

ADVANTAGE PLUS™

Endoscope Reprocessing System | Instructions



Networking

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This document covers connection of the ADVANTAGE PLUS™ Endoscope Reprocessor and ADVANTAGE PLUS™ Pass-Thru Endoscope Reprocessor to a local area network, including component variations and benefits of each variation. Information for network connectivity for both reprocessor models is identical. For documentation purposes, images of the ADVANTAGE PLUS Reprocessor will be used in all illustrations.

CONTENTS

Introduction	3
Network Connection Features	4
Network Options	5
Stand-Alone.....	5
Network Version 1.....	6
Network Version 2.....	6
Network Version 3.....	7
Network Version 4.....	7
Network Version 5.....	8
Central Server Info.....	9
Central Server Minimum Specs.....	9
Additional Information	10
ADVANTAGE PLUS Reprocessor PC Hardware / Software	10
Placing the ADVANTAGE PLUS Reprocessor on Your Network.....	11

INTRODUCTION

ADVANTAGE PLUS Reprocessors running WES7 (Microsoft® Windows Embedded Standard) and Microsoft® Windows 7 Ultimate operating systems are covered by this document.

- LIO software is installed for the current default user. User changes will affect the operation of the software.
- In the default configuration, LIO software and Microsoft® SQL Server run locally; i.e. LIO software and Microsoft SQL both run on the same computer.
- Network connectivity is not required to operate the ADVANTAGE PLUS Reprocessor.

Connecting the ADVANTAGE PLUS Reprocessor PC to the local area network allows implementation of additional features, including:

- Microsoft SQL database backup off-machine.
- Ability to print cycle reports to a network printer.
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- Connectivity with other Medivators devices / systems.
- BeyondTrust remote access.
- Ability to convert from local Microsoft SQL to Central Server.

NETWORK CONNECTION FEATURES

Microsoft® SQL Database Backup

The Microsoft® SQL databases are by default located on the local hard drives in a RAID1 configuration. Data is simultaneously written to both drives. The primary function of the RAID is to ensure that the operating system will continue to run if one of the RAID drives fail. The RAID1 configuration cannot be viewed as a database backup because failure of both hard drives may result in the loss of the database files. To properly backup the databases, they must be saved off-machine on a regular basis. In the event of a catastrophic hardware failure and the databases cannot be recovered from the local hard drives, data can be restored from the off-machine backup with a minimum of data loss.

Reporting Functions

On a non-networked machine, the nurse manager must literally be in front of the ADVANTAGE PLUS™ Reprocessor to use the Management program to export report data or to update endoscope and user lists. With a network connection and implementation of Central Server, these functions can be performed from an office setting using another PC on the same local area network as the ADVANTAGE PLUS Reprocessor.

Cycle Reports to Network Printer

If automatic printing of reprocessing cycle reports is desired, non-networked machines can make use of a local USB printer, one printer for each ADVANTAGE PLUS Reprocessor. Networking allows multiple ADVANTAGE PLUS Reprocessors to print to the same network printer, which simplifies collection of the cycle reports.

Connectivity to Other Medivators Products and Devices

Network connectivity allows the exchange of data with ENDODRY™ Storage Cabinets and the CANEXIS™ Integrated Workflow Solution.

Remote Access

In situations where the operator has questions about the operation of the software, or if there are software-related problems on a machine, the issue can often be handled without the need for an on-site visit from a Medivators field service engineer (FSE) through the use of a remote access session. This is possible only if the PC is connected to the local area network and provided with Internet connection. For domestic U.S. customers, Medivators uses BeyondTrust remote access software exclusively.

No other methods of remote access are supported by Medivators.

