



GE MDS PulseNET
**Enterprise and Standard
Installation Guide**

Version 5.6



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Planning the Installation

Version Disclaimer

Once installed GE PulseNET will need to be licensed under one of the following versions:

GE PulseNET Standard: Includes basic functionality as well as canned reports and rules for supported devices.

GE PulseNET Enterprise: Provides access to enhanced features such as bulk Change Management, Cluster support, and custom reports/rules.

Choosing between these versions will take place during the licensing step after installation has been performed. However, it is important to note that only the default **Single Server** installation is supported for **GE PulseNET Standard**.

A **Multi-Server**, or **High Availability** installation should only be performed if you know ahead of time that you will be licensing for **GE PulseNET Enterprise**.

For further information regarding differences and pricing between these versions, please contact your Sales representative.

System Requirements

Before installing GE PulseNET, ensure that the system meets the following minimum hardware and software requirements. Virtualized environments are also supported. Below are the server, operating system, and browser specifications. It is broken out by the hardware configuration required for a single server installation or one that has multiple servers.

Single Server - For Standard or Enterprise installations

- **CPU:** Quad Core at 2 GHz or greater
- **Memory:** 16 GB or greater of available memory
- **Disk Space:** 240 GB or greater of available storage
- **Operating System:** **Microsoft Windows Server** (2016/2019/2022 with all current updates), **Red Hat Enterprise Linux** (v.8.3), **SuSe Linux Enterprise Server** (v.11)
- **Software:** **Java 8** (or newer)
- **Browser:** **Chrome**, **Firefox** , or **Edge**



Two Server Option - Enterprise Only

Application and Database servers have identical configurations except for Disk Space

- **CPU:** Quad Core at 2 GHz or greater
- **Memory:** 16 GB or greater of available memory
- **Database Disk Space:** 240 GB or greater of available storage
- **Application Disk Space:** 100 GB or greater of available storage
- **Operating System:** **Microsoft Windows Server** (2016/2019/2022 with all current updates), **Red Hat Enterprise Linux** (v.8.3), **SuSe Linux Enterprise Server** (v.11)
- **Software:** **Java 8** (or newer)
- **Browser:** **Chrome, Firefox, or Edge**

Three Server Option - Enterprise Only

Application/Database servers for both Primary and Secondary have identical configurations

- **CPU:** Quad Core at 2 GHz or greater
- **Memory:** 16 GB or greater of available memory
- **Disk Space:** 240 GB or greater of available storage
- **Operating System:** **Microsoft Windows Server** (2016/2019/2022 with all current updates), **Red Hat Enterprise Linux** (v.8.3), **SuSe Linux Enterprise Server** (v.11)
- **Software:** **Java 8** (or newer)
- **Browser:** **Chrome, Firefox, or Edge**

Database Server (Arbiter) - Enterprise Only

- **CPU:** Quad Core at 2 GHz or greater
- **Memory:** 8 GB or greater of available memory
- **Disk Space:** 120 GB or greater of available storage
- **Operating System:** **Microsoft Windows Server** (2016/2019/2022 with all current updates), **Red Hat Enterprise Linux** (v.8.3), **SuSe Linux Enterprise Server** (v.11)
- **Software:** **Java 8** (or newer)

Four Server Option - Enterprise Only

Application servers (2) and Database Servers (2)

- **CPU:** Quad Core at 2 GHz or greater
- **Memory:** 32 GB or greater of available memory
- **Database Server Disk Space:** 240 GB or greater of available storage
- **Application Server Disk Space:** 100 GB or greater of available storage
- **Operating System:** **Microsoft Windows Server** (2016/2019/2022 with all current updates), **Red Hat Enterprise Linux** (v.8.3), **SuSe Linux Enterprise Server** (v.11)
- **Software:** **Java 8** (or newer)
- **Browser:** **Chrome, Firefox, or Edge**





NOTE: For environments with greater than 10,000 devices, please contact [GE MDS Support](#) for proper system sizing. International languages of OS versions have not been fully tested.

Device Support

The following **GE devices** and **standard MIB-II devices** can be monitored by GE MDS PulseNET - (minimum firmware supported):

- **Orbit** (8.3.3)
- **SD Master Station - MPRS** (3.2.5)
- **MPRU/MPRL** (5.0.7)
- **MDPL** (8.4.5)
- **SD Series** (4.1.5)
- **x710** (3.7.1)
- **x790** (2.2.1)
- **Mercury 900** (3.5.0)
- **Mercury 1800** (3.0.6)
- **Mercury 3650 D** (3.7.3)
- **Mercury 3650 E** (3.2.6)
- **Mercury 5800** (3.0.6)
- **TransNET 900** (3.2.3)
- **iNET-900** (6.9.1)
- **iNET-II** (2.9.1)
- **TD220x** (2.0.16)
- **TD220 MAX** (1.2.2)
- **EntraNET** (3.0.7)
- **Intrepid** (1.9.00 b1730)
- **WiYZ** (2.2.3)
- **GE Reason Switch S2020** (07A01)
(separate license required)
- **Cisco Switches**
- **Generic LAN**

The following additional vendor devices can be monitored by **PulseNET PulsePAK** addon with additional licensing.

- **4RF** Aprisa SR series
- **Cambium** 450, 550, 820S
- **FreeWave** HT+, WavePro, Zumlink
- **FreeWave Serial** (with proxy)
- **Radwin** Airmux, 5000
- **Sierra Wireless** LS-300, Raven XT, RV50



Firewall Configuration Rules

Firewall rules should be established which allow only workstations to connect to the PulseNET server on the services listed in the following table:

Function	Access	Port Number	Traffic Direction	Protocol	HA APP	HA DB
HTTP	External	8080	Inbound	TCP	✓	
HTTPS	External	8443	Inbound	TCP	✓	
Shutdown	Internal	8005	Inbound/Outbound	TCP	✓	
Database	Internal	27017	Inbound/Outbound	TCP	✓	✓
SNMP	External	161	Outbound	UDP	✓	
SNMP Trap	External	8162	Inbound	UDP	✓	
SNMP Trap	External	162	Outbound	TCP	✓	
Email	External	25	Outbound	TCP	✓	
LDAP	External	389	Outbound	TCP	✓	
Syslog	External	10514	Inbound	TCP/UDP	✓	
Radius	External	1812	Outbound	TCP	✓	
External DB (SQL Server)	External	1433	Outbound	TCP	✓	
External DB (Oracle)	External	1521	Outbound	TCP	✓	
ICMP	External	ICMP	Outbound	ICMP	✓	
FTP	External	21	Outbound	TCP	✓	
TELNET	External	23	Outbound	TCP	✓	
Active MQ	External	61616	Inbound/Outbound	TCP	✓	✓
Netconf	External	830	Outbound	TCP	✓	
DLINK	External	9999	Outbound	TCP	✓	
SSH/SFTP	External	22	Inbound/Outbound	TCP/IP	✓	
Server Comm	Internal	8161	Inbound/Outbound	TCP	✓	✓

Internal: This port is only used internally on the GE PulseNET server.

External: This port provides communication with other systems. Ensure Firewall is configured to allow port access.

Firmware Change: Mercury only supports TFTP and SFTP; iNET only supports TFTP; Orbit only supports SFTP; SDMS (remote firmware push) only supports TFTP

Telnet: Used by Mercury and iNET radios



Network Requirements

IMPORTANT: In order for GE PulseNET to operate correctly, ensure the IP Address is set to static. A hostname can also be configured in the system's host file. Please ensure that the static IP is used with the hostname in the host file.

Java Upgrade

This version of PulseNET upgrades from Java 8 to a Java 11 equivalent - Zulu, which the installer program requires to run. The installer program will automatically check for the proper version of the Java equivalent. If it is not found on the system, the user will be directed to a link to download Zulu from www.azul.com.

Migrating from older PulseNET versions

If migrating from a Legacy 3.x or older PulseNET instance, it is required to first migrate to the 4.x platform, then perform an upgrade to the latest. Legacy migration will not be supported in this or future versions. Instructions for 3.x to 4.x migration are contained within the 4.5.0 Installation Guide.

Installation Options

PulseNET can be installed in four configurations described below and shown in more detailed drawings in the [Appendices](#).

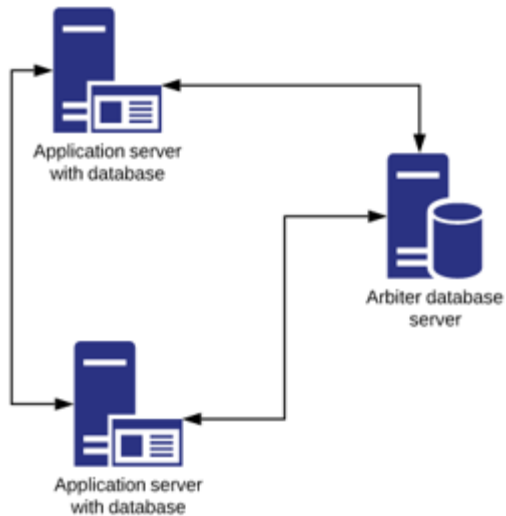


The easiest and most common installation is the single server installation. This installation has the application and database running on the same system. This configuration supports monitoring up to 5000 devices.



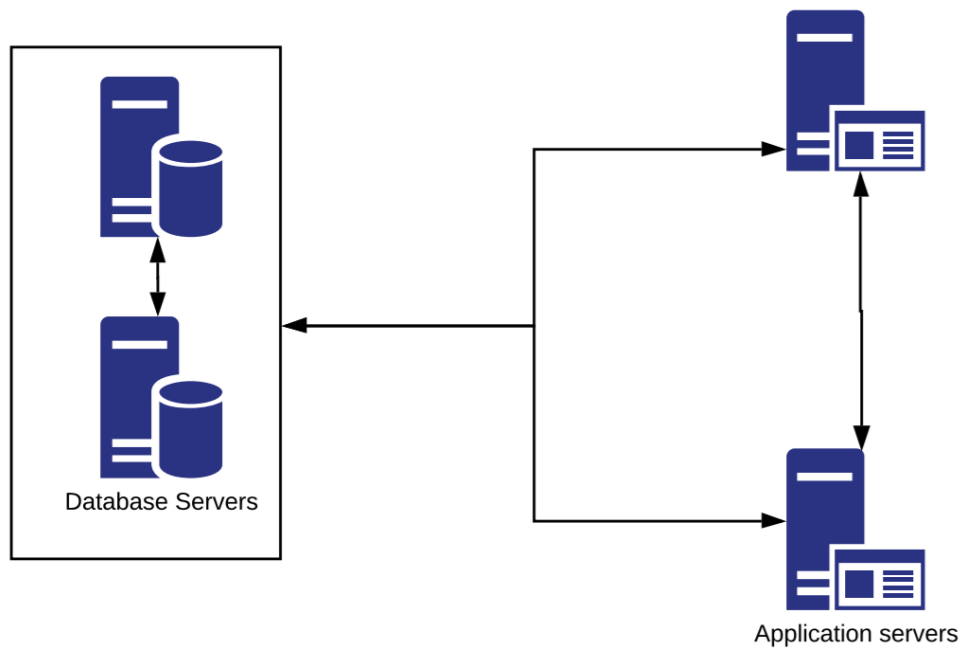
A [two-server](#) configuration has the application and database on separate servers.





A [three-server](#) configuration consists of redundant application/database servers along with a third server called the "arbiter" database server. The third server is required to arbitrate the failover if the primary database fails. It does not contain a copy of the database.

A [four-server](#) configuration provides redundant application servers as well as separate redundant database servers.



