USER MANUAL

EMD3000GE

EMERALD® GE GATEWAY

BLACK BOX®

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SAFETY NOTICES

Before you get started installing the Emerald® GE, be sure to read and understand the following safety notices:

ESD

Electrostatic discharge (ESD) events can damage electronic components inside your system. Under certain operating conditions, ESD may amass on your body or an object, and then discharge into another object, such as your Emerald GE.

To prevent ESD damage to the Emerald GE and other electronic devices, you should discharge static electricity from your body prior to interacting with this device.

You can mitigate ESD damage and discharge by touching a metallic grounded object (such as a light switch screw) before you interact with any electronics. When utilizing your device, you should always ground yourself and any potential peripherals before making contact with any electronic device. In addition, as you continue to interact with the Emerald GE, periodically discharge accumulated ESD.

WARNING:

To avoid potentially fatal shock hazard and possible damage to equipment, observe the following precautions:

These devices contain no user-serviceable technology. Do not open the enclosure. If you have a unit that needs to be repaired, contact Black Box Corporation for technical and RMA support. You should only perform troubleshooting and repairs as authorized or directed by the Black Box technical support. Damage due to servicing that is not authorized by Black Box is not covered by your warranty.

Test AC outlets at the workstation and monitor for proper polarity and grounding.

When you disconnect a cable from the Emerald GE, pull it by its connector or its pull tab, not the cable itself. Some cables have connectors with locking tabs or thumbscrews that you must disengage before disconnecting the cable. When disconnecting cables, keep them evenly aligned to avoid bending the connector pins. When connecting cables, ensure that the ports and the connectors are correctly oriented and aligned.

CHAPTER 1: SPECIFICATIONS

1.1 SPECIFICATIONS

FRONT VIEW

BACK VIEW

1.2 WHAT'S INCLUDED WITH THE GATEWAY (EMD3000GE)

- **(1) EMERALD® GE GATEWAY APPLIANCE**
- **(1) DC POWER SUPPLY (19.5VDC, 4.62A)**
- **(1) COUNTRY-SPECIFIC POWER CORD**
- **(1) VESA MOUNTING KIT WITH ASSOCIATED HARDWARE**
- **(1) INFORMATION SHEET**

CHAPTER 1: SPECIFICATIONS

SPECIFICATIONS FOR EMERALD GE GATEWAY

FEATURE	SPECIFICATION
PROCESSOR	Intel Core i9 processor 14900 vPro (36MB cache, 24 cores, 32 threads, up to 5.4 Ghz Turbo, 65W)
MEMORY	16GB DDR5 Memory, 2x8GB, 5600, Non-ECC, SoDIMM
STORAGE	M.2 2230, 256GB PCIe NVMe SSD Class 35
CONNECTORS	(4) DisplayPort™ outputs; (3) USB 3.2 Gen 2x1, Type A (SuperSpeed USB); (1) USB 3.2 Gen 1x1, Type A (SuperSpeed USB); (1) USB-C, USB 3.2 Gen 2x2 (SuperSpeed USB); (1) 3.5mm Analog Audio Output; (1) 3.5mm Analog Microphone Input; (2) RJ-45 1Gbps Network Ports; (1) Power Input NOTE: Most of the I/O data connectors, such as those for video and USB, are not active since this product functions like a network appliance.
MAXIMUM DISTANCE FROM NETWORK	328 feet (100m) using CATx cabling
USER INTERFACE	Web interface and Boxilla
MOUNTING	None
POWER	180 W AC Adapter, 4.5 mm barrel
INPUT VOLTAGE/VOLTS	100-240VAC, 50/60Hz
INPUT CURRENT/AMPS	2.34 Amps
OUTPUT VOLTAGE/VOLTS	19.5VDC
OUTPUT CURRENT/AMPS	9.23 Amps
POWER CONSUMPTION	180 Watt maximum
HEAT DISSIPATIONS/BTU/H	613.8 BTU/h
TEMPERATURE RANGE	Operating: 50 to 95˚F (10 to 35˚C); Storage: -40 to +149˚F (-40 to +65˚C)
RELATIVE HUMIDITY (MAXIMUM)	Operating: 20 to 80% (non-condensing); Storage: 5 to 95% (non-condensing)
VIBRATION (MAXIMUM)*	Operating: 0.26 GRMS; Storage: 1.37 GRMS
SHOCK (MAXIMUM)	Operating: 40 G†; Storage: 105 G†
ALTITUDE RANGE	Operating: <5,518 ft (1,681 m); Storage: <19,234 ft (5,862 m)
DIMENSIONS	7.17"H x 1.42"W x 7.01"D (182 x 36 x 178 mm)
WEIGHT	2.91 lb. (1.32 kg)
COMPATIBILITY	Boxilla Managers, Emerald Transmitters, and Virtual Machines (RDP, PCoiP, H.264/H.265)

CHAPTER 2: OVERVIEW

2.1 INTRODUCTION

Emerald® GE is the latest addition to the Black Box Emerald High-Performance KVM Switching and Extension system. It connects workstations with remote computers, servers, and Virtual Machines (VM) over an IP network.

