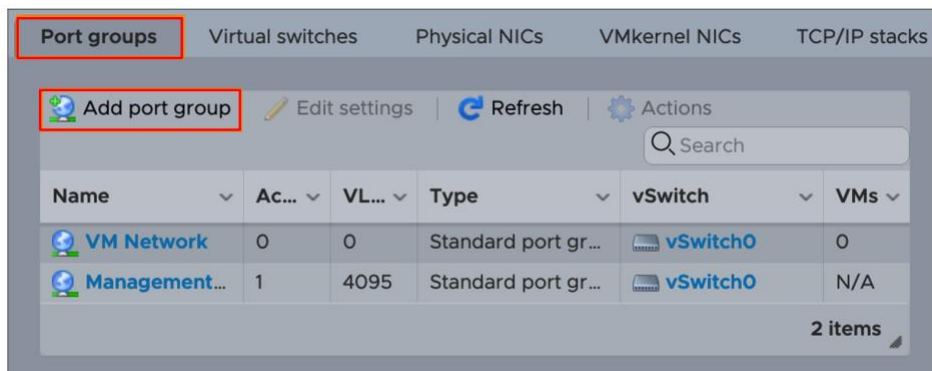

FIGURE 5 – ADD PORT GROUP

Enter the following information to create the port group for the RWG WAN:

- **Port group name**: rwg-WAN-pg
- **VLAN ID**: 0
- **Virtual switch**: vSwitch0 (connected to the ISP)
- **Promiscuous mode**: Accept
- **MAC address changes**: Accept
- **Forged transmits**: Accept
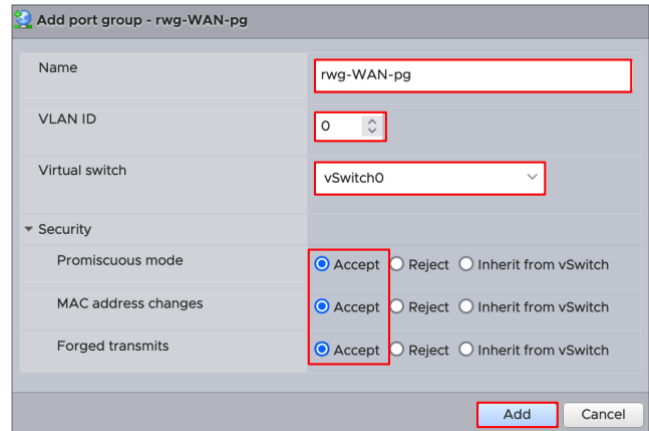
Click **Add** to finish.

FIGURE 6 - WAN PORT GROUP CONFIGURATION

Now let's create a port group for the RWG LAN. Navigate to **Port groups/Add port group** and enter the following information:

- **Port group name**: rwg-LAN-pg
- **VLAN ID**: 4095 (The VLAN ID 4095 enables trunking on the port group. The virtual switch will be able to pass traffic from any VLAN)
- **Virtual switch**: vSwitch1 (connected to the LAN)
- **Promiscuous mode**: Accept
- **MAC address changes**: Accept
- **Forged transmits**: Accept

Click **Add** to finish.
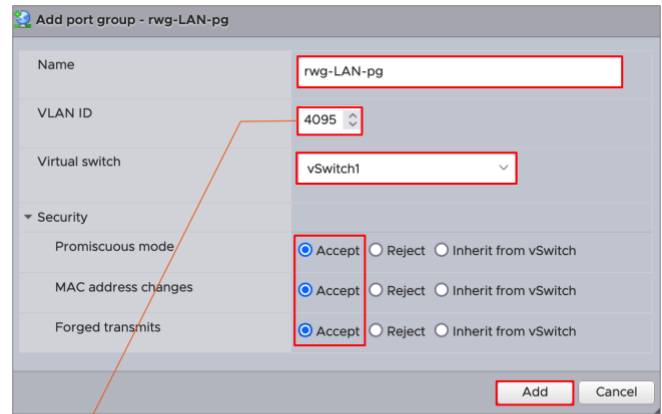
Note: It is important to set the VLAN ID to 4095 for the RWG LAN port group. If you don't do that, RWG will only be able to pass traffic for untagged VLANs.

FIGURE 7 - LAN PORT GROUP CONFIGURATION

The Port groups tab should look like the following:

FIGURE 8 - PORT GROUPS

VMkernel Adapter (Production Environment)

VMkernel NIC adapters are used to provide network connectivity to the hosts and to handle the traffic for additional services such as vSphere vMotion, Provisioning, IP storage, Fault Tolerance logging, vSAN, Management and Replication. VMkernel NIC adapters are not required for most test envinroments.

In an RWG production environment, it is also considered best practice to use a public IP address on the WAN connection, to allow for external management and VPN applications.

To create a VMkernel adapter, go to the **VMkernel NICs** tab and click on **Add VMkernel NIC**.
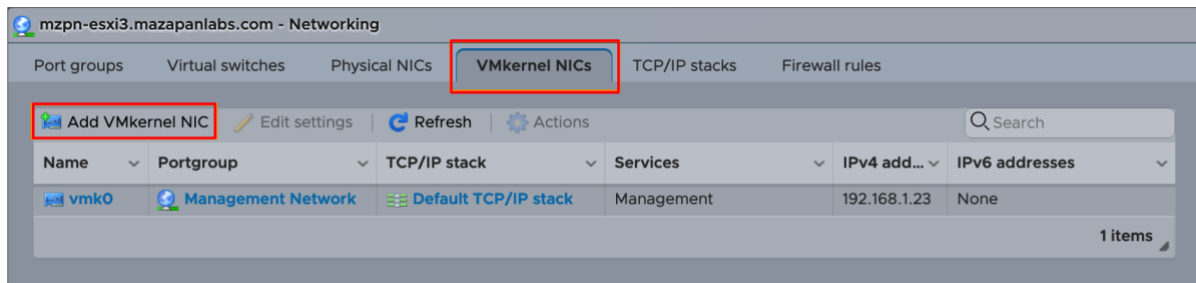