Multi-Server and High Availability Configurations

Careful planning is required on the server side prior to installing a Multi-Server/HA instance. All servers involved in a High-Availability environment **MUST** have the time and date correctly synced between them. It is suggested to time sync daily.

Multi-Server options will always require that the **Database** server(s) are up and running first, so after planning out the server locations, and ensuring they meet system requirements - download the installer to the Primary Database server, and run it there. Subsequent steps will require that the Primary Database be up and can be communicated with before the installation will proceed.

There are three options for Multi-Server/HA mode as shown in the previous configuration diagrams:

- **Two Server Option:** This multi-server option allows the PulseNET application and the database to each run on a separate server, and allows GE PulseNET to support more than 5000 devices. A Primary APP and Primary DB server will be required.

Run the installer on the Primary DB server first, and check the **Multi-Server Configuration** option during installation.

Choose the number of devices - typically 500-10k (This will also automatically adjust the Server Size field) - and ensure that Server Type is set to Database Server Primary.

Proceed with the installation and provide the Primary Application Server IP address on the next screen.

Once installed, the DB will then be listening for the Application on that IP.

Now run the installer on the Primary Application server, and select the same options as above until **Server Type** - Here select **Primary Application Server**. A Primary Database Connection menu will appear - here enter the connection information for the DB server that was set up previously.

Click next when finished, and the installer will attempt to communicate with the DB server. If the DB is not yet installed it cannot make the connection, and will provide an error message. Once a connection is successfully made, the installation will proceed.

- **Three Server Option:** This HA installation mode allows the database and primary application to be installed together on a single server. Then on a secondary server, a redundant secondary application and database will be installed. Here a third server is required for the database configuration and is called the "Arbiter Database" whose purpose is to allow for a failover to the secondary database in case of failure on the primary system. This avoids downtime caused by a potential failure of a single GE PulseNET application/web server. When both the primary and secondary servers are running, users can be directed to the active GE



PulseNET web portal on either system. Upon failover, the active machine becomes the Primary machine automatically.

Run the installer on the **Primary Application Server**. For a Three Server option, select **Multi-Server Configuration** and check the **Redundant Services Configuration** box. Select the number of devices to monitor, and under **Server Type**, select **Application Server (Primary.)** Click Next, and review the **Data Service** menu on the following screen. Here enter the IP address and info for the planned Secondary Application Server, and the Arbiter server. Proceed with the installation until complete. Now run the installer on both the Secondary Application Server, and finally the Arbiter Server, selecting the appropriate **Server Type** for each - in sequence: **Application Server (Secondary)** then **Arbiter**.

- **Four Server Option:** This HA installation provides another level of redundancy by installing the database on two separate servers from the two application servers. Here the Arbiter function will reside on the primary application server.

Run the installer on the Primary DB location - check both the **Multi-Server Configuration**, and **Redundant Services Configuration** boxes to activate 4 server mode. Select number of devices - typically +10k - and check a **Server Type of Database Server (Primary.)** On the following screen, provide the IP and info for all three of the other planned servers, then proceed with installation. Once the Primary DB is complete, repeat the process on the Secondary DB Server before proceeding to run the installer on both the Primary APP, and Secondary APP locations.

Considerations for High Availability (HA) Mode

1. When configuring where applications and databases are going to be installed on a network keep in mind that in order for the PulseNET instance to be fully High Available, Mongo must be installed at three unique locations or data centers. There **MUST** always be two mongo services running in order to access the PulseNET UI.
2. In order to run GE PulseNET in an HA mode, three or four servers are required for the different roles including the database, primary, and secondary application servers. **GE PulseNET must be installed in the following order: (1) the database server, (2) the primary application server, and (3) the secondary application server.**
3. In both High Availability mode and Multi-server mode, the database must be running in order to install the application servers and for GE PulseNET to operate.
4. GE PulseNET application/web servers running in HA mode should run the



database on a separate machine.

After deciding on the server configuration, ensure they meet the default system requirements. The system specifications required depend on the number of devices being monitored. For more information about High Availability server requirements, please contact GE MDS support.

HA Installation instructions continue at following header:

[Installing PulseNET in Multi-Server/HA Mode](#)

System Recommendations for Optimal Database Performance

GE PulseNET uses MongoDB as a cross-platform document-oriented database program. Database configuration is created during the PulseNET installation and no user intervention is required. The installation recommendations for MongoDB are listed below under **General Recommendations**, **Linux**, **Windows**, and **Virtual Machines**. For questions, review the full MongoDB documentation on the MongoDB website at the links below.

Production Notes:

<https://docs.mongodb.com/manual/administration/production-notes>

Production Checklist:

<https://docs.mongodb.com/manual/administration/production-checklist-operations>

General Recommendations

- An SSD is recommended, using the noop or deadline disk schedulers for SSD drives
- If using RAID, use RAID-10
- Enterprise-grade hardware is recommended
- Do not run on NUMA hardware
- Ensure that the system has sufficient swap-space configured

Linux

- Use Linux kernel version 2.6.36 or higher
- Use XFS or EXT4 only
- Turn off atime
- Set the file descriptor limit and the user process limit (ulimit) above 20,000
- Disable Transparent Huge Pages
- Disable defrag
- Disable NUMA in the BIOS
- Set the readahead setting to 0
- Use noatime for the dbPath mount point.
- Configure sufficient file handles (fs.file-max), kernel pid limit (kernel.pid_max), maximum threads per process (kernel.threads-max), and maximum number of



memory map areas per process (vm.max_map_count) for the deployment. For large systems, the following values provide a good starting point: fs.file-max value of 98000, kernel.pid_max value of 64000, kernel.threads-max value of 64000, and vm.max_map_count value of 128000

- Ensure that the system default TCP keepalive is set correctly. A value of 300 often provides better performance for replica sets and sharded clusters

Windows

- Use NTFS only
- Disable NTFS 'Last access time'
- Use SetSystemFileCacheSize to limit file system cache memory (less than 40%)

Virtual Machine

- VM must have dedicated memory. Map and reserve the full amount of memory for the virtual machine running MongoDB. Avoid dynamic memory features, such as memory ballooning.
- Ensure that virtual machines stay on a specific Host by setting affinity rules.
- CPU reservation must not exceed more than 2 virtual CPUs per physical core
- Ensure each mongod has provisioned IOPS for its dbPath, or has its own physical drive or LUN
- Disable the tuned tool if running RHEL 7 / CentOS 7
- Use the noop disk scheduler for virtualized drives in guest VMs

Clusters / Replica Sets

- Use NTP to synchronize the clocks on all components of the cluster
- All replica set members must be identically provisioned: RAM, CPU, disk, network setup, etc.
- Avoid placing all replica set members on the same SAN, as the SAN can be a single point of failure.

Installing GE PulseNET

GE PulseNET should run on a dedicated machine because it will process and store large volumes of data. Before beginning the installation, verify that access to full administrator privilege access to the server's operating system.

Note: If using HA - Ensure all servers involved in the HA environment have their time and date correctly synced. If migrating from a version previous to 5.x, a new license file will be required. If upgrading to a later 5.x from a previous 5.x version, no additional licensing is needed.



After downloading the GE PulseNET installer file, take steps to prevent the antivirus software from scanning the GE PulseNET folder (example: C:\GE_MDS) by adding the GE_MDS folder to the **Exclusion List** of any antivirus software. Consult the specific antivirus software guide for detailed instructions on adding folder exclusions.

The default username and password (admin/admin) will initially be used to log in to the browser interface to configure the system. After the installation completes, it is recommended changing the default users 'administrator' and 'operator' account passwords.

Installing GE PulseNET

Before proceeding, verify the target servers meet the minimum system requirements for the number of devices GE PulseNET will be monitoring.

Step 1: Running the Installer

Locate and run the GE PulseNET install file.

- If installing on a Windows server, right-click the GE PulseNET executable and select **Run as Administrator**. This is vital to ensure proper installation and avoid permission issues later.
- If installing on Linux use the **java -jar** command on the GE PulseNET .jar file. The installation must be performed as a root user or with sudo privileges.

If the installer does not find an available version of Java/Zulu, it will prompt to install one. If the installer says it cannot locate Java, ensure that JAVA_HOME is set to the base java install directory and JAVA_HOME\bin is part of the PATH. For additional details on Java/Zulu configuration, [see Appendix 4](#).



Installer command line options:

Without any command line options the GE PulseNET installer will open the installation wizard as described beginning with Step 2 in the following sections.

GE PulseNET also supports a “silent” install option which will install GE PulseNET without prompts using all default values. Use the following syntax for a silent mode install.

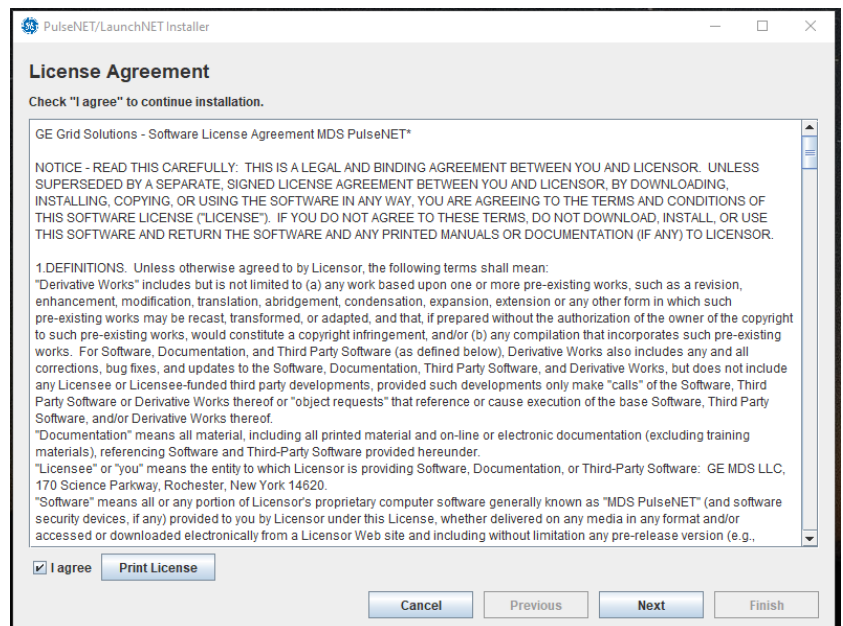
- **Windows:** `pulsenet-install-5.X.0.exe -s`
- **Linux:** `java -jar pulsenet-install-5.X.0.jar -s`

Other install options with the install commands:

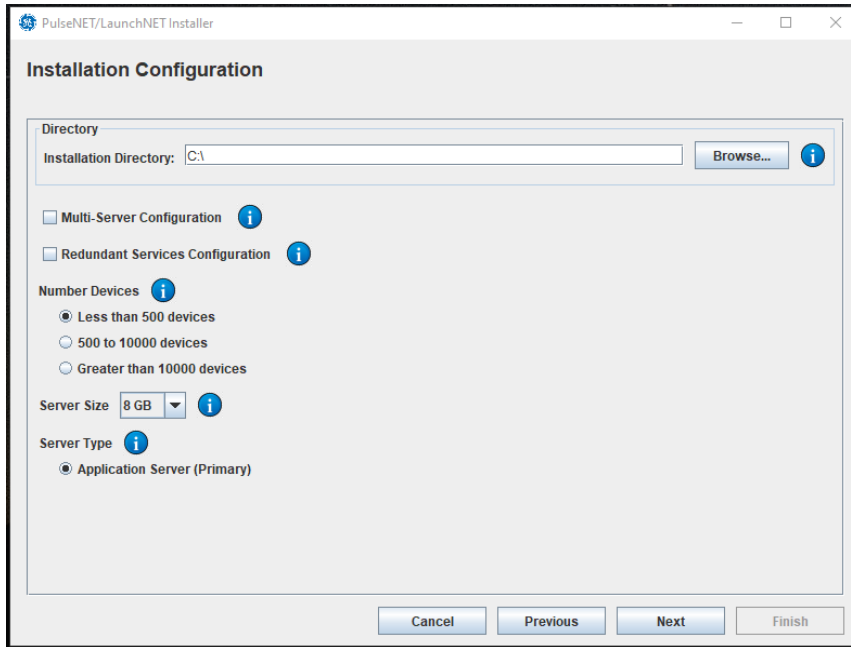
- `pulsenet-install-5.X.0.exe -a` reinstall the services
- `pulsenet-install-5.X.0.exe -t` specify the parent path of the existing GE_MDS folder (i.e. `C:\full\path\to\install\location`)
- `java -jar pulsenet-install-5.X.0.jar -i` Linux only, interactive line installation option

Step 2: License Agreement

- When opening the installation wizard, it will first present the full GE PulseNET License Agreement. Read and select I Agree to proceed. Print the entire license agreement at this point, if desired. Click Next when ready.