The Emerald GE is the next generation technology that allows end users to access, control, and share virtual machines located on a Hypervisor. It is part of the bigger Emerald solution and is fully compatible with the Boxilla manager and the other Emerald appliances. The Emerald GE is a small and capable device intended for control rooms, manufacturing facilities, commercial operation, data centers, and so many more. It maximizes performance while minimizing the physical size, and can be placed anywhere on the network for full operation. Users do not directly interface with the technology, but rather they interface with it through a physical receiver, web interface, or by using the RemoteApp over a TCP/IP network.

Emerald GE is the solution to seamlessly share these virtual machine assets over a network, so one or more user(s) can simultaneously be connected to the same VM to collaborate.

Emerald GE introduces a shared mode feature for Virtual Machines, enabling simultaneous connections for up to 8 Emerald users on a single VM. Each Emerald GE unit can service up to 8 VMs (RDP, PCoIP, or PCoIP ultra), allowing for a total support capacity of up to 64 users.

Truly futureproof, Emerald GE is at the forefront of the trend of more and more control rooms adopting PCoIP.

Remote users connected via any type of Emerald receiver unit get a seamless, low-latency desktop experience that is no different when connecting to a physical computer or to a virtual machine.

Emerald GE simply connects to the Emerald IP network giving all Emerald users enhanced connectivity with VM sharing and physical machine access, saving the costs of VM clients.

Advantages of Virtual Machines:

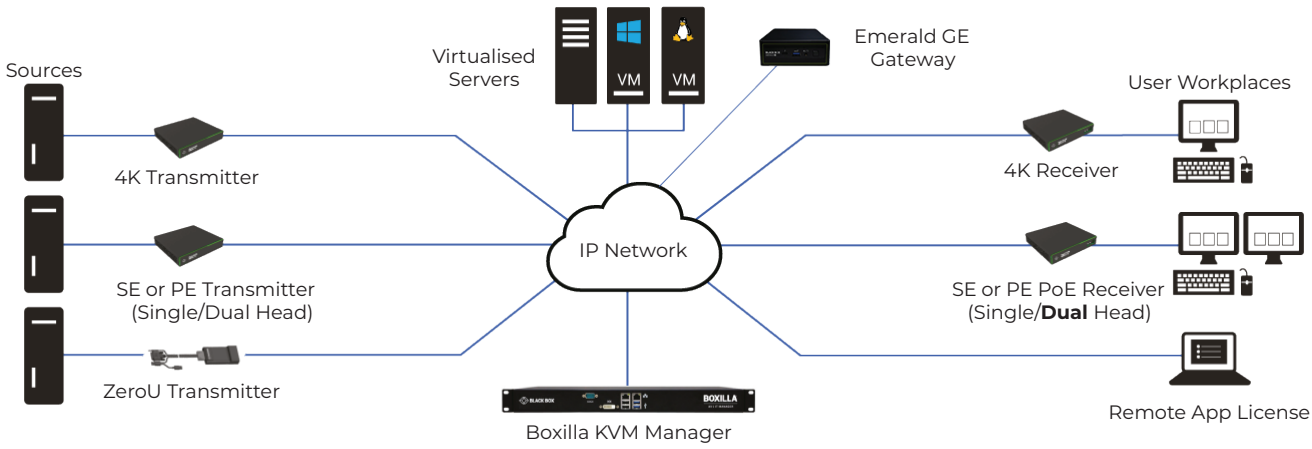
- Flexibility and Scalability: Virtual machines allow users to scale up or down their infrastructure based on their demands. They can easily provision additional virtual machines to handle increased workloads and deprovision them when they are no longer needed.
- Resource Optimization: Virtualization enables efficient utilization of hardware resources by running multiple virtual machines on a single physical server. This maximizes the use of available computing power, memory, and storage.
- Isolation and Security: Virtual machines provide a level of isolation between different applications and workflows. This isolation helps prevent issues in one application from affecting others, enhancing overall system stability and security.
- Disaster Recovery and High Availability: By running critical production applications on virtual machines, users can implement robust disaster recovery and high availability solutions. Virtualization allows for easy replication of virtual machines to secondary sites or cloud environments, ensuring continuity of operations in the event of hardware failures or disasters.
- Testing and Development: Frequent updates and changes to software and configurations is often needed for testing and develoment. Virtual machines provide an ideal environment for testing and development, allowing engineers to experiment with new software versions, configurations, and workflows without impacting production systems.
- Remote Access and Collaboration: Virtual machines can be accessed remotely, enabling production teams to work from different locations and collaborate effectively. This is particularly useful for distributed teams or situations where remote work is necessary.
- Cost Savings: Virtualization can lead to cost savings by reducing the need for physical hardware, lowering energy consumption, and streamlining maintenance and management processes.