FIGURE 9 - VMKERNEL NICS

Enter the following information:

- **IP address**: enter the RWG WAN address
- **Subnet netmask**: enter the RWG WAN address subnet mask
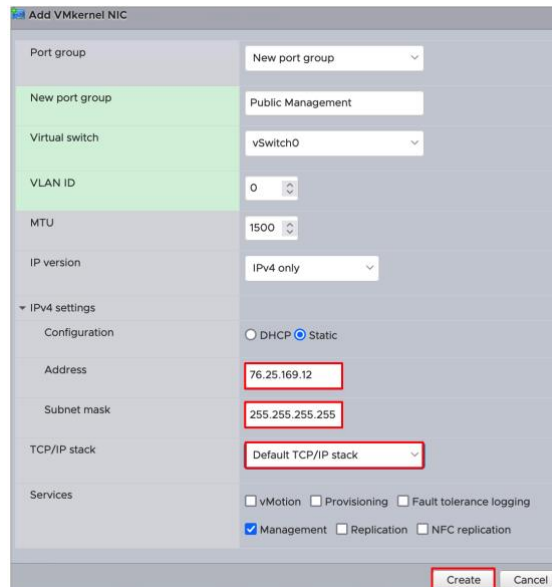- Be sure to modify the **Default TCP/IP stack** with the proper default gateway, DNS and hostname.

FIGURE 10 – NEW VMKERNEL NIC

Click **Create** to finish.

Firewall Configuration

Edit the **Firewall** settings for the SSH Server and vSphere Web Client rules to only allow traffic from your desired subnets. Navigate to the **Firewall** rules tab and in the search field, search for **SSH Server**. Highlight the SSH Server rule and click on **Edit Settings**.
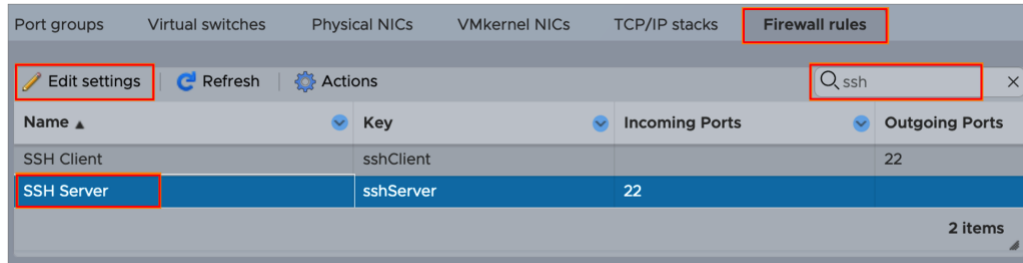

FIGURE 11 - FIREWALL RULES

In the firewall rule settings, select **Only allow connections from the following networks:** and input your chosen networks.
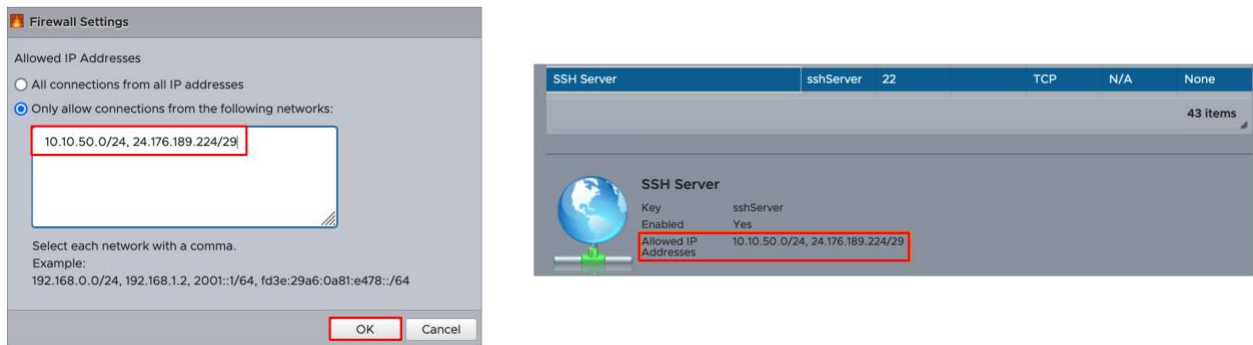

FIGURE 12 - SSH SERVER FIREWALL RULE SETTINGS

Click **OK** to finish. The ruleset should refresh automatically.

Repeat the same process for the **vSphere Web Client** rule.