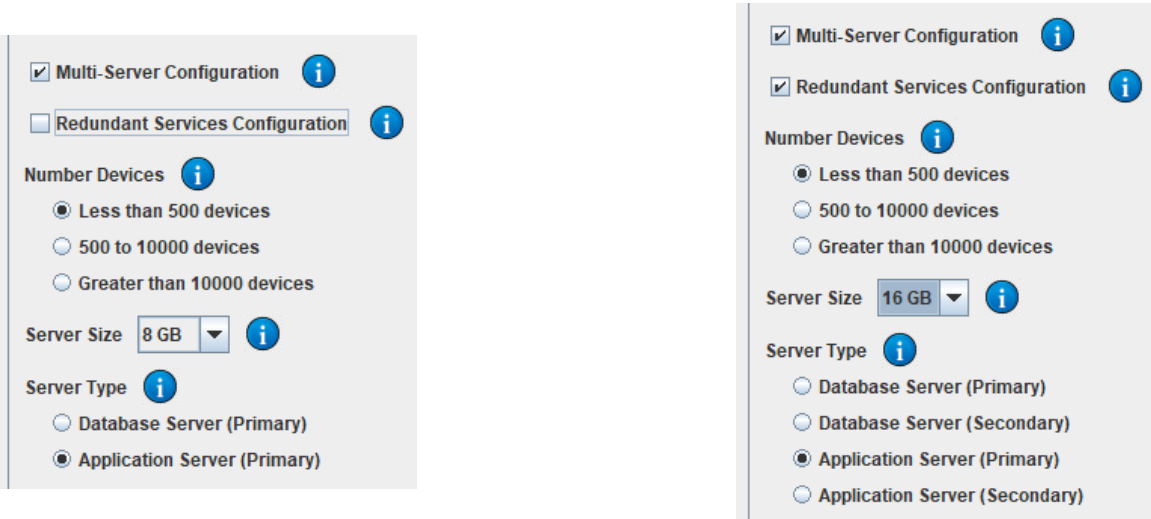


Step 3: Installation Directory



- Select an existing directory or the default root directory for the installation of GE PulseNET which will be automatically appended with GE_MDS\PulseNET.
NOTE: Do not use spaces in the directory name.
- The **Multi-Server Configuration** checkbox only is used for installing separate database and application servers.
- The **Redundant Services Configuration** checkbox only is used for installing a Multi-Server configuration with both the database and application servers in a redundant configuration. There will be three individual servers required; two servers will run the application+database and a third sever, called the Arbiter Server is used with the two database servers.
- Selecting both the **Multi-Server Configuration** and the **Redundant Services Configuration** checkboxes is for installing [Multi-Server, High Availability environments](#). This requires four servers - primary and secondary application servers plus primary and secondary database servers.
- Select the **Number Devices** that are planned to be monitored. This setting will configure the system resources for optimal use.

- The **Server Size** allows modifying the memory used by PulseNET. The minimum amount for less than 500 devices is 8 GB which would be used for testing or a proof-of-concept with a small number of devices. The drop down allows for larger memory allocations to be selected. It is recommended to use 16 GB as the minimum amount of memory for a production environment. Please ensure the server has enough physical memory to meet the requirements before proceeding.
- The **Server Type** options will change depending on if the Multi-Server or Redundant Services boxes are selected. For multi-server installs, each of the server types will need to be installed separately and in a prescribed order. Follow the install instructions in this Guide on the proper order of installation.



- If neither the Multi-Server Configuration OR the Redundant Services Configuration boxes are checked, then a single server installation will be used where the database and application will run on the same server. This is the most common method for running PulseNET.
- Click Next when finished.

Step 4: Configure GE PulseNET Services


- In the Configure PulseNET Server screen, modify any of the default GE PulseNET ports as needed. Checking the **Secure Server Only** box will require the program to run in secure HTTPS mode.
- The default **Data Service** settings can be modified for GE PulseNET's database.



- Click Next when ready.

Configure PulseNET Server

Define server ports and if only HTTPS requests should be accepted (Secure Server Only - *Recommended)

Server
Service stingtomcat not detected on this server. An instance of this serviced will be installed on this server.
Installation Profile: Small - Single 8GB Server (< 500 devices)
 Secure Server Only 

Server Host: 10.1.0.66
HTTP Port: 8080
HTTPS Port: 8443 *Port change accepted.*
AJP Port: 8009 *Port change accepted.*
Shutdown Port: 8005 *Port change accepted.*

Data Service
Service stingmongo not detected on this server. An instance of this serviced will be installed on this server.
** Set IP Address or Hostname in 'DB Host' field to enable remote connection. (ex: 192.168.1.1)

DB Host: 127.0.0.1
DB Port: 27017 *Port change accepted.*
DB Path: C:\GE_MDS\PulseNET\dbData
DB Username: stingray
DB Password: ●●●●●●
Confirm password: ●●●●●●

Cancel Previous **Next** Finish



Step 5: GE PulseNET Configuration Summary

- Review the installation configuration and use the Previous button to change any settings that are not correct.
- Click Next.

Installation Configuration Summary

The following installation parameters have been set.
 To continue with the installation, click Next. To change these settings, click Previous.

Installation Directory: C:\

Selected services to Install

Data Service

- DB Host: 127.0.0.1
- DB Port: 27017
- DB Path: C:\GE_MDS\PulseNET\dbData
- DB Username: stingray
- DB Password: *****

Server

- Secure Server Only Selected

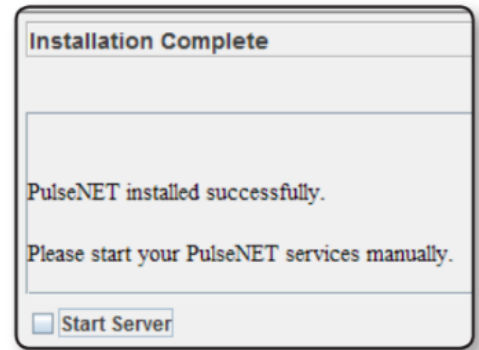
Step 6: GE PulseNET Installation

- GE PulseNET installs the files into the selected directory, indicated by the progress bar. The default installation path is <directory_selected>\GE_MDS\PulseNET.
- Once the progress bar reaches 100%, click Next.
- **Note:** The install will take a few minutes to complete.



Step 7: GE PulseNET Server Startup

- If GE PulseNET was installed using server Administrator or *root* credentials, there is a choice to start the GE PulseNET services now by checking the Start Server checkbox and clicking Finish. This will start all of the services. **Note:** PulseNET Services are set to automatically start. To disable this uncheck “Start Server”



Step 8: Startup Verification

Verify that GE PulseNET is running by checking the processes started on the server. Eight services will be running as shown below from the Windows Services console. A similar services application is available on Linux servers with graphical displays.

Name	Description
stingdbx	DB Export Service
stingdlink	DLink Service
stingmongo	MongoDB Server
stingmongo-log	Mongo Log Service
stingmq	ActiveMQ Broker
stingnetconf	Netconf Service
stingsnmp	SNMP Service
stingtomcat	Tomcat Server

Installing PulseNET in Multi-Server/HA Mode

If a firewall is used between the database, primary and standby GE PulseNET High Availability servers, the firewall must be configured to allow communication on the following ports between all machines in the cluster: (for TCP) 61616, and 27017.



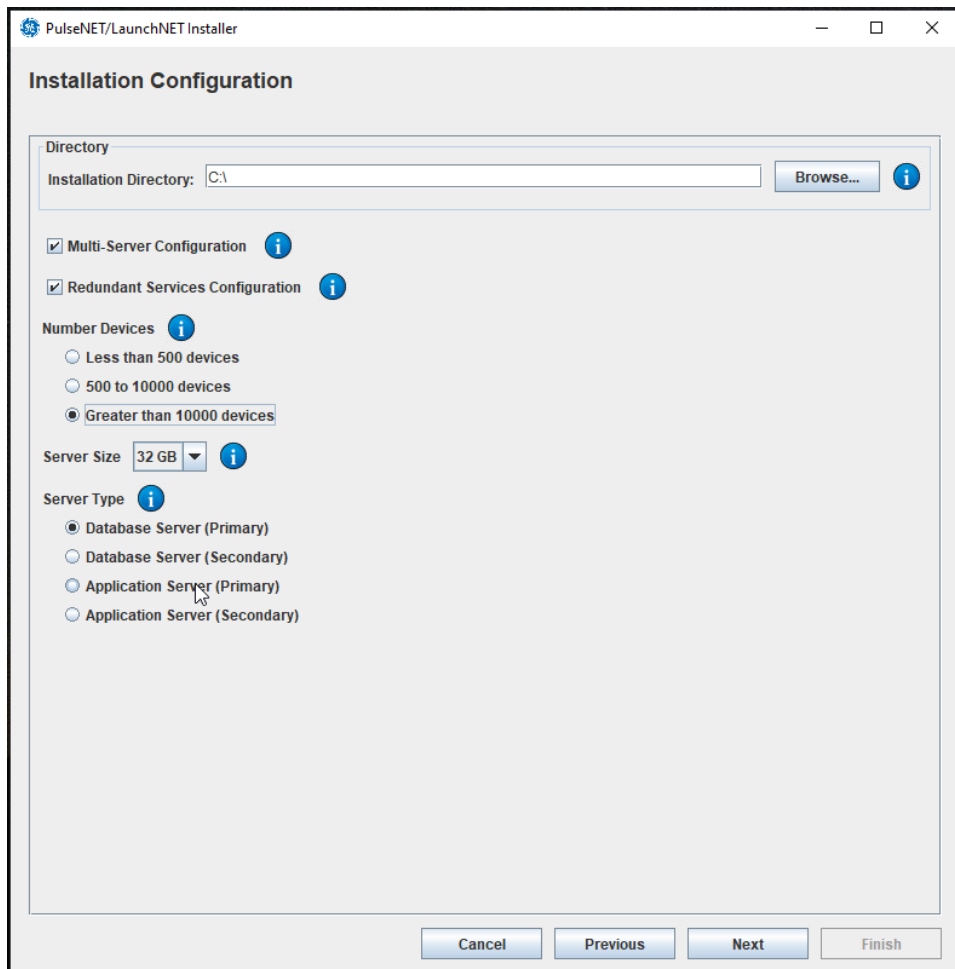
NOTE: In a GE PulseNET HA environment, a firewall can have an adverse effect on system performance and stability. Issues related to having a firewall between the GE PulseNET servers are beyond the scope of this guide. For the GE PulseNET support team to assist in debugging HA server issues, any such firewall must be disabled.