CHAPTER 2: OVERVIEW

2.2 EMERALD GE GATEWAY FEATURES

- Small form factor design allows for space conservation.
- Powerful system hardware provides a seamless user experience.
- Supports multiple connections to the same virtual machine to share with other users simultaneously.
- Supports up to 8 active virtual machines with up to 8 users per connection (64 total users).
- Interface with any Windows® or Linux® based virtual machine on any Hypervisor.
- Design features low noise emissions for quiet environments.
- Easy integration with the Boxilla® Enterprise KVM Manager.
- Supports Emerald receiver appliance connections using any model.

2.3 APPLICATION DIAGRAM



CHAPTER 3: CONFIGURATION

3.1 BASIC CONFIGURATION

One Emerald® GE supports eight virtual machines being used simulataneously.

TIP: You can have an unlimited number of virtual machines and still only need one Emerald GE. This is because the Emerald GE only limits simultaneous use of virtual machines, not the actual number of virtual machines.

Example #1:

You have 50 virtual machines, but only 8 of those virtual machines are used at one time. You only need to have one Emerald GE, since the unit can support the use of 8 simulataneous virtual machines.

Example #2: You have 16 virtual machines, and all 16 need to be used simultaneously. You will need to have two Emerald GE units, since each unit can support the use of 8 simultaneous virtual machines.

Each Emerald GE supports a maximum of 64 users. This is because each GE unit supports 8 simultaneous virtual machines, and each virtual machine can support 8 users.

CHAPTER 3: CONFIGURATION

3.2 EMERALD GE GATEWAY CONNECTOR INFORMATION

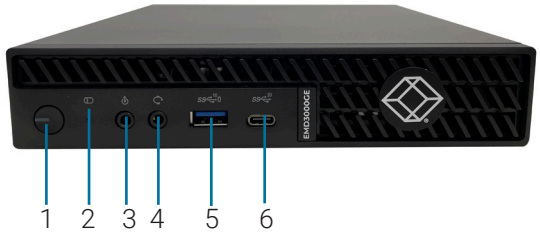


FIGURE 4-1. FRONT VIEW OF EMERALD® GE GATEWAY (EMD3000GE)

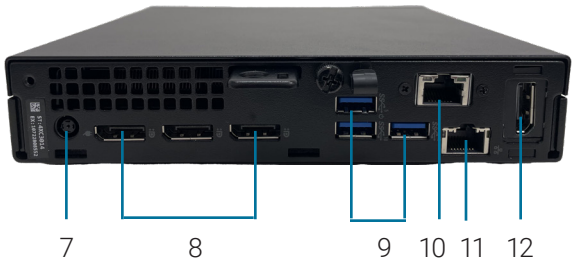


FIGURE 4-2. REAR VIEW OF EMERALD GE GATEWAY (EMD3000GE)

CHAPTER 3: CONFIGURATION

TABLE 4-1. EMERALD GE GATEWAY COMPONENTS

NUMBER IN FIGURES 4-1 THROUGH 4-2	COMPONENT	DESCRIPTION
1	(1) Power button	Use to turn unit on or off.
2	(1) SSD Activity LED	Illuminates to indicate Solid State Drive (SSD) activity
3	(1) 3.5-mm jack (MIC)	Connects to analog microphone
4	(1) 3.5-mm jack (SPK)	Connects to analog speaker
5	(1) USB 3.2 Gen 1x1, Type A port	Connects to optional USB peripherals
6	(1) USB-C, USB 3.2 Gen 2x2 port	Connects to optional USB peripherals
7	(1) Power input	Connects to external 19.5VDC power supply
8	(3) DisplayPort™ outputs (4K)	Connects to DisplayPort output(s) up to DCI 4K 4096x2160 @ 60 Hz
9	(3) USB 3.2 Gen 2x1, Tpe A Ports	Connects to USB peripherals
10	(1) ETH2	Connects to Network Interface Card (NIC) (not enabled, future use)
11	(1) ETH1	Connects to Network Interface Card (NIC)
12	(1) DISPLAYPORT OUTPUT (5K)	Connects to 5K DisplayPort output (5120x2880 @60 Hz)

CHAPTER 4: OPERATION

Setting up and configuring the Emerald® GE can be done once the device is powered up and the network cable is connected to the ETH1 (bottom NIC). Configuration can be done using a web interface with any web browser.

4.1 EMERALDGE INITIAL SETUP AND LOGIN

To set up the Emerald GE:

1. Open any web browser and navigate to the Emerald GE web interface using the default IP address of https://192.168.1.10 (If this default was previously changed, then substitute that IP address.)

   NOTE: Upon the initial connection to the Emerald GE, you will be prompted with a "Connection not Private" warning. This notice will vary depending on the web browser you are using. This manual was written using the Google Chrome web browser, so images and screenshots will use the Google Chrome templates and themes.