Virtual Machine

Download the RWG ISO File

Navigate to the RUCKUS support site at https://support.ruckuswireless.com/software, and select RUCKUS WAN Gateway (RWG) in the dropdown list. The **Downloads** tab will show the recommended ISO images. Download the latest recommended image to your computer.
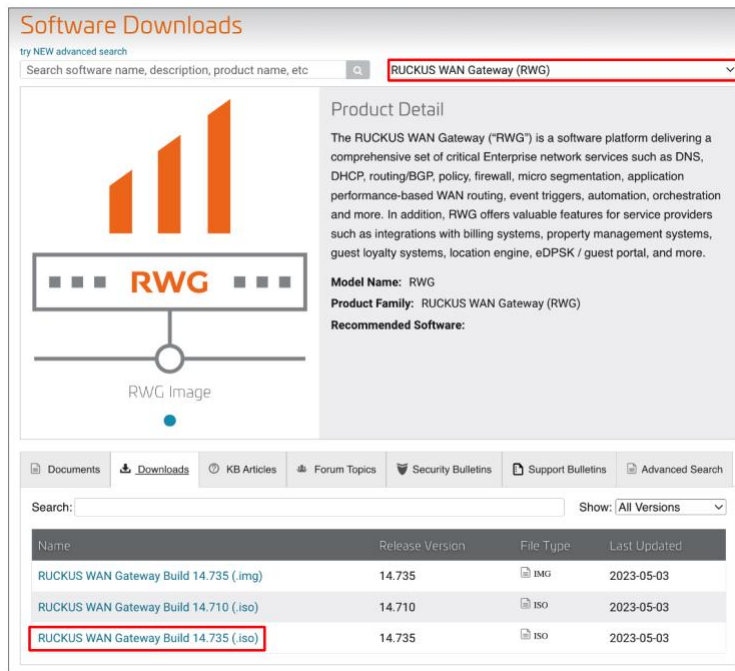

FIGURE 13 – RWG IMAGES AT THE RUCKUS SUPPORT PORTAL

After you downloaded the RWG ISO, upload the file to an accessible datastore on the ESXi host. Navigate to **Storage**, select your datastore, then go to the **Datastore browser**, select your datastore directory and click **Upload**:
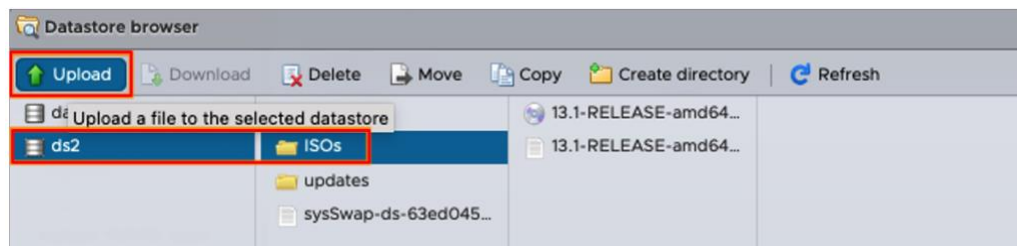

FIGURE 14 – UPLOAD IMAGE TO DATASTORE

Create VM

The VMware wizards are designed for creating virtual servers. RWG is a router, and its requirements are different from a standard VMware server, so a custom VM creation is required. Go to **Navigator/Virtual Machines** and click **Create/Register VM**.
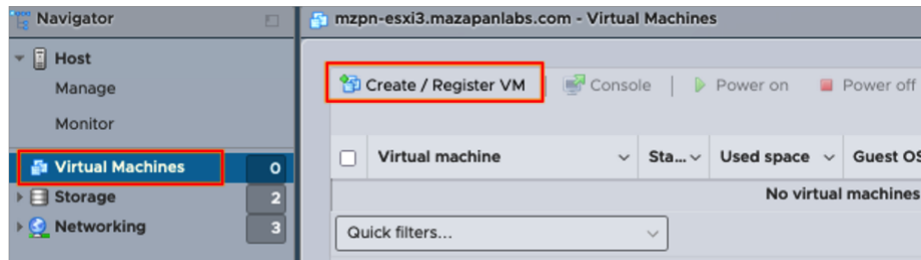
Execute the following steps:
- Select **Creation Type**
- Select **Create a new virtual machine** and click **Next**.
- Enter a name and select the parameters for the Guest OS:
  - **Name**: RWG VM
  - **Compatibility**: ESXi 6.7 virtual machine
  - **Guest OS family**: Other
  - **Guest OS version**: FreeBSD 12 or later versions (64-bit)
- Click **Next**
- Select **Storage**
- Select your datastore and click **Next**

Customize Settings

These settings should be entered according to your requirements. Use the **RWG Resource Calculator** to confirm the required resources. This example will use the minimum settings. Enter the follow information:
- **CPU**: 4 (1 core per socket)
- **Memory**: 12 GB
- **Hard disk 1**: 80 G (thick provisioned, lazily zeroed)
- **Network Adapter 1**
  - Select the rwg-WAN-pg port group that was previously created. The first network interface on the server is a DHCP client (vmx0/vmnic0) which will be utilized for the RWG WAN uplink to the ISP.

Click on **Add network adapter** to create a new network adapter.
- Select the rwg-LAN-pg port group that was previously created. The last network interface on the server is a DHCP server (vmx1/vmnic1 in this example), which will be used for the RWG LAN connection.
- **CD/DVD Drive 1**
  - Mark the **Connect** checkbox
  - Select **Datastore ISO file**
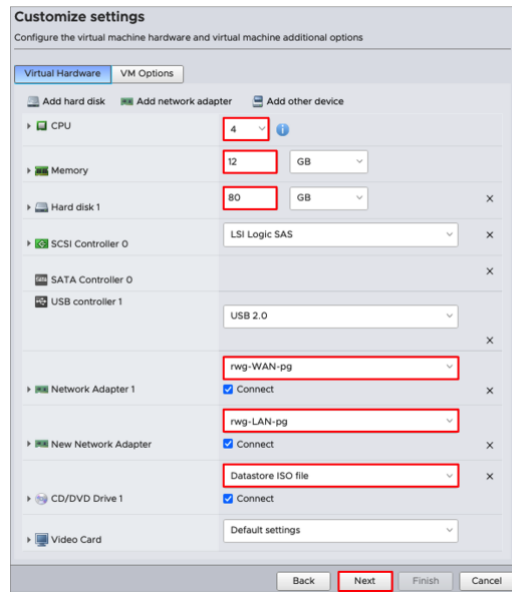 - Locate the RWG ISO file and click **Select**

FIGURE 16 – CUSTOMIZE SETTINGS

Click **Next** to continue. The system will show the resulting configuration.