Central Server

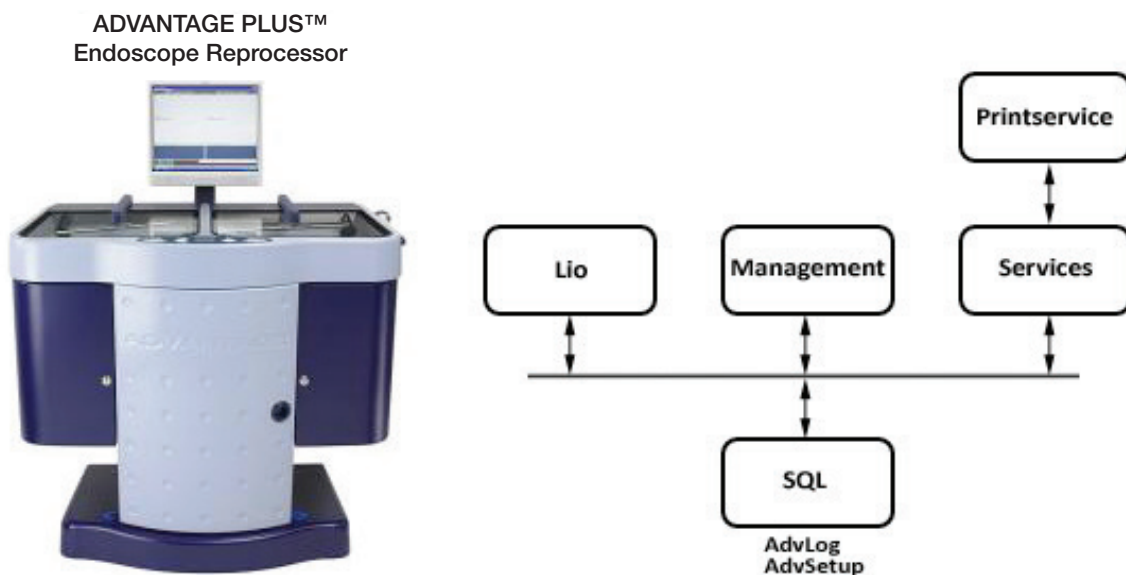
Switching the ADVANTAGE PLUS Reprocessors from local Microsoft SQL operation to Central Server Microsoft SQL operation allows multiple ADVANTAGE PLUS Reprocessors on the same local area network to operate using the same set of databases. This provides a level of database security not available to units running Microsoft SQL locally, as the databases are directly under the control of the facility IT department. Use of Central Server simplifies database backup as well as nurse manager reporting and configuration activity.

In a Central Server configuration, the facility provides hardware and software, is responsible for installation, operation, and maintenance of the server, Microsoft® SQL Server software, local area network, and databases. The Central Server option can be implemented at the time of new ADVANTAGE PLUS Reprocessor installation or after ADVANTAGE PLUS Reprocessors have been in operation for a period of time. Legacy ADVANTAGE PLUS Reprocessor Microsoft® Windows XP units are not supported for Central Server operation (WES7 upgrade is available.)

NETWORK OPTIONS

The Stand-Alone configuration is not a network option, but must be described here to understand some of the components mentioned in later sections. The ADVANTAGE PLUS™ Reprocessor is initially installed in the Stand-Alone configuration. Depending on customer requirements, the machine can then be connected to the local area network. There are 5 general network options, ranging from the most basic for database backup to the most complex which includes remote access and use of a central database server.

A. Stand-Alone



In a Stand-Alone configuration, the ADVANTAGE PLUS Reprocessor does not communicate with any other device. A simple block diagram of the LIO software and its relationship to Microsoft® SQL is shown above.

- LIO is the reprocessing program and must always run locally.
- Management is used for reporting purposes, endoscope and user list administration, and machine configuration. In the Stand-Alone configuration, Management runs locally.
- Services moves data between Microsoft SQL and Printservice for automatic cycle report printing. Services and Printservice must always run locally. Automatic cycle report printing is optional.
- Microsoft® Sequel Server is the database application. Microsoft SQL runs locally, supporting three ADVANTAGE PLUS Reprocessor databases:

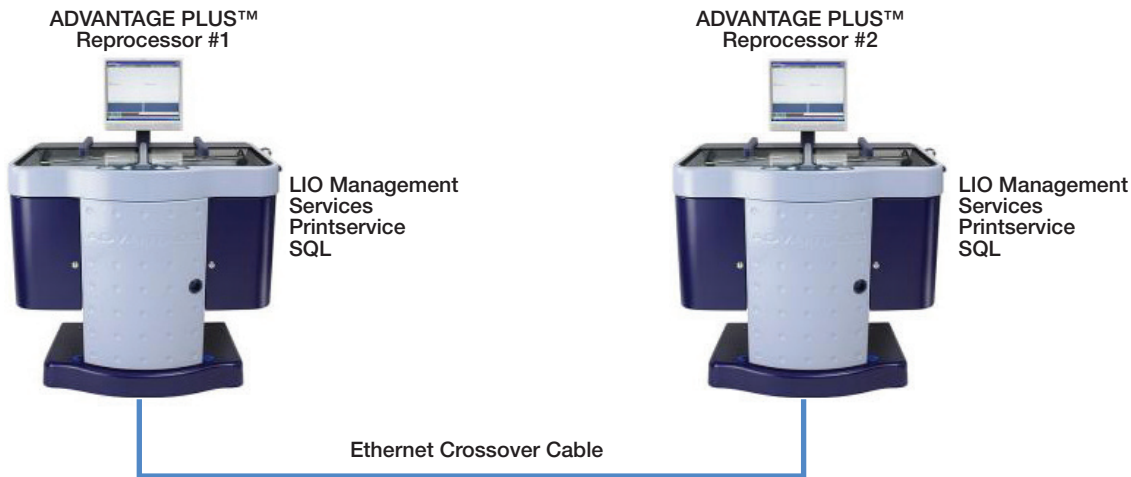
AdvLog: Cycle and Event report database.

AdvSetup: Endoscope, User, Physician, Parameter Set and System database.

AdvArchive: Empty database, not used in normal operation.

- For reporting purposes and Microsoft SQL database backup, a flash drive must be connected to the ADVANTAGE PLUS Reprocessor PC and the data manually saved to the flash drive. The flash drive is then disconnected from the PC and the data is used as required by the nurse manager on a workstation PC.
- If the Microsoft® Windows operating system requires reimaging, the databases will be recovered from the hard drives, then restored following reimaging. Database restoration from the hard drives results in no data loss, and is successful in the vast majority of cases.
- If database recovery from the hard drives is not possible and an off-machine database backup does not exist, the configuration data and cycle history is lost, and the ADVANTAGE PLUS Reprocessor must be manually reconfigured.
- Remote access is not possible in a Stand-Alone configuration.

B. Network Option 1

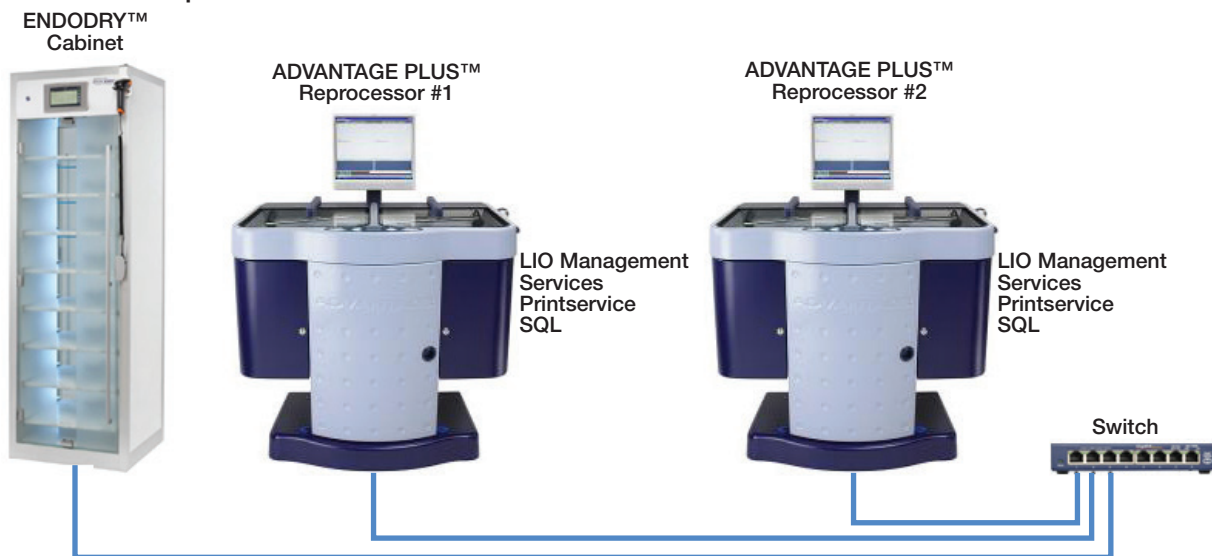


Connecting an Ethernet crossover cable between two ADVANTAGE PLUS™ Reprocessor PC's is the most basic form of network.