   An example warning message is shown in Figure 4-1 below:

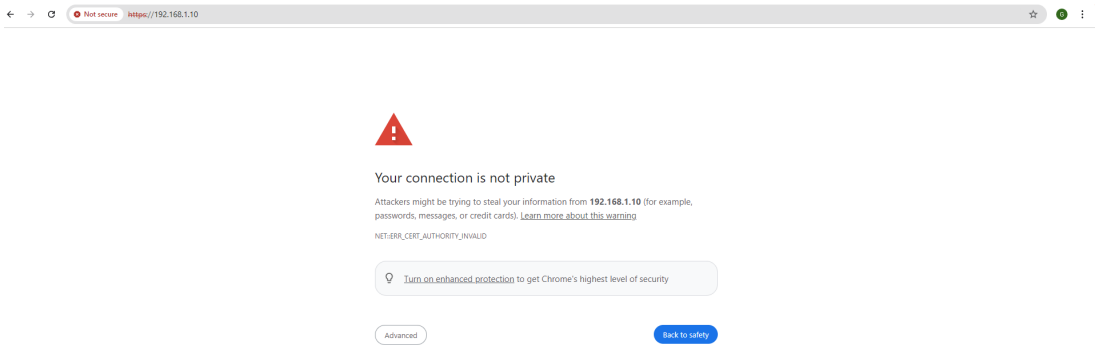


FIGURE 4-1: SAMPLE CONNECTION NOT PRIVATE SCREEN

It is normal to see this message, and you should continue through the setup steps to gain access to the Emerald GE web interface.

2. After you continue to the next page, click on the Login button as shown in Figure 4-2 below to log into the Emerald® GE.

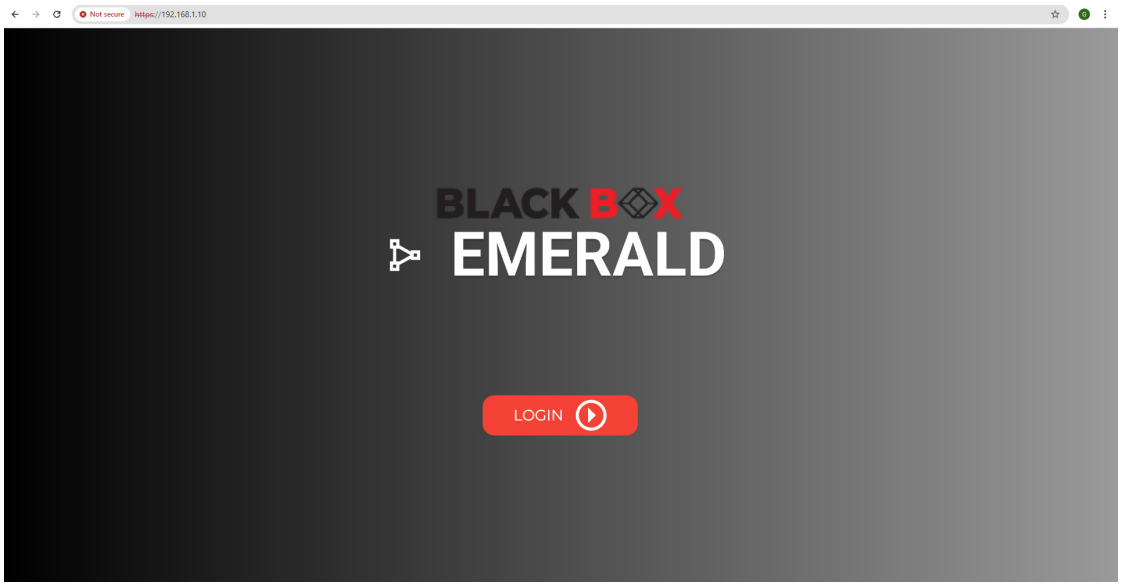


FIGURE 4-2: LOGIN SCREEN

After you click on the Login button, a welcome screen appears, and you can enter your username and password to log in. The welcome screen is shown in Figure 4-3 below:

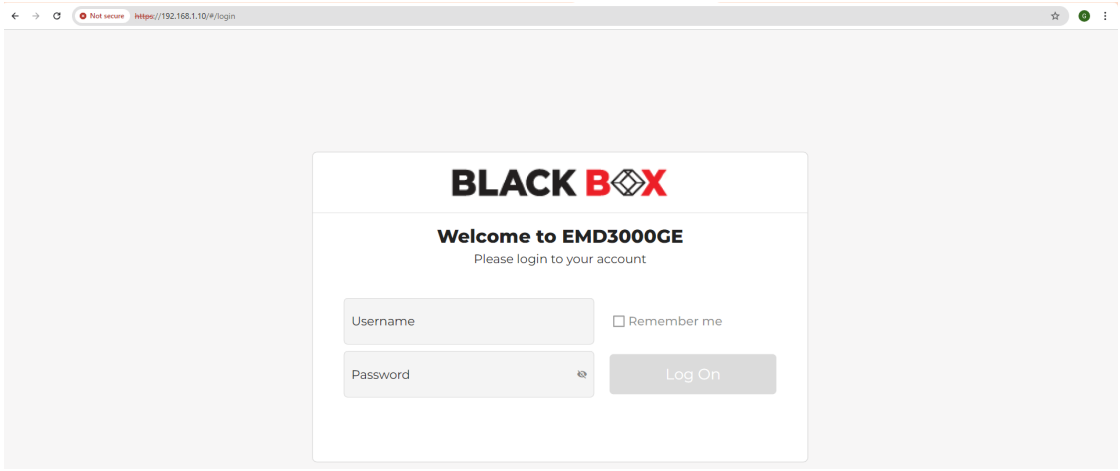


FIGURE 4-3: WELCOME SCREEN

Enter your username and password in the respective fields. The default username and password are both “admin” (without the quotation marks). If you have already changed the login credentials, use the updated username/password combination instead to authenticate with the EmeraldGE. To see the password that was typed, click on the eye icon inside of the password text box to toggle the password between hashed and normal text.

CHAPTER 4: OPERATION

NOTE: If you wish to remember the username the next time you log in, click in the “Remember me” checkbox to select this option. A check mark will appear in the check box when selected. You can click in the checkbox again to unselect this option and remove the check mark from the box. As of the time this manual was created, however, the “Remember me” checkbox was not enabled and is reserved for future use.

4.2 CONNECTIONS

After you enter the proper credentials and click on the Login button, the Connections page, which shows all available connections by default, will be displayed. This page, shown in Figure 4-4 below, may or may not be pre-populated with generic connections, and it may change depending on the version of firmware being used.

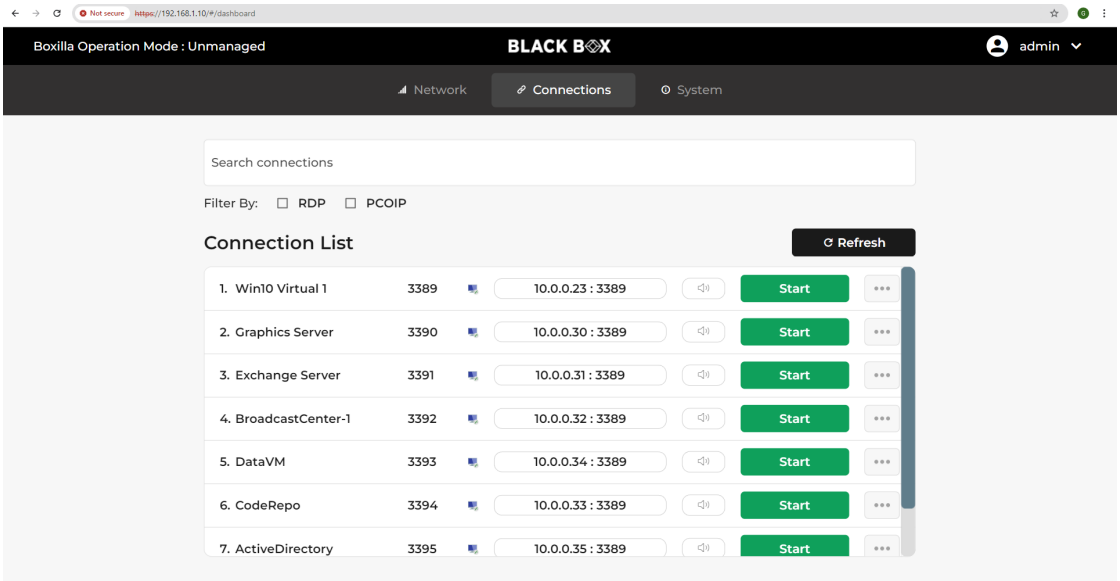


FIGURE 4-4: CONNECTIONS SCREEN

The Connections Screen shows the Emerald® GE’s management status in the upper left hand corner of the screen. If the Emerald GE is not managed by a Boxilla, the status will show “Boxilla Operation Mode: Unmananged.” If it unit is managed by a Boxilla, it will show “Boxilla Operation Mode: Managed” instead.

The Connection page has several options which are worth noting. Each connection shows some basic information, such as the connection name, the IP address, the Emerald GE network port, and an indication if sound is enabled. The connections can be edited to change the connection target and parameters, as explained later in the manual. The list can be refreshed using the Refresh button, which is useful if the list doesn’t display all available connection options. The connections can also be filtered between RDP and PCOIP to help find certain targets. If you know the name of the target, it can be entered into the “Search connections” field to make it easier to find a certain system.