FIGURE 17 – READY TO COMPLETE

Confirm the settings and click **Finish** to create the virtual machine.

Best Practices for Multiple Uplink/Interface Deployments

The example in this document uses only two physical ethernet interfaces and vSwitches. In production, multiple uplinks and interfaces may be required. The following are some caveats and considerations when deploying multiple interfaces for a VM deployment:

- Licensing is locked to the number of interfaces on the VM. Create a few more interfaces than you. Having more interfaces available will avoid the need to obtain new RWG licenses. Unused interfaces can remain disconnected until you need them.

- A VMXNET3 adapter is required for interfaces running at 10 GBps.

- The first network interface on the server is a DHCP client (vmx0/vmnic0), which will be utilized for the WAN uplink to the ISP. It needs to be connected to your ISP router.

- The last network interface on the server is a DHCP server (vmx3/vmnic3 if using 4 interfaces), which will be utilized for the LAN connection.

- The additional interfaces can be configured as either WAN uplinks or LAN connections, depending on your use case.

Virtual Network Adapter Order (Known VMware issue)

It is possible that when deploying multiple virtual network adapters (3 or more), the order of the adapters may appear as non-linear in the vSphere/ESXi settings, which can cause NIC configuration issues with the RWG. You may need to manually adjust the parameters. This is done post VM installation.

To manually set the virtual network adapter order, shut down your VM, then do a right click and select **Edit Settings**. Go to **VM Options/Advanced/Configuration Parameters** and click **Edit Configuration**.
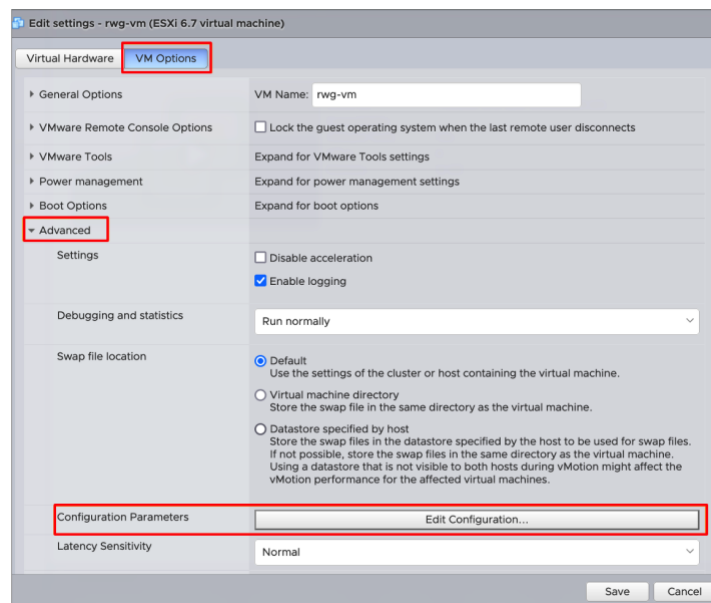

FIGURE 18 - VM OPTIONS

In the Search field type in **ethernet** to filter for the **ethernetX.pciSlotNumber** entries. This sequence of values works reliably for multiple ethernet interfaces:
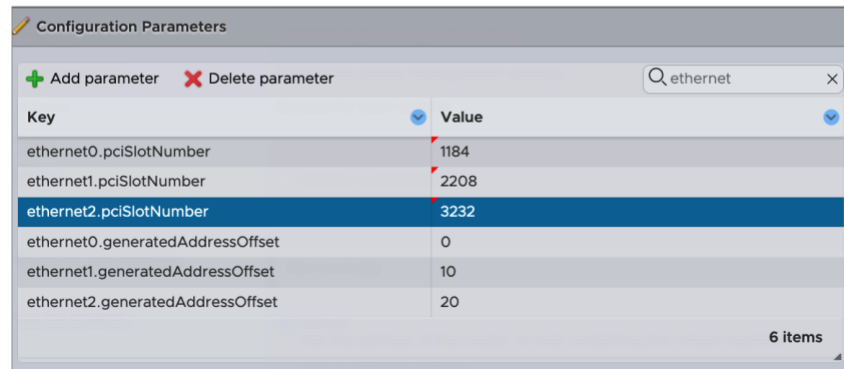
- ethernet0.pciSlotNumber: 1184
- ethernet1.pciSlotNumber: 2208
- ethernet2.pciSlotNumber: 3232
- ethernet3.pciSlotNumber: 4256
- ethernet4.pciSlotNumber: 5280
- ethernet5.pciSlotNumber: 6304
- ethernet5.pciSlotNumber: 7328

Double click on the value field and make the required changes for each ethernet.pciSlotNumber.

FIGURE 19 - ETHERNET ENTRIES BEFORE AND AFTER CHANGES

Click **OK** and then **Save**.