Database Installation

To run GE PulseNET in High Availability modes, the database must be installed on a separate dedicated server. **Before installing the primary or secondary servers application servers, the database must be installed first.** Download the installer file to the Primary Database server first, then to all subsequent servers. The IPs of all involved servers must be known, and accessible at this time. Installation instructions will cover a full four-server setup. Smaller instances will follow the same installation sequence, but do not require all steps.

- Follow Steps 1 and 2 in the previous section, **Installing GE PulseNET**.
- For **Multi-Server**, Step 3 - Select the Installation directory. Leave the **Redundant Services Configuration** checkbox unselected and choose an option from the device count.
- For **HA**, Step 3 cont. - Select the Installation directory. Ensure the **Redundant Services Configuration** checkbox is checked for High Availability and optional **Multi-Server Configuration** checkbox.
 - If using a 3 server configuration install in the following order
 1. Install Primary Application Server First
 2. Install Secondary Application Server Second
 3. Install Arbiter Server Last
 - If using a 4 server configuration install in the following order
 1. Install Primary Database Server First
 2. Install Secondary Database Server Second
 3. Install Primary Application Server Third
 4. Install Secondary Application Server Last
- After choosing the configuration for the current system click next.





Configure PulseNET Server menu, confirm the details of the Primary DB already filled in, then provide and confirm a DB password. Next, depending on the configuration of installation there will be fields to provide the IP address of the systems used in the Multi-Server/HA environment. Click Next after providing all the information.

Configure PulseNET Server

Define Database Server Information

Data Service
 Service stingmongo not detected on this server. An instance of this service will be installed on this server.
 ** Set IP Address or Hostname in 'DB Host' field to enable remote connection. (ex: 192.168.1.1)

DB Host: 10.1.0.86
 DB Port: 27017 *Port change accepted.*
 DB Path: C:\GE_MDS\PulseNET\dbData
 DB Username: stingray
 DB Password: ●●●●●●●●
 Confirm password: ●●●●●●●●
 Secondary Database Server: 10.1.0.87
 Secondary Database Port: 27017
 Primary Application Server: 10.1.0.66
 Primary Application Port: 27017
 Secondary Application Server: 10.1.0.88

Buttons: Cancel, Previous, Next, Finish

Installation Configuration Summary is used to review the parameters that have been set for the installation. Confirm it has been configured correctly, then click Next to continue.

Installation Configuration Summary

The following installation parameters have been set.
 To continue with the installation, click Next. To change these settings, click Previous.

Installation Directory: C:\

Selected services to Install

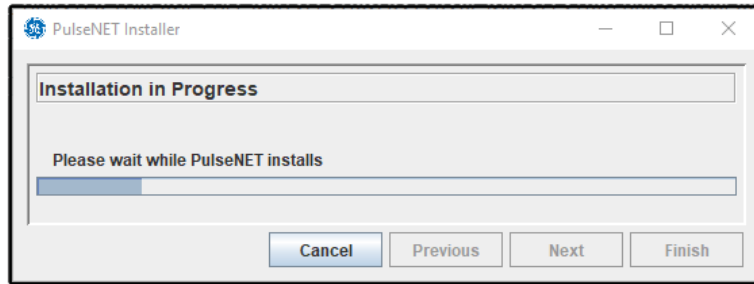
Data Service

- DB Host: 10.1.0.86
- DB Port: 27017
- DB Path: C:\GE_MDS\PulseNET\dbData
- DB Username: stingray
- DB Password: ●●●●●●●●
- Secondary Database Server: 10.1.0.87
- Secondary Database Port: 27017
- Primary Application Server: 10.1.0.66
- Primary Application Port: 27017
- Secondary Application Server: 10.1.0.88

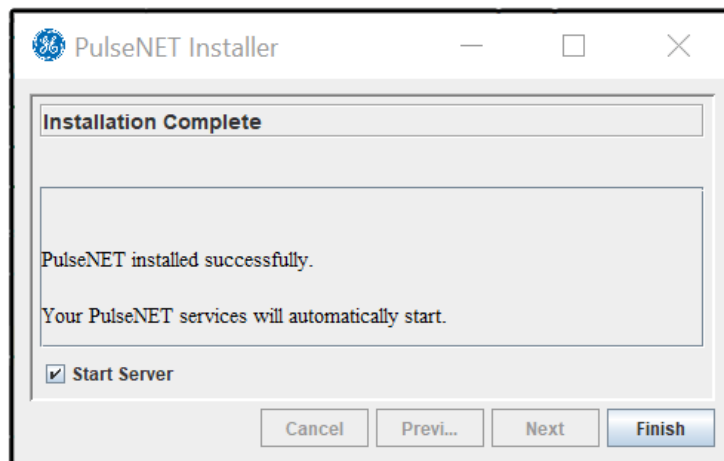
Buttons: Cancel, Previous, Next, Finish



The **Installation in Progress** window, is used to monitor progress of the installation. Once installation has been completed, click **Next**.



In the **Installation Complete** window, click the **Start Server** checkbox to start the services, then click **Finish**.

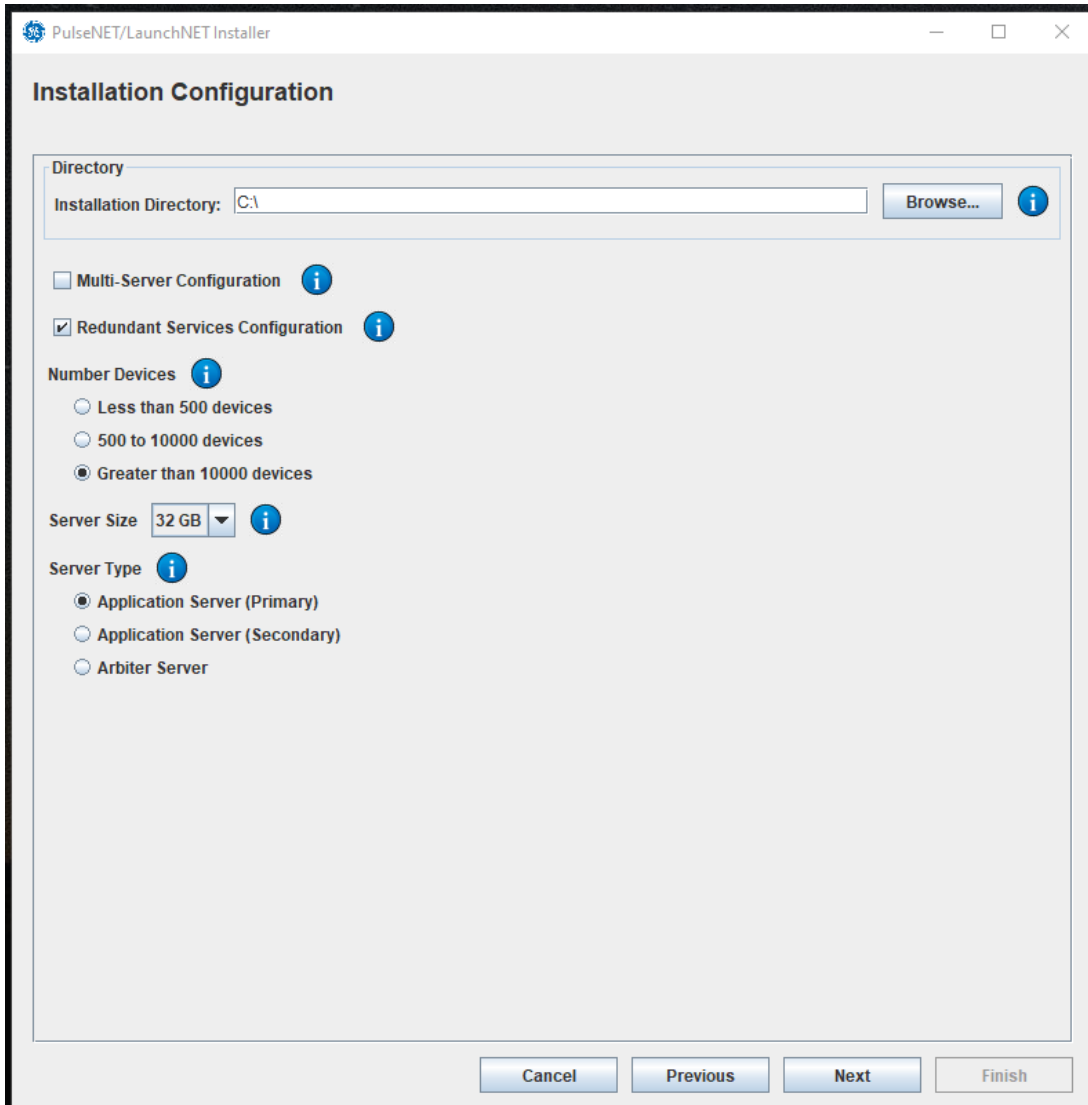


Additional Server Installations

After installing the primary server, continue to install the other servers.

1. Download and run the installer on the next server, and click through to the **Installation Directory** menu. Select the same configuration, however, depending on the configuration, change the server type.

If using a **three server HA configuration** select one of the following: Secondary Application or Arbiter Server.



Note: (If there is any issue with the connection to the Primary DB machine, a failure message will appear. A stable connection must be made before the installation can continue.)

If using a **four HA server configuration** select one of the following : Secondary Database, Primary Application, Secondary Application. This will prompt entry of the IP and password used in the previous installation. When set correctly, click Next.

Installation Configuration

Directory
Installation Directory: C:\ Browse... i

Multi-Server Configuration i

Redundant Services Configuration i

Number Devices i

Less than 500 devices

500 to 10000 devices

Greater than 10000 devices

Server Size: 32 GB i

Server Type i

Database Server (Primary)

Database Server (Secondary)

Application Server (Primary)

Application Server (Secondary)

Primary Database Connection: i

Database Host:

Database Port: 27017

Database Name: stingray

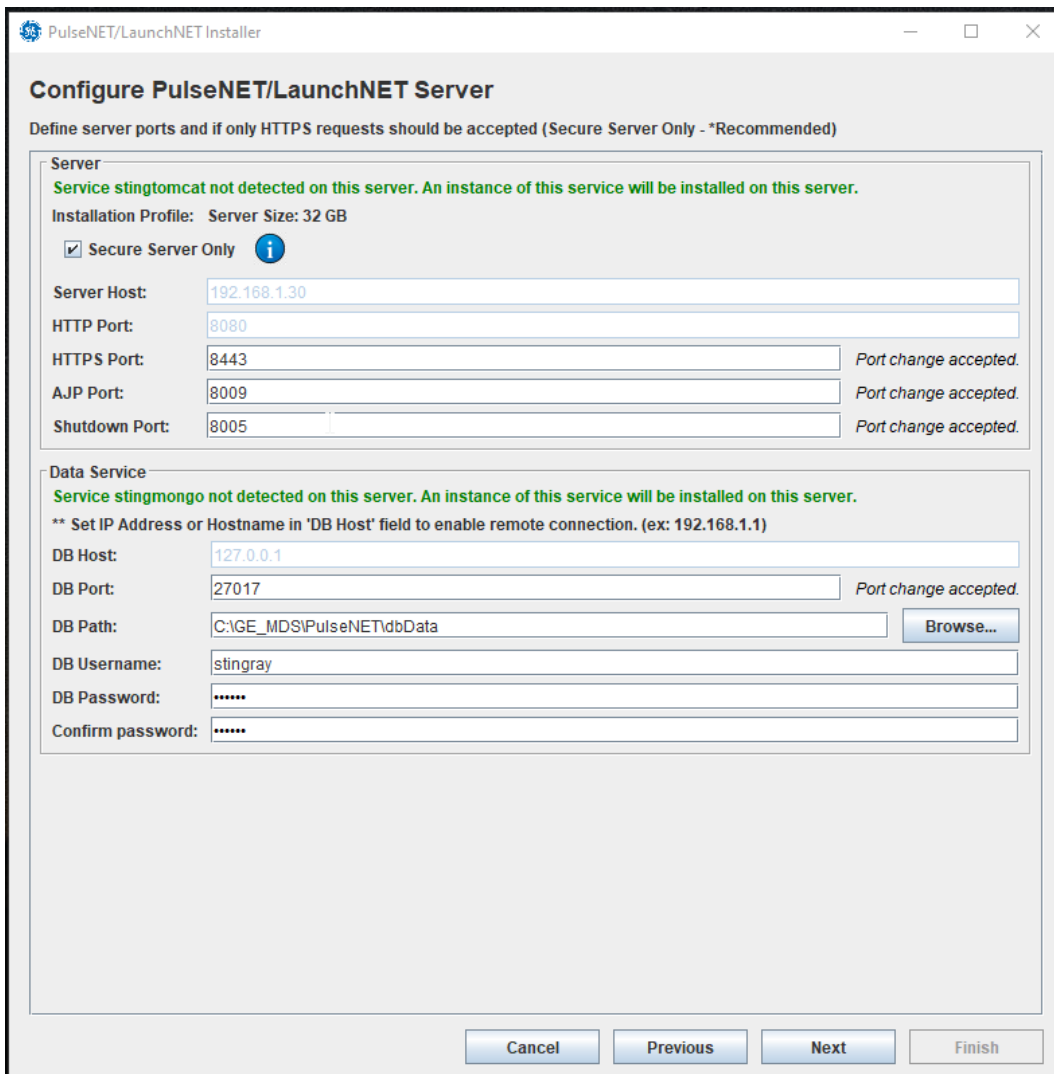
Database User Name: stingray

Database Password:

Cancel Previous Next Finish



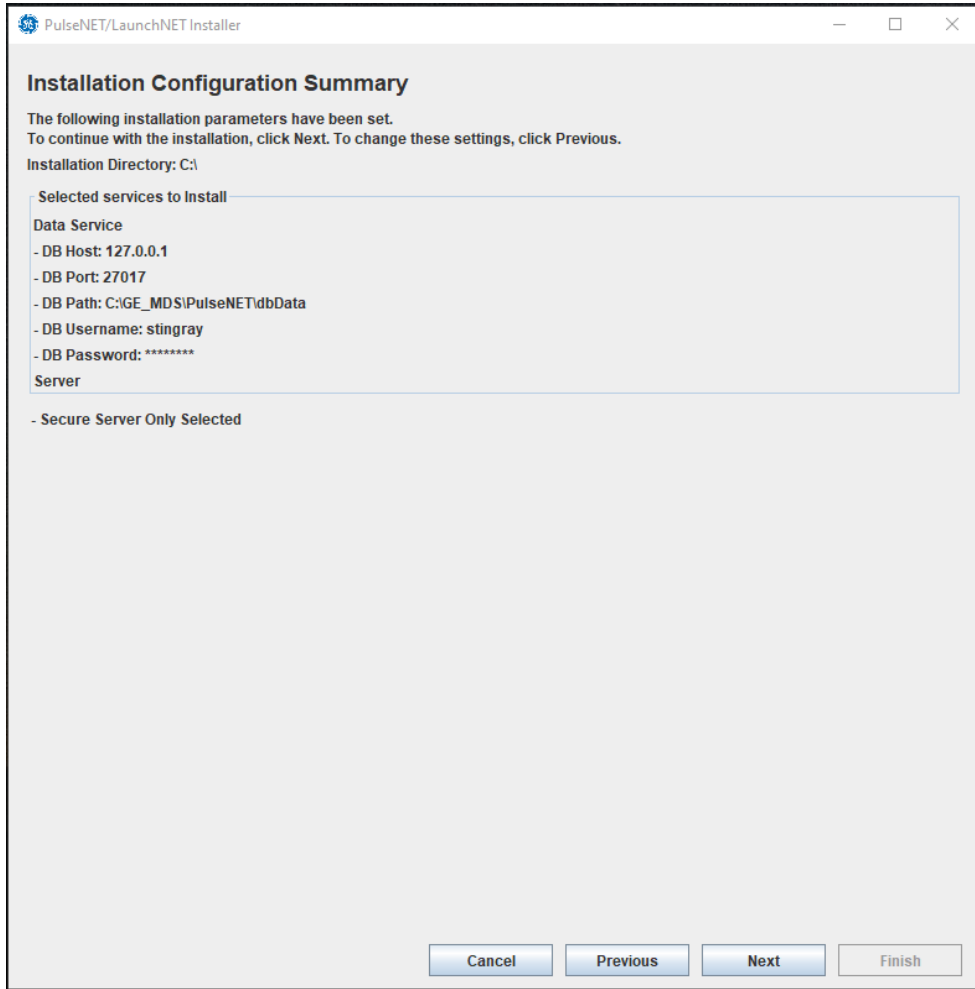
In the **Configure PulseNET/LaunchNET Server** screen, confirm that the populated information is correct, and modify if needed. The **Server Host** field should contain the correct IP address of the primary server. A warning message will appear if the selected ports are in use, etc...when ready, click **Next**.



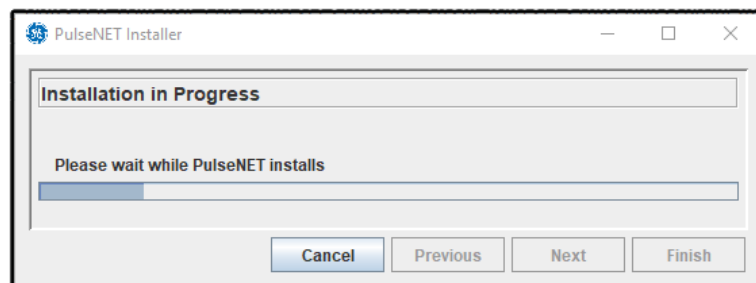
NOTE: PulseNET must be configured to connect to the same database instance on all members of the HA cluster. This means that the DB Host, DB Port, DB Name, DB Username, and DB Password are set to the same values as those used for the other members. In some rare cases, certain settings might be different. For example, the value for DB Host may need to be changed if there is a firewall between the database and certain members of the HA cluster in the environment. For more information, see Manual Database Configuration.



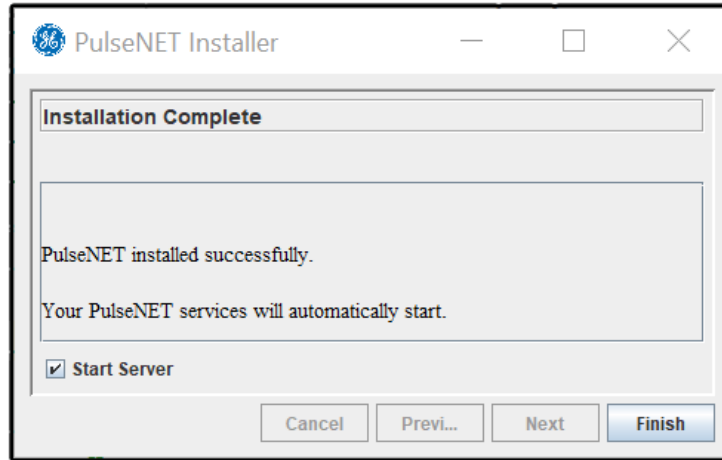
2. In the **Installation Configuration Summary** is used to review the parameters that have been set for the installation. To continue, click **Next**.



3. In the **Installation in Progress** window, the progress of the server installation. Once installation has been completed, click **Next**.



- In the Installation Complete window, click the Start Server checkbox to start the primary server. To continue, click Finish.



- Once all installations are complete, the HA environment will be ready for login/licensing. **High Availability environments only require a single license. Login to PulseNET on any of the application servers to obtain the hardware ID and request a license key.**
- See **Logging in to PulseNET** in the User Guide, if needed.
- Obtain a GE PulseNET license from GE and install it on the primary server. For instructions on obtaining and installing a license, see the **Working with Licenses** section in the **GE PulseNET Administration Guide**.
- After the installation is complete on all systems/servers on each database installation, browse to `\GE_MDS\PulseNET` and **run the start.bat on Windows or start.sh file on Linux**. This will start the stingmongo-log service.

Verify the Multi-Server/HA Installation

- Using a web browser, login as admin to the primary GE PulseNET application/web server.
- Navigate to the Administration menu and select System Configuration.
- For a High Availability System, click **System Configuration Summary** and look for the High Availability section. In the Status row, the value should be "true." In the Peers row, the value should be greater than "0." Next, look for the Database section. In the External row, the value should be "true."
- In a Multi-Server System, click **System Configuration Summary** and look for the Database section. In the External row, the value should be "true."



Administration > System Configuration > System Configuration Summary

System Configuration Summary

Configuration summary include OS, Database and High Availability information.

System Summary	
Operating System	WINDOWS
IP Address	10.0.0.252
Home Path	C:\GE_MDS\PulseNET\
Home Name	

OS	
Type	Windows 10
Patch	10.0

High Availability	
Status	true
Peers	1

Database	
Host	127.0.0.1
Port	27017
Database Name	stingray
User	stingray
External	true



NOTE: In some cases, the communication may become unreliable between servers in an HA cluster. In order to avoid errors, ensure the servers have synchronized system clocks. Out-of-sync system clocks can increase the risk of communication errors.

Configuring High Availability Load Balancing

If a backend server or IT Load Balancer exists already, configure the existing device to automatically redirect incoming user traffic to one of the available web servers. Consult the Load Balancer documentation for instructions on reconfiguring the device. Alternatively, a tool such as HTTP Proxy filter (<http://www.inlab.de/balance.html>) may be used to test each web server url and direct users to an active server.



Starting GE PulseNET Manually

- Navigate to the directory <pulsenet_home> (GE_MDS\PulseNET) and execute the start.bat or start.sh file that is applicable for the operating system.
- When GE PulseNET starts successfully, the following message appears in the command window: **PulseNET startup completed.**

Stopping GE PulseNET Manually

- Navigate to the directory <pulsenet_home> (GE_MDS\PulseNET) and execute the stop.bat or stop.sh file that is applicable for the operating system.

Note: Services can be found with the beginning string of “sting”. For example: stingsnmp.

Logging On to GE PulseNET

By default, GE PulseNET is installed with a **secure port of 8443**. In order to access the software, navigate using a web browser to the following address, replacing localhost with the hostname or ip address: <https://localhost:8443>

If the program was recently installed, it may take approximately 5 minutes for the program to start and the login screen to be accessible. Once the login screen appears, access the program with the default Administrator account using:

Username: admin

Password: admin

After initial login, the default **Summary** screen appears and the next step is to obtain and install a license key under **Administration > Licensing**.

A license provides GE PulseNET with the capability to authorize and monitor devices. Each device authorized in GE PulseNET will require a unique license. Dependant on the upgrades currently applied to the system, the products available for licensing are as follows:

PulseNET - Standard license for basic monitoring functionality.

PulseNET Enterprise - Enhanced monitoring and configuration features.*

GE Lentrionics JPAX - Addon for monitoring GE's Lentrionics JunglePAX

GE Reason - Standalone, or PN addon to monitor GE Reason S20 series.

GE LaunchNET - Addon to unlock GE LaunchNET provisioning features.**

GE LaunchNET Device - Used to license each GE LaunchNET device.