CHAPTER 4: OPERATION

An example showing information entered in the Search box to limit the results in the Connection List appears in Figure 4-5 below:

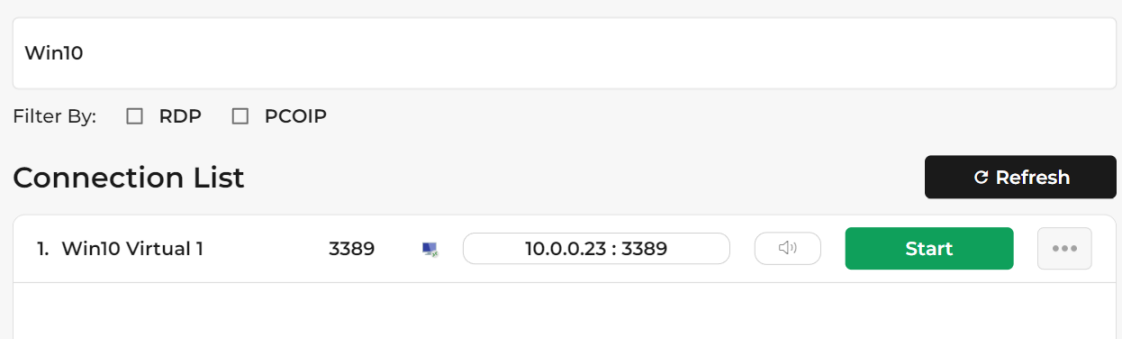


FIGURE 4-5: FILTER OPTION ON CONNECTIONS SCREEN

Every connection can be edited by clicking on the ellipsis icon ("...") next to the connection.

To edit the connection:

1. Click on the ellipsis button.
2. Select "Edit" from the drop-down menu, as shown in Figure 4-6 below:

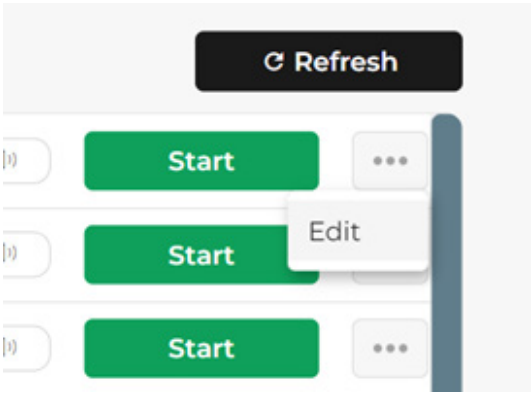


FIGURE 4-6: EDIT OPTION

CHAPTER 4: OPERATION

The “Edit Connection” screen appears, as shown in Figure 4-7 below:

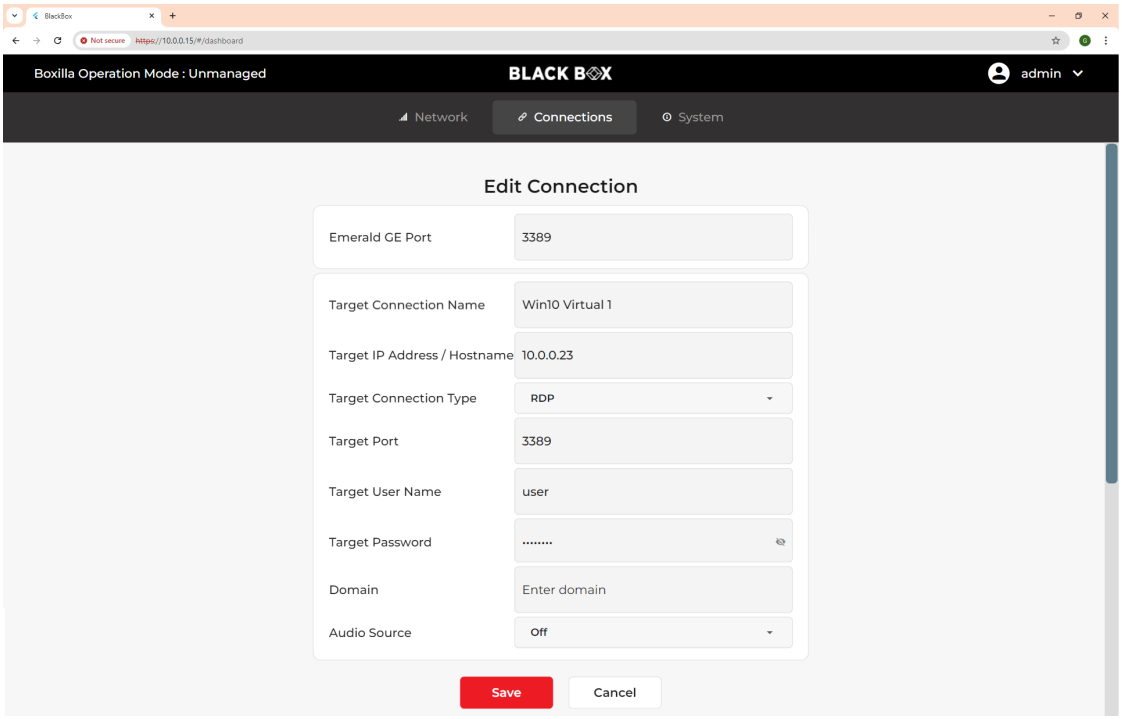


FIGURE 4-7: EDIT CONNECTION SCREEN

The connection settings can be configured on the “Edit Connection” screen to meet the connection requirements so the Emerald receivers can establish a connection to the virtual machines. The settings are described in Table 4-1 below.