Installing RWG

Start the VM to boot from the ISO file to begin the RWG installation process. The system will auto boot into the RWG installer.
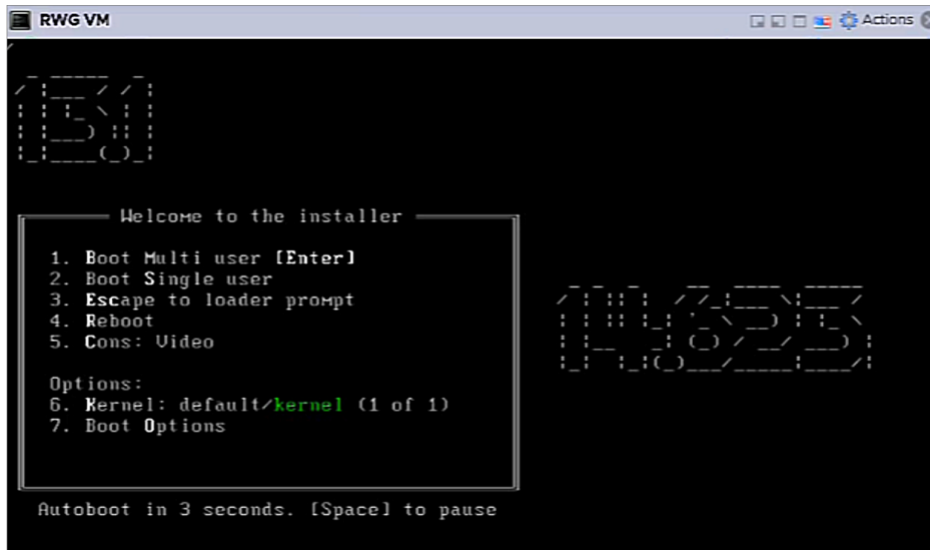
FIGURE 2 - VM STARTUP

Installer wizard

The next screens will ask for confirmation to install RWG's Base OS and software. Click **Yes** to start the process.

FIGURE 3 - CONFIRM INSTALLATION
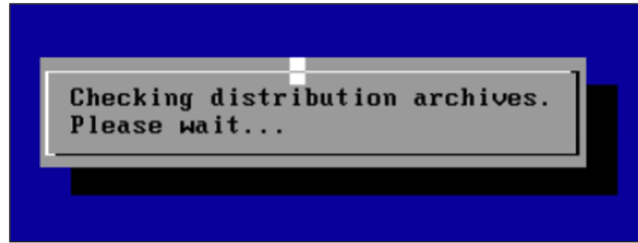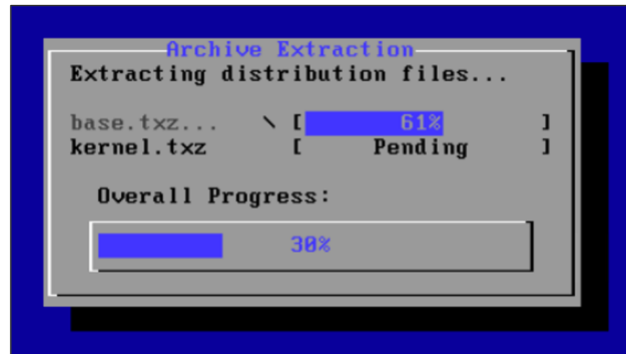
FIGURE 4 - CHECKING DISTRO ARCHIVES
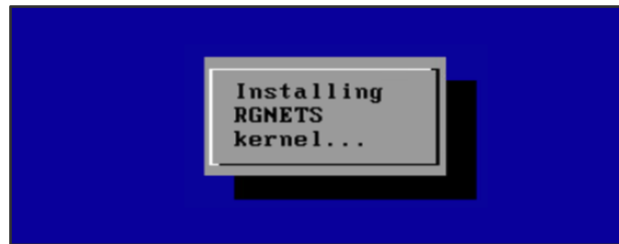