- Databases may be automatically backed up from one ADVANTAGE PLUS Reprocessor PC to another.
- No other resources are shared.
- ADVANTAGE PLUS Reprocessor computers are not connected to the facility network.

Theoretically, one ADVANTAGE PLUS Reprocessor could function as a Central Server, housing the databases for both machines. However, this configuration is not supported because the ADVANTAGE PLUS Reprocessor PC is designed to control a single machine, and the addition of Microsoft® SQL-related duties from other machines pushes the PC beyond the limits for which it was tested. In addition, if the primary ADVANTAGE PLUS Reprocessor PC is not functional for some reason, the secondary machine would not function due to loss of database connection.

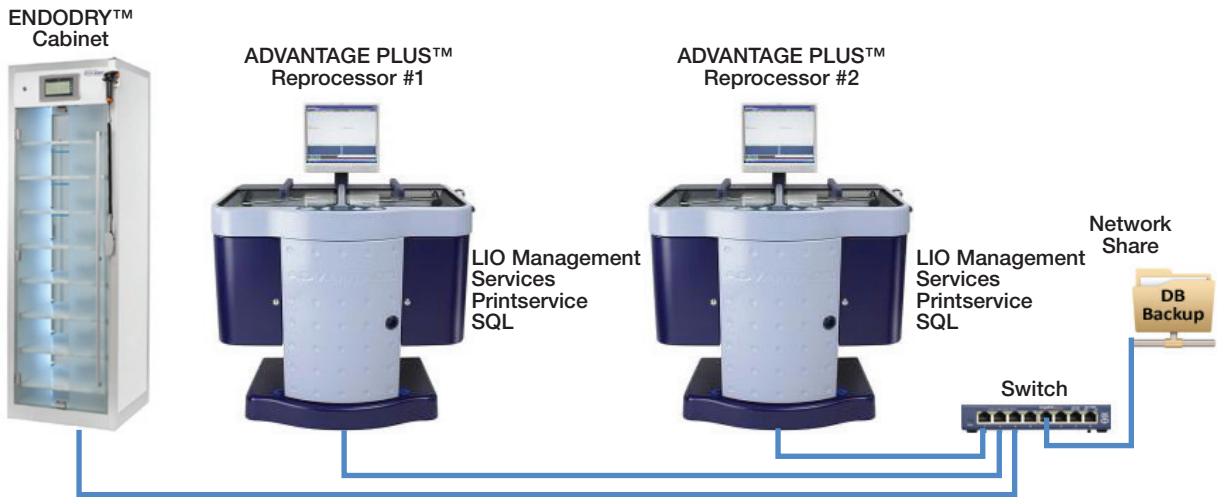
C. Network Option 2



Connecting ADVANTAGE PLUS Reprocessors via a network switch allows connection between multiple machines.

- ADVANTAGE PLUS™ Reprocessor databases may be automatically backed up from one ADVANTAGE PLUS Reprocessor to another.
- ENDODRY™ Cabinet may communicate with the Microsoft SQL database on one ADVANTAGE PLUS Reprocessor.
- A ADVANTAGE PLUS Reprocessor may run endoSTOREManager, CERHost, and FTP connect applications for remote ENDODRY Cabinet administration.