TABLE 4-1. EDIT CONNECTION SCREEN OPTIONS

ITEM	DESCRIPTION
Emerald® GE Port	This is the port configuration of the specific virtual machine target that a connecting receiver will use. This must be unique compared to other virtual machine targets. This port will be used in the connections within the Emerald receivers (in unmanaged networks) and Boxilla (in managed networks). This field only accepts numerical values with a maximum character length up of up 16 characters. Ports shouldn't typically exceed 5 characters.
Target Connection Name	This is the connection name that will be displayed to help identify what target is being accessed. Using a descriptive name is encouraged. The name length can be almost limitless. Most characters can be used (upper and lower case alphanumeric and special characters !@#$^&*()_+-=), but % is not supported as a character and will return an error.
Target IP Address	This is the IP address for the target virtual machine. The format of the IP address should only use numerical characters in the format of IPV4 (xxx.xxx.xxx.xxx).
Target Connection Type	The connection type can be chosen to set the proper protocol. The current options are RDP and PCOIP.
Target Port	The target port is the specific IP port used on the target virtual machine. This should not be confused with the EmeraldGE Port, which is designed for the receiver to pick the right connection when connecting to EmeraldGE units. Once the receiver is connected to the EmeraldGE unit, it will then use this target port to establish a connection to the target virtual machine (typically 3389). This field only accepts numerical characters.
Target User Name	The connection username is used to log into the target virtual machine when the connection is initiated. This username can be longer than 50 characters and may contain alphanumeric characters, including special characters !@#$^&*()_+-=, but not %.
Target Password	The connection password is used to log into the target virtual machine that is tied to the Target User Name when the connection is initiated. This target password can be longer than 50 characters and may contain alphanumeric characters, including special characters !@#$^&*()_+-=, but not %.
Domain	When the target virtual machine is on a domain, this domain entry can be applied here.
Audio source	When a connection requires audio, this setting can enable and disable it.

Once the configuration settings are entered, use the Save button to apply them and write the changes to memory. If the Cancel button is used, changes entered on this screen will not be saved.

CHAPTER 4: OPERATION

4.3 NETWORK

The Network page allows the Emerald® GE to be configured so it can be accessed by local network assets. The settings, as shown in Figure 4-8 below, can be changed to fit your application.

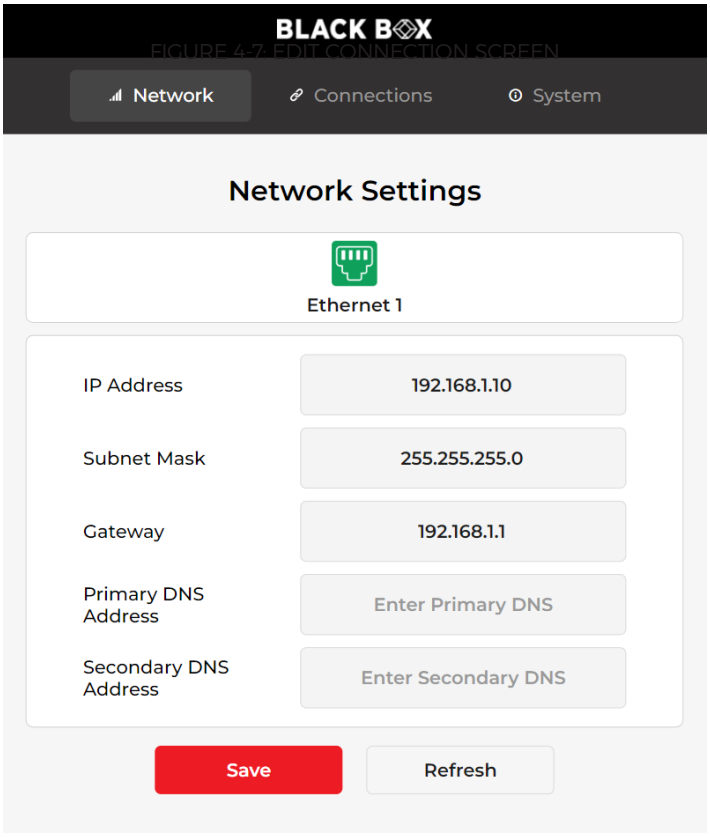


FIGURE 4-8: NETWORK SETTINGS SCREEN

Although these settings should be very common for any device that supports IP communication, the details of each setting are shown in Table 4-2 below.

TABLE 4-1. EDIT CONNECTION SCREEN OPTIONS

ITEM	DESCRIPTION
IP Address	This is the IP address that is assigned to the EmeraldGE ETH1 (bottom NIC) that can be used to link devices and connections.
Subnet Mask	The subnet mask for EmeraldGE can be configured to align with the local area network.
Gateway	The Gateway setting is used to link the EmeraldGE to the local network Gateway.
DNS	Although not required, a DNS can be entered to help the EmeraldGE navigate external networks.