FIGURE 5 - DISTRO FILES EXTRACTION

FIGURE 6 - INSTALLING RWG KERNEL
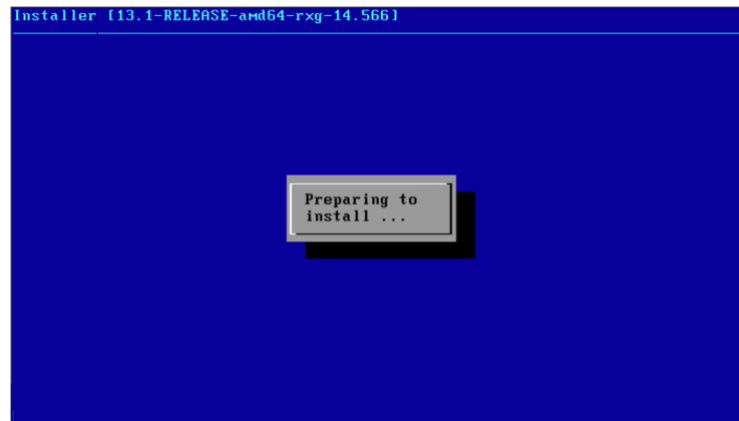
FIGURE 7 - PREPARING TO INSTALL RWG SOFTWARE

17   Deployment Guide
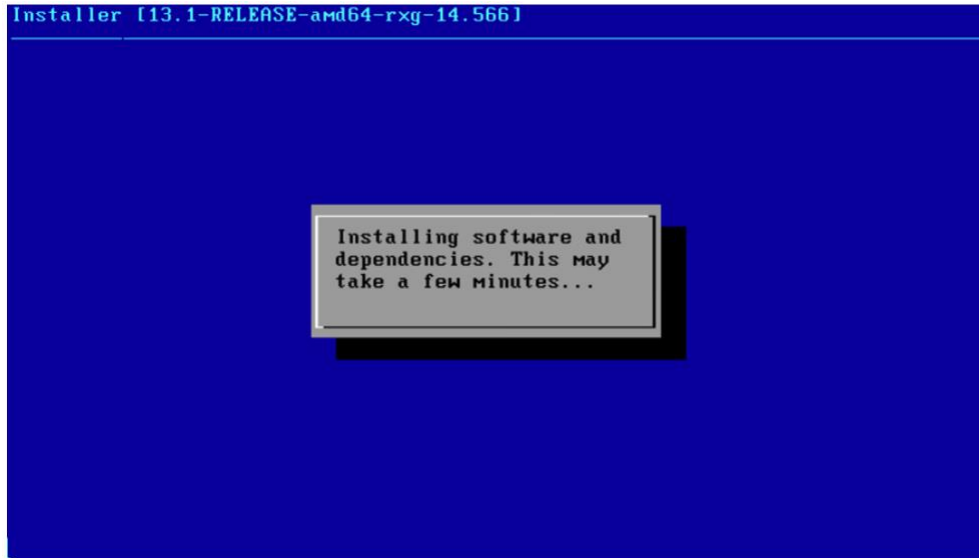
FIGURE 8 - SOFTWARE AND DEPENDENCIES INSTALLATION

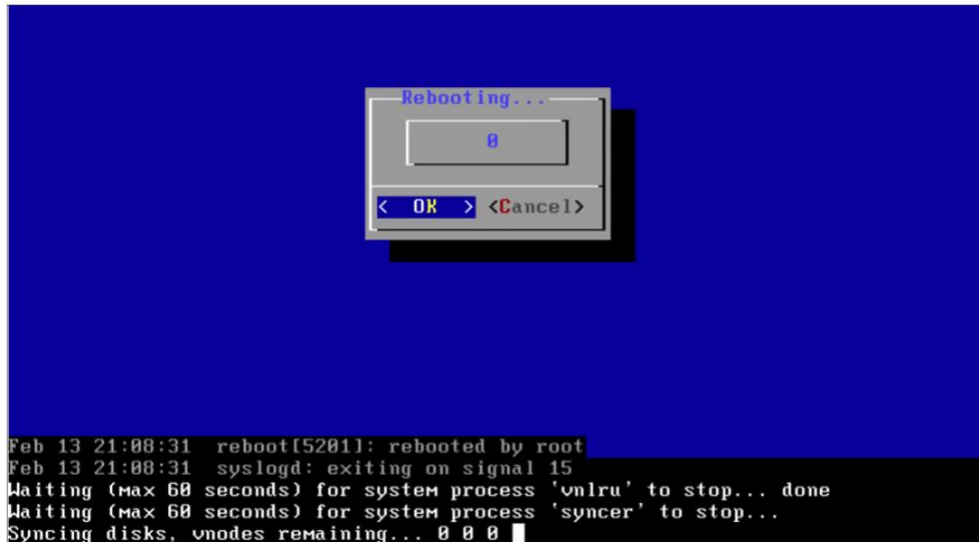After the installation is complete, the system will reboot automatically.

FIGURE 9 - REBOOTING AFTER INSTALLATION

System Initialization

After rebooting, the system will come back up with an initializing screen and ask that you wait at least ten minutes for the process to complete.

FIGURE 10 - WAIT FOR FIRST COMPLETE INITIALIZATION

The network interfaces will be shown, as well a **License Required** message.

FIGURE 11 – ASSIGNED WAN AND LAN IP ADDRESSES

The system will acquire an IP address on the WLAN port, and the LAN port will be assigned 192.168.5.1/24 by default.

Initial Configuration Tool

The WAN and LAN IP address can be changed with the RWG configuration tool that loads after installation. Select option **1** for WAN IP configuration changes and option **2** for LAN IP configuration changes.

FIGURE 12 - CONFIGURATION TOOL

RWG Licensing

The **Installation Unique Identifier (IUI)** is required to generate the RWG license. From the configuration tool, choose option **7** and copy the IUI.

Alternatively, you can open a web browser on a separate system and navigate to https://192.168.5.1/admin to view the GUI and copy the IUI. The web server may take a short while to display the page but will eventually show up. When the webpage loads, you can click on the **Copy** button under the IUI to copy it.
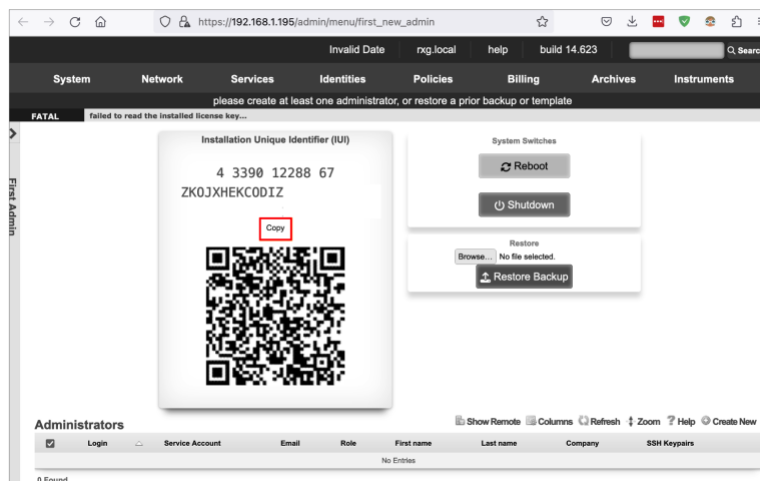