E2E-PulsePAK - Addon for monitoring non-standard devices.



Request a License:

1. Navigate to **Administration > Licensing > Request a License**. A dialog box will appear.
2. Select a product from the **Available Products** dropdown list.
3. In the **Contact Name** field, type the name of the person at the company who will be the primary contact.
4. In the **Access Code** field, type the access code which can be obtained from the GE Sales team.
5. In the **Desired Capacity** field, type the total number of licenses required. For example, if 100 access points and 300 remote devices will be monitored, enter 400.
6. In the **Comment** field, enter any comments which would help the Licensing team fulfill the license request.
7. Click **Save Request to a File** in order to create a licenseRequest.txt file. This must be sent directly to the GE Licensing Team at: gemds.pulsenet@ge.com

When the request is approved, the new license will be sent via email by GE.

*When a PulseNET Enterprise License is applied the system cannot be reverted to PulseNET Standard. It will require a re-installation of the PulseNET application to revert back to Standard.

**See external LaunchNET documentation.

Adding Licenses

After receiving the new licenses, they must be added to the PulseNET instance before devices can be authorized.

1. Navigate to **Administration > Licensing > Add a License**.
2. In the dialog box that appears, click **Import License from File** to locate the license file on the computer (the file must be on the machine where the browser is running). The license key can also be copied from the file and pasted directly into the **License Key** field.
3. Click **Add License**.

If the license is valid, it is added to GE PulseNET. Otherwise, a message will appear stating that the license key is invalid. Contact the GE PulseNET Licensing team if this occurs.



Importing a Network Security Certificate

GE PulseNET relies on the underlying Apache Tomcat web service. To install network security certificates, refer to the steps for configuring security on the [Apache Tomcat website \(https://tomcat.apache.org/tomcat-8.0-doc/ssl-howto.html\)](https://tomcat.apache.org/tomcat-8.0-doc/ssl-howto.html). Once the Apache Tomcat security certificates have been imported, GE PulseNET will need to know how to use them.

1. Locate the full path to the certificate file (JKS, PKCS11 or PKCS12 format).
2. Edit the GE PulseNET **server.xml** file in <pulsenet-home>\apache-tomcat\conf
3. Find the *keystoreFile* variable and set it to the full path of the certificate
4. Set the *keyAlias* to “tomcat”
5. Set the *keystoreType* to the keystore type (ex. “JKS”, “PKCS11” or “PKCS12”)
6. Set the *keyStorePass* to the password for the keystore file
7. Save the **server.xml** file and restart the *stingtomcat* service.

Multi-Server and High Availability Installs

Steps 1 through 4 above must be completed on both of the PulseNET web/application servers in the cluster. Contact GE Technical Support for assistance importing certificates that are delivered in other formats.

Uninstalling GE PulseNET

There are steps that must be executed after the uninstaller completes in order to completely remove GE PulseNET from the machine. The simple process listed below can be used to uninstall GE PulseNET manually. To uninstall in a Multi-server or High Availability environment, start the uninstall of the secondary server first, followed by the primary server, and then the database server.

- Open a command window or file explorer and navigate to the <pulsenet-home> directory and run the **uninstall.bat** or **uninstall.sh** program that is appropriate for the operating system.
- To delete any remaining program files, navigate to the GE_MDS install location and recursively remove all of the remaining files and folders.

Note: In case the reinstallation of PulseNET is required, run the **uninstall.bat** or **uninstall.sh** to remove the services, then delete the GE_MDS folder, check that the services and processes do NOT exist, and all contents before proceeding to install again.

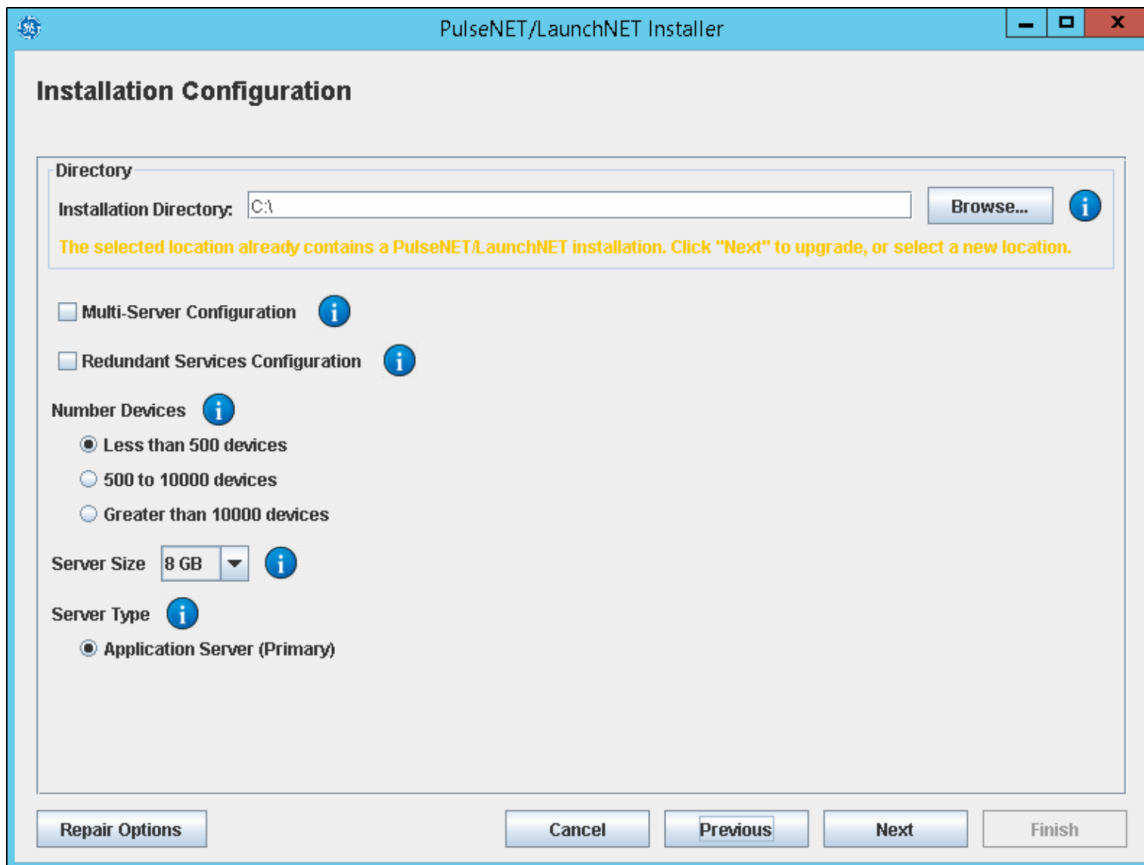


Repair Options

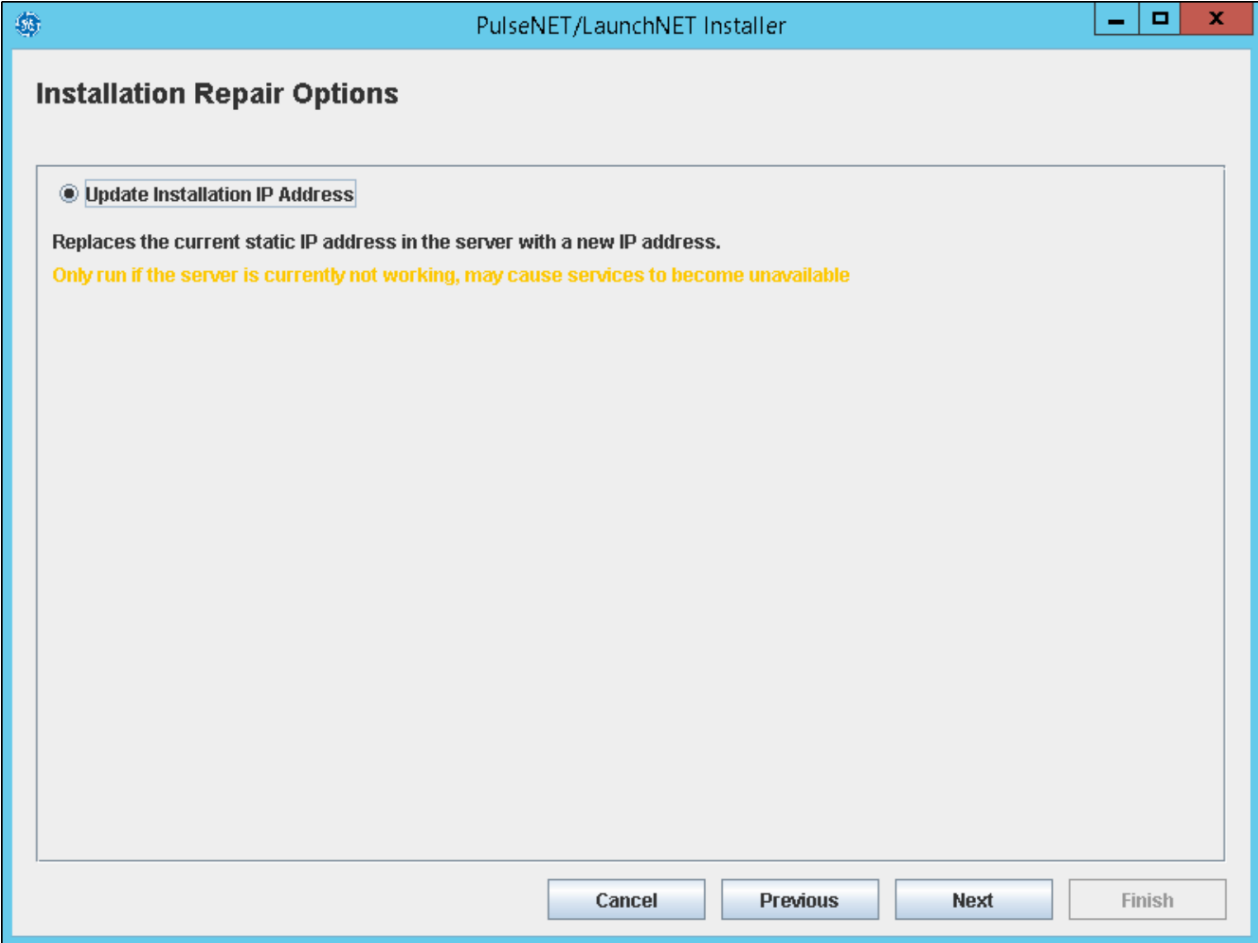
Update Installation IP Address

An PulseNET instance is bound to the IP Address of the server where it has been installed, but it is possible that a different IP Address will later be assigned to the server. In this case, simply re-run the PulseNET installer file. **Note: Before running repair options please contact GE Support.**

Click through to the second installation screen and select Repair Options:



Select Update Installation IP Address and hit Next:



Enter the old IP address that PulseNET was originally installed with, then the new IP that PulseNET will use. Provide the Database Port, as well as Database Username and Password. Finally select the installation directory.