CHAPTER 4: OPERATION

4.4 SYSTEM

The Emerald® GE System page, shown in Figure 4-9 below, offers additional settings and features to help maintain the technology and keep it up to date.

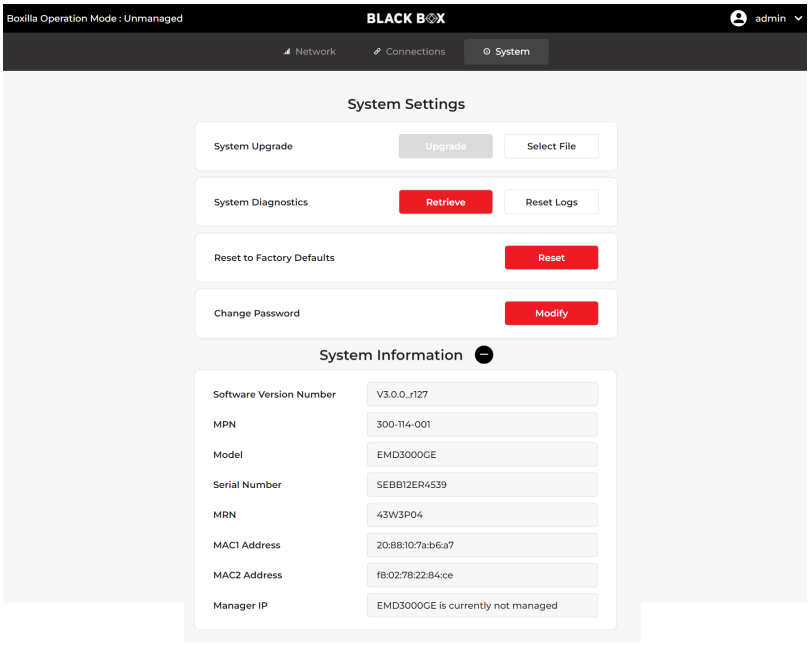


FIGURE 4-9: SYSTEM SETTINGS SCREEN

Table 4-3 below explains the options on the system settings screen.

TABLE 4-3. SYSTEM SETTINGS SCREEN OPTIONS

ITEM	DESCRIPTION
System Upgrade	When a new firmware becomes available, the unit can be upgraded using these options. Select the new file, then, when done uploading, click on the Upgrade button.
System Diagnostics	To export system logs to help Black Box troubleshoot a problem, use these options. Resetting the logs will clear any historical logging information.
Reset to Factory Defaults	This function will restore the Emerald GE back to its original factory default options.
Change Password	The password can be changed using the Modify button.
System Information section	The system displays information about the system.

CHAPTER 4: OPERATION

4.5 LOGGING OUT AND RESTART OPTIONS

Click on the arrow to the right of the user name in the upper right hand section of the screen to display a User drop-down menu. This menu, shown in Figure 4-10 below, allows the user to log out or restart the unit, depending upon whether the user has admin rights.

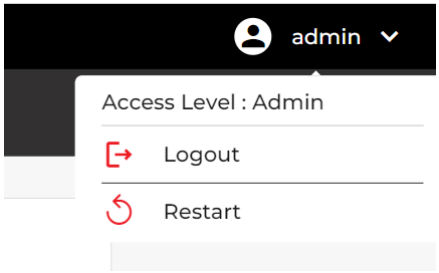


FIGURE 4-10: USER DROP-DOWN MENU

4.6 TROUBLESHOOTING

To troubleshoot problems with the Emerald GE:

1. Ensure that the cables are properly connected.
2. Verify that the power supply is connected and active.
3. Restart the device.

APPENDIX A: BOXILLA INTEGRATION

This section reserved for future use.

APPENDIX B: API

This section reserved for future use.

APPENDIX C: REGULATORY INFORMATION

C.1 FCC STATEMENT

This equipment has been tested and found to comply with the regulations for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with this manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case, the user will be required to correct the interference at his/her own expense.

C.2 CE

This is a Class B product in a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

C.3 TSCA

This product is in compliance with the TSCA Toxic Substances Control Act.

C.4 ROHS

This product is RoHS compliant.

C.5 REACH

This product is in compliance with the Reach / SCIP Regulations

APPENDIX C: REGULATORY INFORMATION

C.6 NOM STATEMENT

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
    A: El cable de poder o el contacto ha sido dañado; u
    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o
    C: El aparato ha sido expuesto a la lluvia; o
    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
    E: El aparato ha sido tirado o su cubierta ha sido dañada.

APPENDIX D: TECH SUPPORT/DISCLAIMER/TRADEMARKS

D.1 TECH SUPPORT/CONTACT INFORMATION

Visit blackbox.com/discover-bb/global-presence for regional technical support and contact information.

D.2 DISCLAIMER

Black Box Network Services shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Network Services may revise this document at any time without notice.

D.3 TRADEMARKS USED IN THIS MANUAL

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Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.

NOTES:

BLACK BOX®

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