FIGURE 31 - COPY IUI FOR LICENSING PORTAL

Generating and Applying the License

The **Asset Manager** is available for RUCKUS SEs to create licenses for demos and POCs. Navigate to https://store.rgnets.com/asset_manager. You need an user account and password to login.
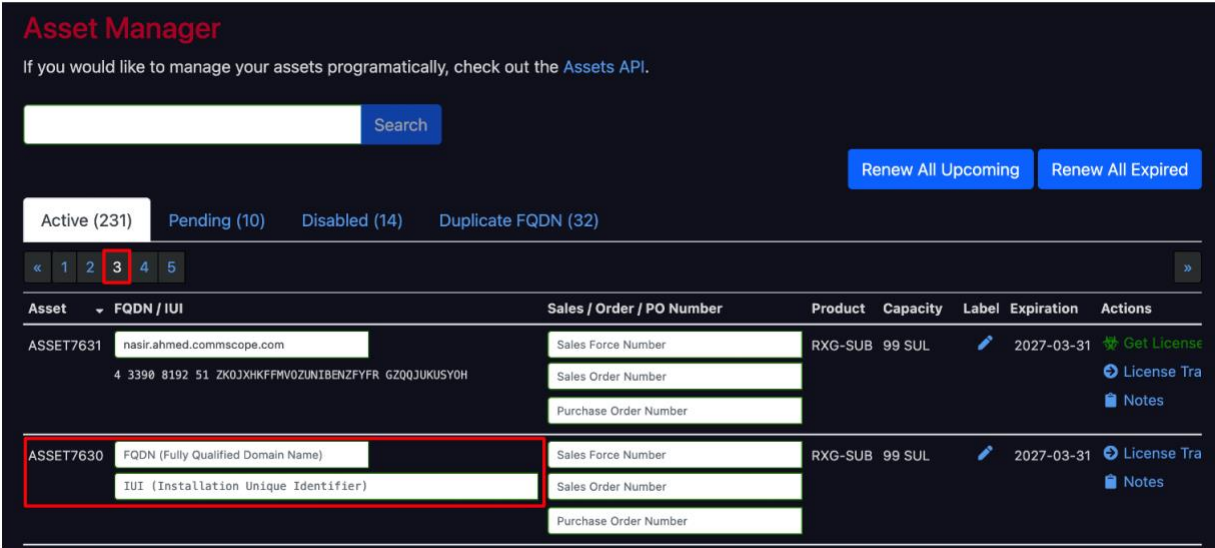
Enter the following information:

- **FQDN**: Enter the FQDN for your instance. If it is not defined yet, enter rxg.local. Click **Set FQDN** to complete.
- **IUI**: Paste the IUI you copied from your instance. Click **Set IUI** and the confirmation to complete.

FIGURE 33 – ENTER THE FQDN AND IUI

Scroll right, then click **Get License** to see your license. Click **Copy to Clipboard** to copy it.
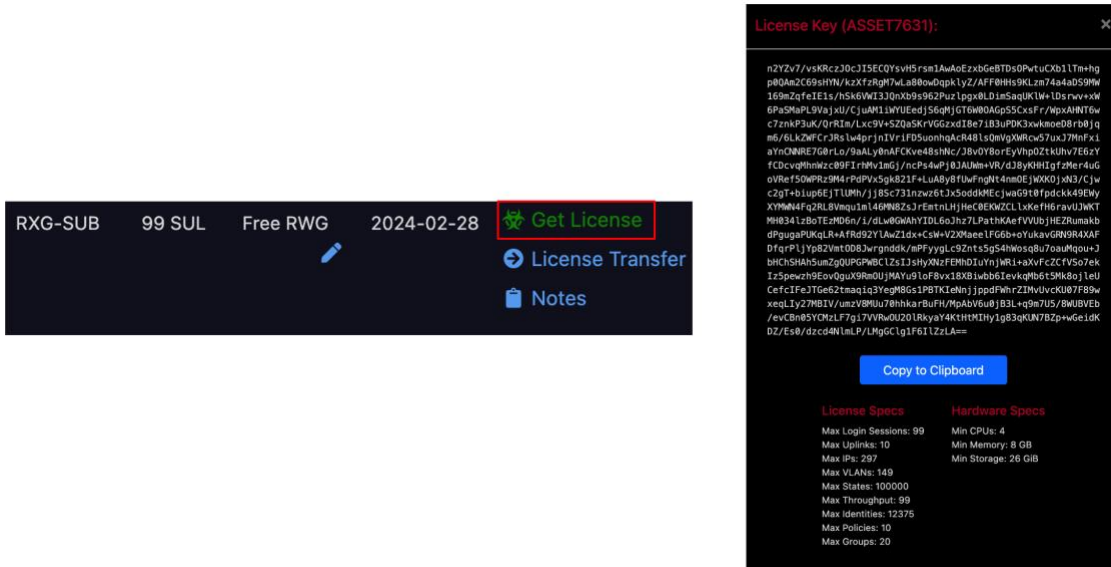

FIGURE 34 – GET LICENSE

If the RWG server has internet connectivity, you do not need to perform any additional steps, as the system will reach out to the Asset Manager server and apply the license automatically.

If the RWG server does not have internet connectivity, you need to paste the license manually. Navigate to https://192.168.5.1/admin, go to the **License Keys** section and click on **Edit**.

FIGURE 35 – EDIT LICENSE KEYS

Paste the license copied from the Asset Manager into the empty field and click **Update**.
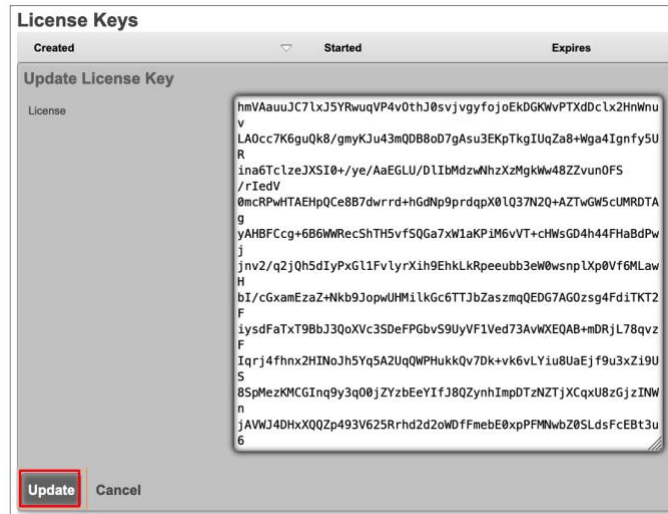
FIGURE 36 – PASTE THE LICENSE