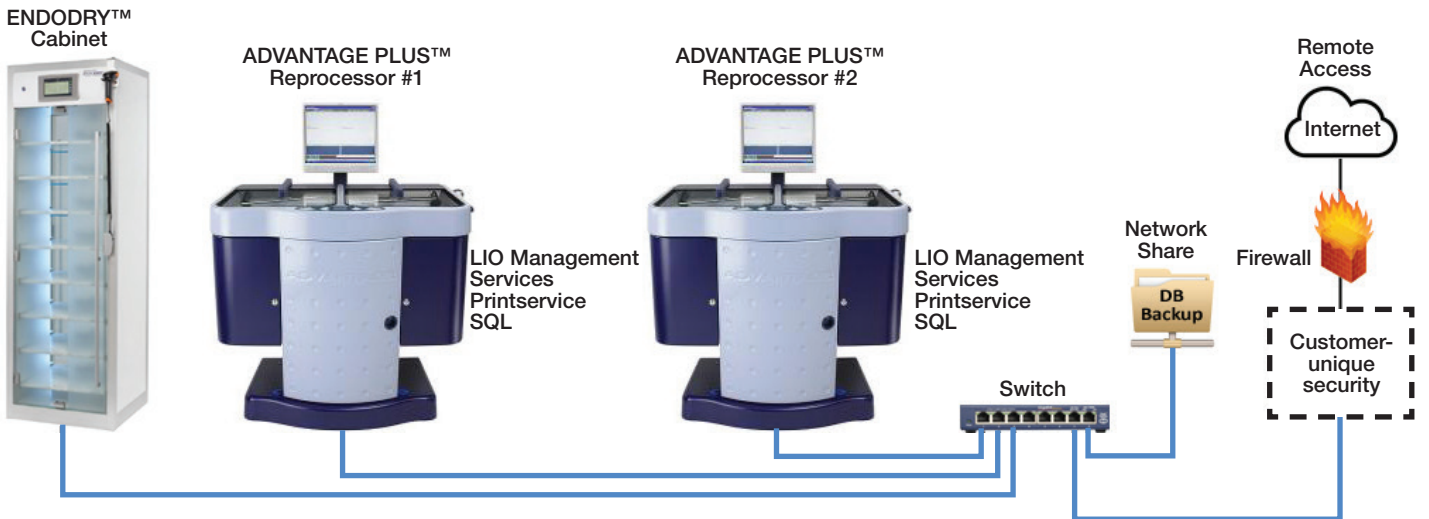
D. Network Option 3



In this configuration, the Medivators devices are incorporated into the facility network, primarily to back up the databases to a network share.

- ADVANTAGE PLUS™ Reprocessor databases may be automatically backed up to a network share, a destination on the local area network made available by the facility IT department. Microsoft® SQL Backup and FTP software is included on the ADVANTAGE PLUS Reprocessor PC for this purpose. Network authentication is required for access to the share.
- ADVANTAGE PLUS Reprocessor PC IP addresses are DHCP by default, but may be fixed, reserved, or DHCP, under control of the facility DHCP server.
- Medivators does not equip the ADVANTAGE PLUS Reprocessor PC with a wireless network adapter, and use of a wireless NIC is not supported. Wireless network connections can be problematic and typically reduce the reliability of the machine.
- Additional information related to joining the ADVANTAGE PLUS Reprocessor to the local area network is found later in this document in the *Additional Information* section.