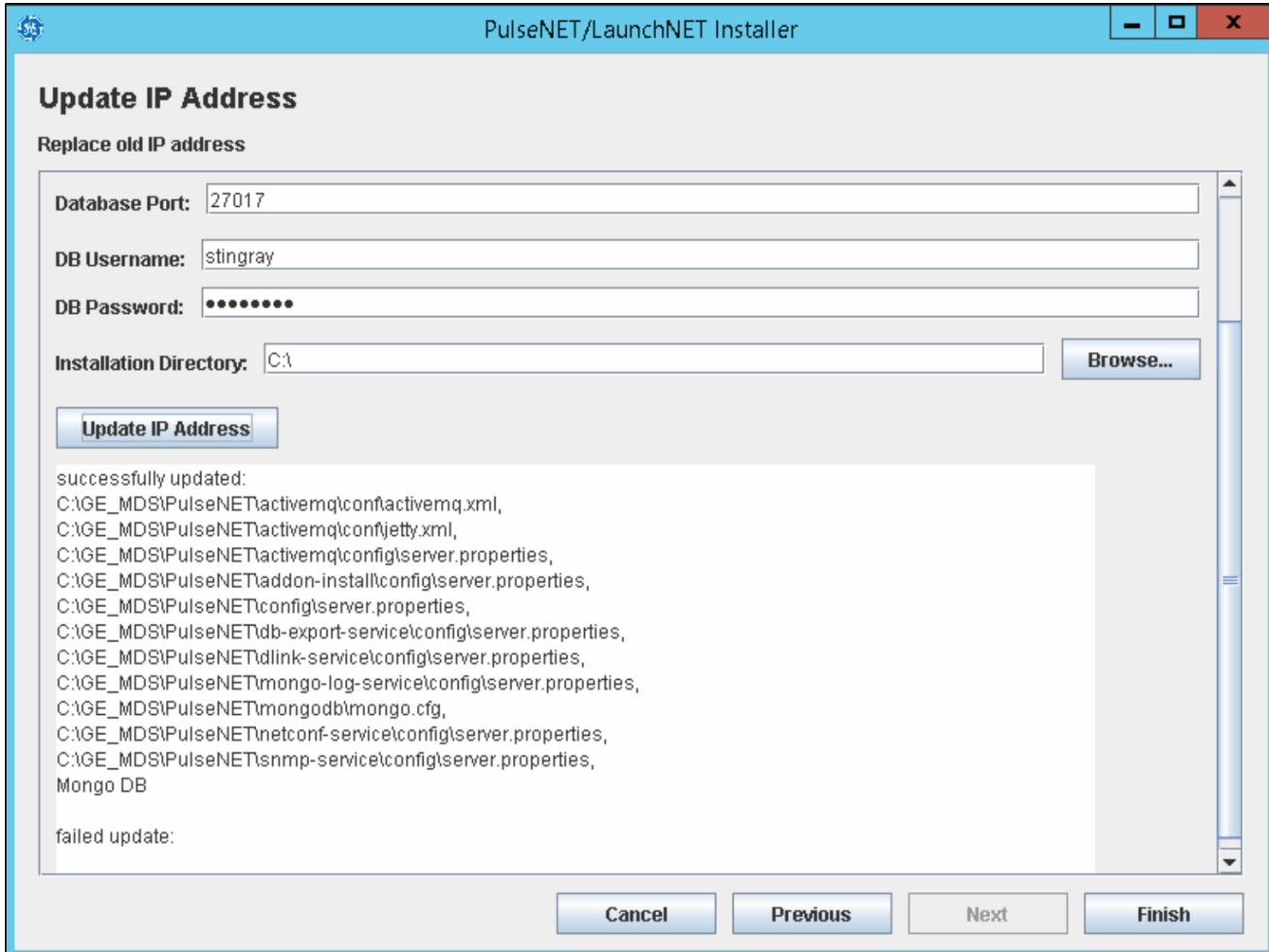
Note: Installation Directory can be the top level C:\ drive...or the GE_MDS\PulseNET directory.

The screenshot shows a Windows-style dialog box titled "PulseNET/LaunchNET Installer" with a sub-header "Update IP Address". The main heading is "Replace old IP address". Below this, a text box contains instructions: "Running this utility will replace the current installations IP address with the new one" and "Before running stop all sting processes. All IPs should be entered without port numbers e.g. (192.168.1.100)". The form includes several input fields: "Old Primary App Address" (10.1.0.57), "New Primary App Address" (10.7.1.248), "Database Port" (27017), "DB Username" (stingray), and "DB Password" (masked with dots). There is also an "Installation Directory" field with "C:\", a "Browse..." button, and a large "Update IP Address" button. At the bottom, there are "Cancel", "Previous", "Next", and "Finish" navigation buttons.

When the configuration is set, hit Update IP Address to proceed.



The final menu will provide a summary of the changed files.



Note: The “Failed Update” section will show files that were not able to be updated. If blank as in the screenshot above, there is no issue.

Upgrading GE PulseNET

Preparing to Upgrade

Before upgrading GE PulseNET, complete the following steps:

1. Review the list of installation considerations given in [Planning the Installation](#).
2. Ensure that the GE PulseNET system has enough disk space to store both the old and new versions of GE PulseNET, as well as any backup files created.
3. Stop GE PulseNET and generate a backup of the previous version by copying the



`GE_MDS\PulseNET` directory to something like `GE_MDS\PulseNET-<timestamp>`, or use an archiving tool to package the previous directory tree into a compressed archive file (ex. zip).

Migrating from GE PulseNET 3.x to 4.5

Note: To migrate from GE PulseNET 3.x to 5.x, Please contact GE MDS Tech Support.

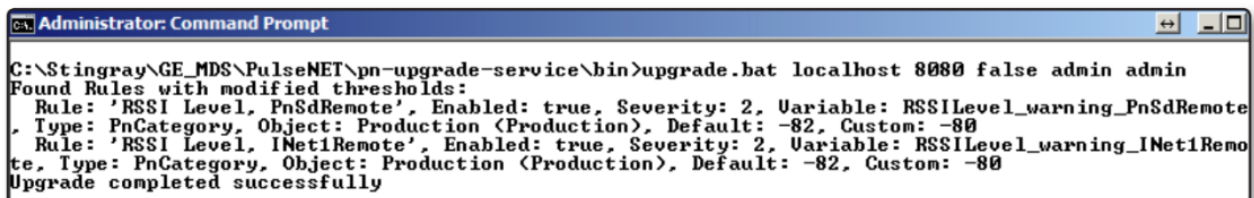
The upgrade process requires that the previous and new versions of GE PulseNET be running simultaneously so that existing information can be exported from the previous version and imported into the new version. This means that GE PulseNET directory and port settings may need to be configured to allow both versions to run (especially on the same machine), and after the upgrade these directory and port settings can be reset.

The new agents and the old agents cannot be polling devices at the same time. Before the new agents can pull data from the new devices, the old agents need to be shut down. To shut down the old agents, run the following command `fglam -r` from an Administrative Command Window in the legacy 3.x directory `GE_MDS\PulseNET\bin`. The same command can be used for Windows and Linux platforms.

Example:

```
C:\GE_MDS\PulseNET\fglam\bin\fglam -r
```

The data export/import is accomplished by the GE PulseNET 4.5 Upgrade Service, which must be executed from an Administrator command prompt as shown below.



```
Administrator: Command Prompt
C:\Stingray\GE_MDS\PulseNET\pn-upgrade-service\bin>upgrade.bat localhost 8080 false admin admin
Found Rules with modified thresholds:
  Rule: 'RSSI Level, PnSdRemote', Enabled: true, Severity: 2, Variable: RSSILevel_warning_PnSdRemote
, Type: PnCategory, Object: Production <Production>, Default: -82, Custom: -80
  Rule: 'RSSI Level, INet1Remote', Enabled: true, Severity: 2, Variable: RSSILevel_warning_INet1Remo
te, Type: PnCategory, Object: Production <Production>, Default: -82, Custom: -80
Upgrade completed successfully
```

The upgrade service requires the following command line parameters:

The hostname or IP address of the existing GE PulseNET 3.x server, the GE PulseNET 3.x web server port number (8080 or 8443), whether the GE PulseNET 3.x web server is using HTTPS/SSL encryption (true or false), and the username/password for the administrative user.

If the upgrade service reports any error messages, the GE MDS Support team can troubleshoot them using the GE PulseNET 4.5 log files.



Upgrading from GE PulseNET 4.x or 5.x

Customers with an existing GE MDS PulseNET 4.x environment should obtain the GE MDS PulseNET upgrade file, which is delivered as a ZIP or TAR archive containing new software and logic. To upgrade an existing GE MDS PulseNET 4.x environment, extract the files from the archive and follow the steps below.

Take note of the path to the GE MDS PulseNET home directory as well as the path to the GE MDS PulseNET upgrade package. It is best to use full path specifications rather than relative paths in order to avoid potential issues during the upgrade.

Upgrade Instructions

1. On Windows, open a command window as the Administrator user. On Linux, open a terminal window using the account that was used when the installed GE MDS PulseNET.
2. Navigate to the extracted directory, and then navigate to the bin directory. In the example below, the path was

C:\Downloads\pulsenet-5.X-update-installer\bin

3. Execute `install.bat` or `install.sh` after entering the full path to the GE MDS PulseNET home directory as well as the path to the GE MDS PulseNET upgrade package as command line arguments.

> `install.bat C:\GE_MDS\PulseNET C:\Downloads\pulsenet-5.X-update-installer\pulsenet-5.X-update.pn`

4. The command line installer should start, validate the required licenses, import any json files, stop the existing GE MDS PulseNET services, install the new code, restart GE MDS PulseNET services, and provide feedback on the success of the upgrade (as shown on the next page).

If experiencing any issues, contact **GE MDS PulseNET Support** for assistance.

```
Starting Command-line Installer
Validating required license: PulseNET
Importing json files
Stopping server
.....
Installing files
Starting server
Installation completed successfully
Press any key to continue . . .
```

5. Log into the GE MDS PulseNET web interface and check the **About** box to verify the new version number.



Upgrading a Multi-Server/HA System

Customers with an existing GE MDS PulseNET Multi-Server/High Availability environment should obtain the GE MDS PulseNET upgrade file, which is delivered as a ZIP or TAR archive containing new software and logic. To upgrade an existing GE MDS PulseNET environment, extract the files from the archive and follow the steps below. If running a single standalone server and wish to convert to a HA/Multi-Server environment, a fresh install will be required. Contact GE support for more information.

Take note of the path to the GE MDS PulseNET home directory as well as the path to the GE MDS PulseNET upgrade package. It is best to use full path specifications rather than relative paths in order to avoid potential issues during the upgrade.

Multi-Server/HA Upgrades must be run on the Primary Database server first, however, the services on the Primary Application server must be running to verify license during this step, so leave all HA instance services running.

Upgrade Order

- Primary Database
- Secondary Database
- Primary Application
- Secondary Application

Upgrade Instructions

1. On the Primary Database server - In Windows, open a command window as the Administrator user. On Linux, open a terminal window using the account that was used to install GE MDS PulseNET.
2. Shutdown the primary and secondary servers by navigating to the directory <pulsenet_home> (GE_MDS\PulseNET) and executing the stop.bat or stop.sh file that is applicable for the operating system.
3. Navigate to the extracted directory, and then navigate to the bin directory. In the example below, the path was
C:\Downloads\pulsenet-5.x-update-installer\bin
4. Execute **install.bat** or **install.sh** after entering the full path to the GE MDS PulseNET home directory as well as the path to the GE MDS PulseNET upgrade package as command line arguments.
> install.bat C:\GE_MDS\PulseNET ↓
C:\Downloads\pulsenet-5.x-update-installer\pulsenet-5.x-update.pn
Note: When upgrading to 5.x from 4.x a new license will be required. Contact GE MDS PulseNET Support.
5. The command line installer process will start, validate the required licenses, import any json files, stop the existing GE MDS PulseNET services, install the new code, restart GE MDS PulseNET services, and provide feedback on the success of the upgrade (as shown on the next page).



```
Starting Command-line Installer
Validating required licenses: [PulseNET, PulseNET Enterprise]
Importing json files
Stopping server
.....
Installing files
Starting server
Installation completed successfully
Press any key to continue . . .
```

6. Log into the GE MDS PulseNET web interface and check the **About** box to verify the new version number.
7. Repeat Steps 1-6 on the Secondary Database machine - then proceed to upgrade the Primary and Secondary Application servers.