RWG will reboot, the GUI will update and show the RWG logo, and the license file information will display in the **License Keys** section.
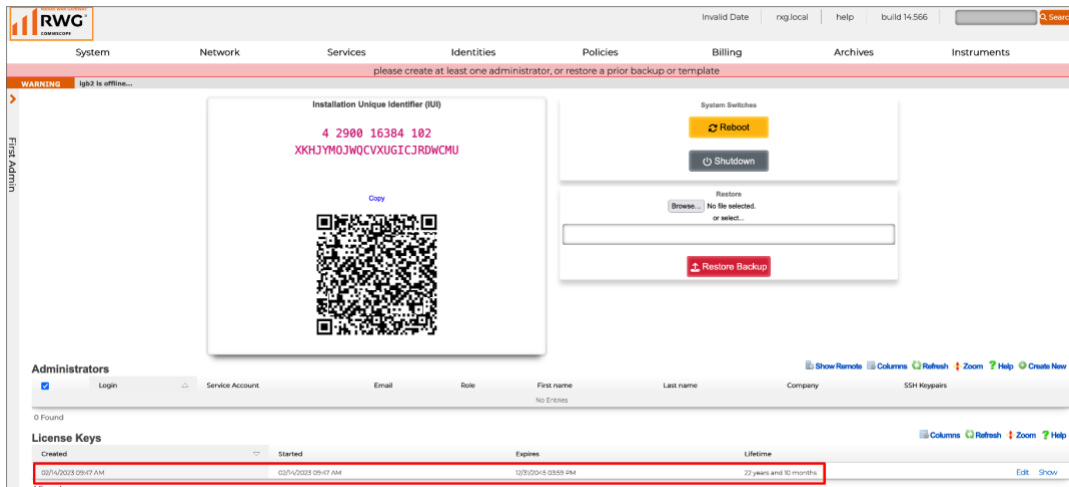

FIGURE 37 – LICENSE IS APPLIED

Creating the First Admin Account

In the Admin GUI a message asking you to create at least one administrator account. To create the account, click on **Create New** in the **Administrators** section.
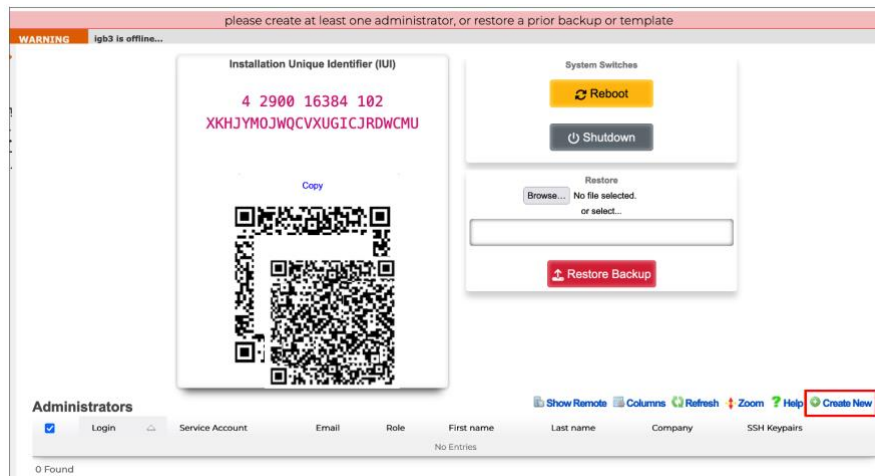

FIGURE 38 – CREATING A NEW ADMINISTRATOR

Enter the Administrator account information and apply the **Super User** role to the administrator account. Scroll down and click **Create** to finish.
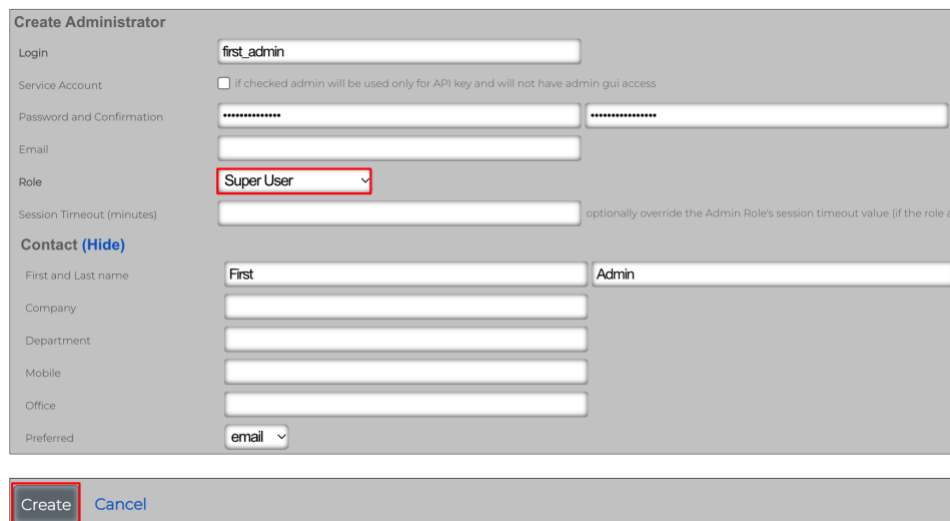

FIGURE 39 – CREATE ADMINISTRATOR

This concludes the virtual machine installation. Other documents will cover the RWG's basic setup, adoption of devices, and step-by-step guides for different use cases.

RUCKUS solutions are part of CommScope's comprehensive portfolio for Enterprise environments (indoor and outdoor).

We encourage you to visit commscope.com to learn more about:

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- RUCKUS ICX switches
- SYSTIMAX and NETCONNECT: Structured cabling solutions (copper and fiber)
- imVision: Automated Infrastructure Management
- Era and OneCell in-building cellular solutions
- Our extensive experience about supporting PoE and IoT