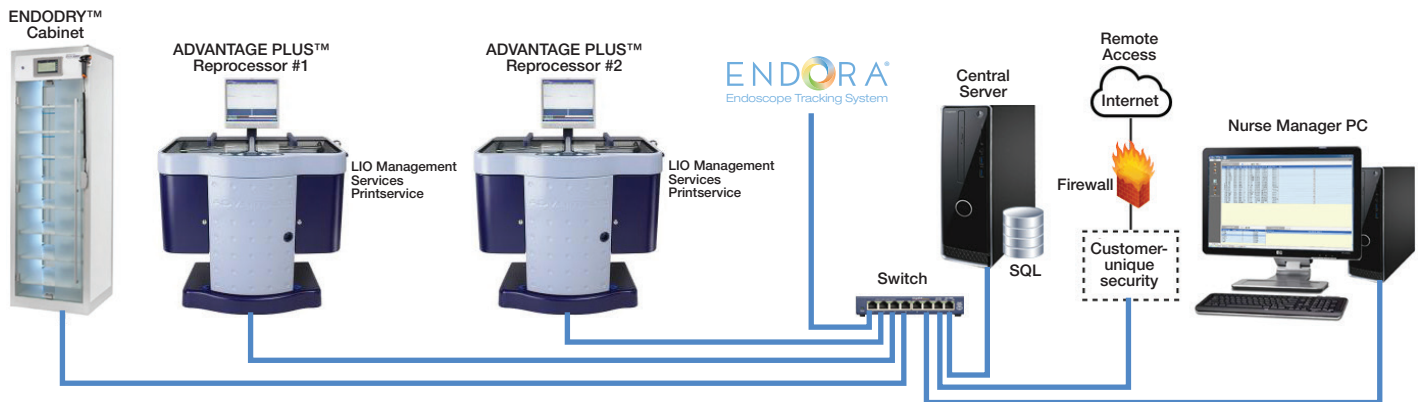
E. Network Option 4



This configuration adds one item to the Option 3 configuration: Internet connection for BeyondTrust remote access. Remote access allows a Medivators Technical Support Representative to connect to the PC to assist the operator with LIO-related questions, to troubleshoot problems, or to install Medivators software updates.

An Internet connection for remote access requires that the facility IT department implement security as they see fit. See *Additional Information* section for more information.

F. Network Option 5



This option requires major software and hardware configuration changes for the implementation of Central Server.

A server has been added to the illustration, replacing the network share which was used for database backup. In this configuration, the local ADVANTAGE PLUS™ Reprocessor databases have been merged and attached at the Central Server. The active ADVANTAGE PLUS Reprocessor databases are no longer local. Benefits of Central Server include:

- Databases are under direct control of the facility IT department, and are subject to the same control and security as all facility-maintained data.
- The facility IT department may backup the databases using any method of their choosing.
- In case of a ADVANTAGE PLUS Reprocessor Microsoft® Windows crash or hardware failure, the databases are not at risk since the active database files are not local.
- The nurse manager performs ADVANTAGE PLUS Reprocessor reporting and administration functions from an office workstation. Changes to the master endoscope and user lists are immediately available at all ADVANTAGE PLUS Reprocessors.
- The CANEXIS™ Endoscope Tracking System monitors endoscope-related activity via Microsoft® SQL connection to the server. More information on the CANEXIS Endoscope Tracking System is available upon request.

CENTRAL SERVER INFO

With proper planning, Medivators ADVANTAGE PLUS™ Reprocessors can be configured for Central Server operation at initial installation. Existing ADVANTAGE PLUS Reprocessors that have months or years of data in local databases may be converted to Central Server with the assistance of Medivators Technical Support. Additional documentation covering Central Server configuration is available from Medivators.

- From the ADVANTAGE PLUS Reprocessor point of view, there is no definitive limit to the number of ADVANTAGE PLUS Reprocessors that can be connected to the same Microsoft® SQL databases. That limitation lies with the resources available to Microsoft SQL.
- Microsoft® SQL Server 2012 (or more current) on the Central Server PC is required to ensure compatibility with the ADVANTAGE PLUS Reprocessor databases.
- The customer is responsible for installation, operation, and maintenance of the server PC, Microsoft SQL Server software, databases, and the local area network.
- Microsoft SQL Central Server or network-related problems will result in the ADVANTAGE PLUS Reprocessors being non-functional until the problems are resolved.
- ADVANTAGE PLUS Reprocessor warranty and contract coverage does not extend to the Central Server.
- ADVANTAGE PLUS Reprocessors running Microsoft® Windows XP are not supported for Central Server configuration (WES7 upgrade is available).

CENTRAL SERVER MINIMUM SPECIFICATIONS

The Central Server PC and Microsoft SQL instance are provided and maintained by the customer.

- Microsoft SQL Server 2012 or newer.
- Microsoft SQL may be 32- or 64-bit.
- Microsoft SQL may run on a physical or virtual server.
- Microsoft SQL may have a named or unnamed instance.
- 50GB database storage (typical ADVANTAGE PLUS Reprocessor database growth is approximately 400MB / ADVANTAGE PLUS Reprocessor / year).
- A fixed or reserved IP address is required for persistent operation.
- Wireless networking is not supported.