See [Starting GE MDS PulseNET Manually](#) for instructions on restarting the primary and secondary servers. If experiencing issues, contact **GE MDS PulseNET Support** for assistance.

Operating System Patch - Safe Order to Disable HA Service

The GE PulseNET HA upgrades must be performed with the services running, but it is best practice to shut down the HA instance prior to patching/upgrading the OS, etc...This section describes the safe order to shut down all HA instances prior to an OS patch.

Stopping HA Configuration for OS patching:

1. First, stop the secondary application server using the stop.bat script.
2. Next, stop the primary application server using the stop.bat .
3. Then stop the secondary database using the stop.bat .
4. Finally, stop the primary database server using the stop.bat .
(During steps 3-4 **stingmongo-log** may not stop, it is safe to manually end this process to make the service stop if needed.)

Starting HA Configuration for OS patching:

1. Start Primary Database server using start.bat
2. Start Secondary Database server using start.bat
3. Start Primary Application server using start.bat
4. Start Secondary Application server using start.bat

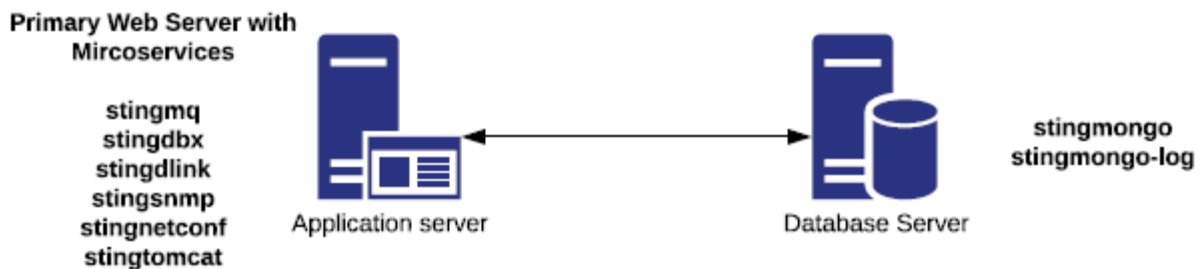


Notes:

- All .bat scripts mentioned above can be found in the **GE_MDS\PulseNET** directory.
- All PulseNET services start with sting* prefix.
- In the main PulseNET folder is a checkprocesses.bat - this script will check the status of the services.
- If the following error appears: "INFO: No tasks are running which match the specified criteria" - it means that the service we are trying to check doesn't exist on the system or the service is stopped.
- There is a disable.bat script that will disable the services to prevent them from starting up. **If multiple restarts** are required, use this.
- If using the disable.bat script, ensure that the enable.bat is run when done with patching.

Appendix 1 - Two Server, External Database

2 PulseNET Server Option



Appendix 2 - Three Server, High Availability

3 PulseNET Server Option

Primary Web Server with
Microservices and
Database

stingtomcat
stingmq
stingdbx
stingdlink
stingsnmp
stingnetconf
stingmongo
stingmongo-log



Application server
with database



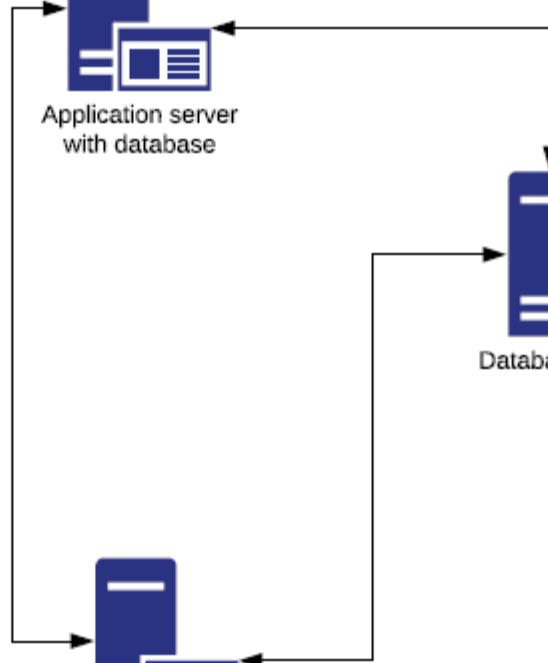
stingmongo
(Arbiter)
Database Server

Secondary Web Server
with Microservices and
Database

stingtomcat
stingmq
stingdbx
stingdlink
stingsnmp
stingnetconf
stingmongo
stingmongo-log



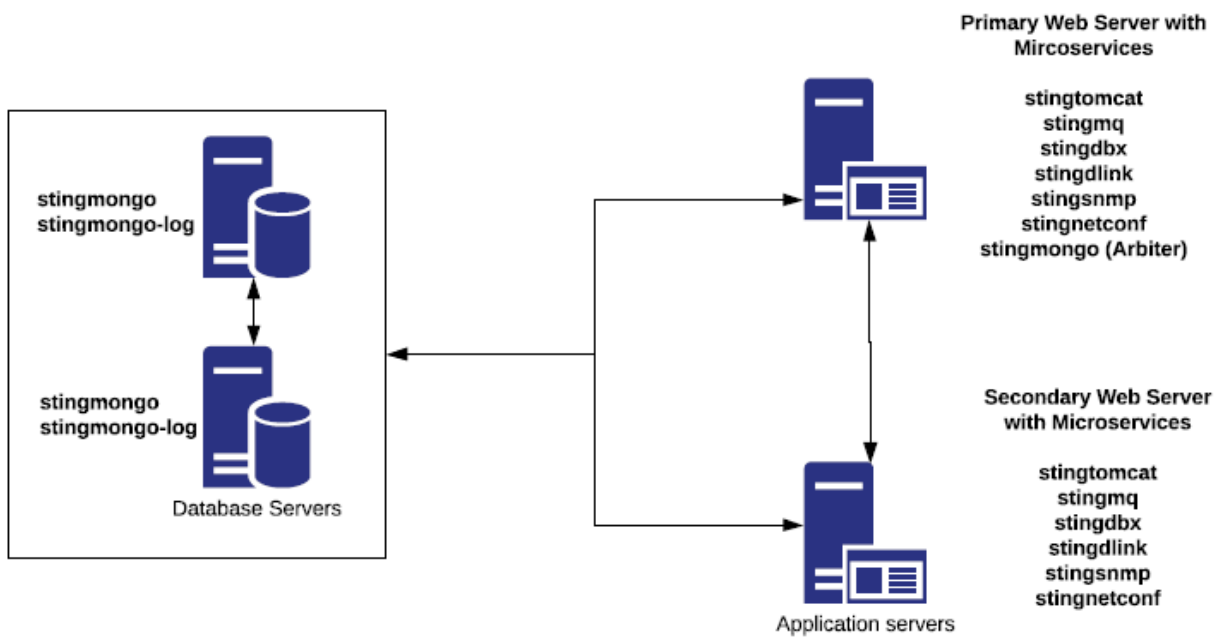
Application server
with database



Appendix 3 - Four Server, High Availability

Note: for full redundancy one of the database servers or Arbiter Server (shown below on Primary Web Server) must be at a different physical location.

4 PulseNET Server Option Redundant Database



Appendix 4 - Java Install

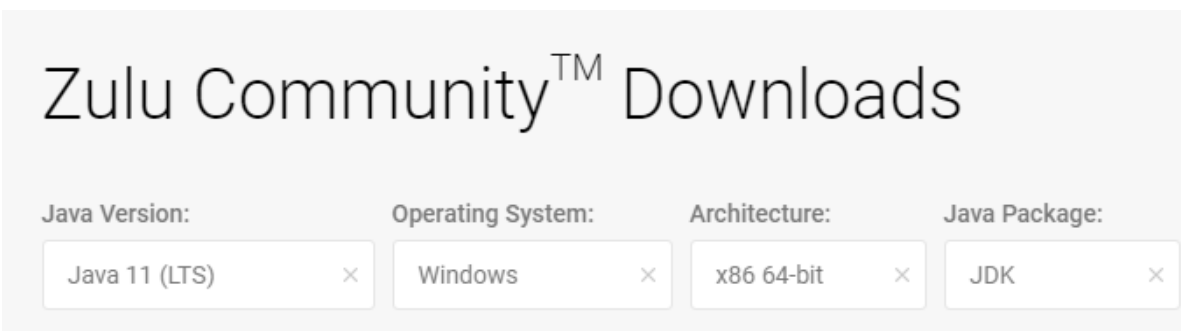
When executing the installation program, a message may appear if the server does not have a minimum Java version:



Click OK and go to the site to download Java



Select Java 11 LTS from the drop down menu.
Select the Operating System Windows (64-bit) or Linux (64-bit)
Select JDK



Choose the .msi file



Java 11 (LTS)			
11.0.7+10 Zulu: 11.39.15 Latest	Windows 2008r2 or later	x86 64-bit	JDK

Run the downloaded .msi file and walk through the install.



About GE MDS

Over two decades ago GE MDS began building radios for business-critical applications. Since then we have installed millions of radios in countries across the globe. We overcame impassable terrain, brutal operating conditions, and complex network configurations to succeed. We also became experts in wireless communication standards and applications worldwide. The result of our efforts is that today thousands of organizations around the world rely on GE MDS wireless networks to manage their critical assets.

The majority of GE MDS radios deployed since 1985 are still installed and performing within our customers' wireless networks. That's because we design and manufacture our products in-house, according to ISO 9001, which allows us to meet stringent global quality standards.

Thanks to our durable products and comprehensive solutions, GE MDS is the wireless leader in industrial automation—including oil and gas production and transportation, water/wastewater treatment, supply, and transportation, electric transmission and distribution, and many other applications. GE MDS is also at the forefront of wireless communications for private and public infrastructure and online transaction processing. As your wireless needs change, you can continue to expect more from GE MDS. We'll always put the performance of your network above all.

GE MDS ISO 9001 Registration

GE MDS adheres to the internationally-accepted ISO 9001 quality system standard.

To GE Customers

We appreciate your patronage. You are our business. We promise to serve and anticipate your needs. We will strive to give you solutions that are cost effective, innovative, reliable and of the highest quality possible. We promise to engage in a relationship that is forthright and ethical, one that builds confidence and trust. Data sheets, frequently asked questions, application notes, firmware upgrades and other updated information is available on the GE MDS Web site.

Manual Revision and Accuracy

This manual was prepared to cover a specific version of our product. Accordingly, some screens and features may differ from the actual version you are using. While every reasonable effort has been made to ensure the accuracy of this guide, product improvements may also result in minor differences between the manual and the product shipped to you. If you have additional questions or need an exact specification for a product, please contact our Customer Service Team using the information below. In addition, manual updates can often be found on the GE MDS Web site.

About End 2 End Technologies

End 2 End (E2E) Technologies offers a unique combination of wireless communications and information technology expertise. We improve efficiency, reduce risk and lower the cost of industrial field operations via modernization and management of our customer's wireless communications networks. From initial planning through lifecycle support we assist your team in adopting a wireless solution that keeps communication costs low while maximizing network reliability and performance. For more information visit us at www.e2etechinc.com.

Customer Support

If you have problems, comments, or questions pertaining to the GE MDS PulseNET application, please contact GE MDS via one of the methods below.

Phone: 585-241-5510

Email: gemds.techsupport@ge.com

Fax: 585-242-8369

License Credits

GE MDS PulseNET contains several third party components. Please refer to the complete list of these components at: e2etechinc.com/pages/legal.