ADDITIONAL INFORMATION

A. ADVANTAGE PLUS™ Reprocessor PC Hardware/Software

The system consists of an onboard PC running Microsoft® Windows 7 and Medivators software.

- **Computer** Proprietary PC with mini ITX motherboard and Intel processor. PC is physically connected to the frame of the ADVANTAGE PLUS™ Reprocessor. Current production PC: 4GB RAM; (1) RJ45 Ethernet port.
- **Printer** Epson TM-U220 USB printer is an optional accessory. The Epson printer driver software is pre-installed. Use of a customer-supplied network printer is allowed; the customer is responsible for software, hardware, and network support.
- **Antivirus software** Microsoft® Security Essentials is installed by default. The customer may uninstall MSE and install antivirus software of their choice. Updates should be rolled out on a schedule that does not conflict with the running of reprocessing cycles. CPU usage should be monitored if third-party antivirus software is installed.
- **Operating system** Microsoft® Windows Embedded Standard 7.
- **Proprietary software** ADVANTAGE PLUS Reprocessor LIO, including Management software for configuration and reporting. LIO is installed for the current administrative user. Software upgrades are not automatically performed by Medivators.
- **Database software** Microsoft® SQL Server 2012 Express.
- **Data encryption** Not supported.
- **PHI** The ADVANTAGE PLUS Reprocessor optionally saves the Patient ID in the database along with the associated reprocessing cycle information. Viewed independently, the data contains no sensitive information, but some customers view any type of patient-related data as protected health information.
- **LAN adapter** On-board NIC with dynamic addressing. Fixed or reserved addressing may be used. Wireless networking is not supported.
- **Ports used**
 - LAN Connection - TCP - Port 49159 - Inbound/outbound
 - UDP - Port 1434 - Inbound/outbound
- **Remote access** BeyondTrust remote access is available for domestic U.S. customers.
- **Microsoft® Windows updates** Automatic Microsoft® Windows updates are turned off by default. If enabled on the local machine, automatic updates can cause a significant decrease in PC performance, and may trigger a Microsoft Windows restart while the Medivators application is in use. The facility IT department is ultimately responsible for updates, and may roll out patches via WSUS (or similar) as long as the process does not initiate a restart during a reprocessing cycle or during scheduled maintenance events.
- **Database backup** Microsoft® SQL Backup and FTP is installed on the PC for automatic scheduled backup of local Microsoft SQL databases.

B. Placing the ADVANTAGE PLUS™ Reprocessor on Your Network

- The ADVANTAGE PLUS™ Reprocessor PC uses DHCP by default. You may configure for reserved or fixed IP address.
- If possible, use the default Microsoft® Windows local account (the ADV user for current machines). This is an Admin user, and the LIO software is installed for the current user only. Running LIO under a new user requires the LIO configuration to be migrated to the new user. Use of a VLAN is beneficial since it allows the use of the default user account without domain restrictions. If you must run LIO under a new user, contact Medivators Technical Support for information.
- The ADVANTAGE PLUS Reprocessor PC is not Active Directory-ready; the computer should not be managed as though it were a workstation with multiple users, each with their own Microsoft Windows logon. Security-related restrictions typically employed for multiple user workstations may negatively impact the operation of the software.
- You may uninstall Microsoft® Security Essentials (MSE) and install the antivirus software of your choice. Schedule for virus definition updates during off-hours, with no restart. Some antivirus programs can cause heavy CPU usage. Monitor the CPU usage to verify normal operation: 10% or less CPU usage when the machine is idle.
- Turn off Microsoft Windows automatic updates, or choose to install during off-hours. Allowing Microsoft control of automatic updates can cause the system to become unresponsive to commands and may become basically unusable.
- Create an exception for the C:\Medivators and C:\Program Files\ADV folders. These folders contain utilities related to the operation of the Medivators LIO software. The ADV folder is the working folder for LIO software. Some antivirus programs may flag files in these folders for quarantine or deletion. All files present on the device have passed Medivators qualification protocol.


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